The steep decline in populations of eels (*Anguilla* spp.) endangers the immediate future of these legendary fish. With less than 1% of major juvenile resources remaining, precautionary action must be taken immediately to sustain the stocks.

Eels are curious animals. Despite decades of scientific research, crucial aspects of their biology remain a mystery. In recent decades, juvenile abundance has declined dramatically (Figure 1): by 99% for the European eel (*A. anguilla*) and by 80% for the Japanese eel (*A. japonica*). Recruitment of American eel (*A. rostrata*) to Lake Ontario, near the species’ northern limit, has virtually ceased. Other eel species also show indications of decline. The causes of the downward trends are yet unclear, in part due to the catadromous life history of these fishes, which has so far made it impossible to observe their spawning adults in the open ocean. Because of this, the annual spawning stocks of eels that successfully complete the long migration to their spawning areas have never been assessed. The lack of access to basic life history information about the oceanic phase of eels makes it especially difficult to monitor and identify the cause of their population declines. This is in distinct contrast with other declining fishes such as anadromous salmon, whose spawning adults can be relatively easily surveyed when they return to freshwater to spawn, and Atlantic cod, which spawn relatively close to continental margins and can be surveyed by standard fishery techniques. In the case of eels, which depend on freshwater and estuarine habitats for their juvenile growth phase, anthropogenic impacts (e.g., pollution, habitat loss and migration barriers, fishery) are considerable and may well have been instrumental in prompting these declines. Loss of eel resources will represent a loss of biodiversity but will also have considerable impact on socioeconomics of rural areas, where eel fishing still constitutes a cultural tradition.

Research is underway to develop a comprehensive and effective restoration plan. This, however, will require time. The urgent concern is that the rate of decline necessitates swifter protective measures. As scientists in eel biology from 18 countries assembled at the International Eel Symposium 2003 organized in conjunction with the 2003 American Fisheries Society Annual Meeting in Québec, Canada, we unanimously agree that we must raise an urgent alarm now. With less than 1% of juvenile resources remaining for major populations, time is running out. Precautionary action (e.g., curtailing exploitation, safeguarding migration routes and wetlands, improving access to lost habitats) can and must be taken immediately by all parties involved and, if necessary, independently of each other. Otherwise, opportunities to protect these species and study their biology and the cause of their decline will fade along with the stocks.

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**Worldwide decline of eel resources necessitates immediate action**

**Québec Declaration of Concern**

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**Figure 1.** Time trends in juvenile abundance of the major eel stocks of the world. For *Anguilla anguilla*, the average trend of the four longest data series is shown, which trend appears to occur almost continent-wide; for *A.rostrata*, data represent recruitment to Lake Ontario; for *A.japonica*, data represent landings of glass eel in Japan.
Prepared Québec City, 14 August 2003. Submitted by the undersigned:

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For recent publicity about the decline in eel populations, see:
www.nature.com/nsu/030929/030929-1.html
www.sciencemag.org (Science Vol 302, 10 October 2003, available with subscription)
www.ices.dk/marineworld/eepl.asp

Annotated list of selected literature references documenting declines

European eel Anguilla anguilla:


ICES (International Council for the Exploration of the Sea). 2002. ICES cooperative research report No 255. Report of the ICES Advisory Committee on Fishery Management, 2002: 940-948. Upon request by the European Commission, the International Council for the Exploration of the Sea (ICES) has provided scientific advice for sustainable management of the European eel stock. ICES recommends that an international recovery plan be developed for the whole stock on an urgent basis and that exploitation and other anthropogenic mortalities be reduced to as close to zero as possible, until such a plan is agreed upon and implemented. www.ices.dk/products/cooperative.asp


American eel Anguilla rostrata:

Castonguay, M., P. V. Hodson, C. M. Couillard, M. J. Eckersley, J-D Dutil, and G. Verreault. 1994. Why is recruitment of the American eel, Anguilla rostrata, declining in the St. Lawrence River and Gulf? Canadian Journal of Fisheries and Aquatic Sciences 51:479-488. Drastic declines in juvenile American eel recruitment to the upper St. Lawrence River-Lake Ontario stock are documented. Potential causes are discussed: there is little evidence that commercial fishing and oceanic changes are the cause. Emphasizes that recruitment declines could be species-wide.

Evidence for a decline in the abundance of the American eel, Anguilla rostrata (LeSueur), in North America since the early 1980s. Dana 12:83-97.

The preponderance of data suggests a continent-wide decline in American eel abundance. There are statistically significant negative trends in Ontario, Québec, Virginia, and New York. There are no statistically significant increasing trends. Possible reasons: ocean conditions, pollution, habitat degradation, recruitment overfishing, growth overfishing, hydroelectric dams.


Casselman, J. M. 2003. Dynamics of resources of the American eel, Anguilla rostrata: declining abundance in the 1990s. Pages 255-274, chapter 18, in K. Aida, K. Tsukamoto, K. Yamauchi (eds.) Eel Biology, Springer-Verlag Tokyo. Reviews dynamics and status of American eel from prehistoric and historic times to the present, emphasizing the past 50 years. Long-term catch and scientific indices are numerous and emphasize unprecedented and dramatic declines, particularly in association with commercial harvest during the past decade throughout the entire species range. Recruitment decreases precipitously and in synchrony with catch and resource declines. Causal factors are reviewed but are inconclusive. Encourages joint management plans and reductions in human-induced mortality.

Japanese eel Anguilla japonica:
Tatsukawa, K. 2003. Eel resources in East Asia. pages 293-300 in K. Aida, K. Tsukamoto and K. Yamauchi, eds., Eel Biology, Springer-Verlag Tokyo. This paper provides an overview of existing information on time-trend in fisheries for the various life stages, and discusses causes of observed declines.


This paper provides catch data for the Japanese eel elver in Taiwan, China, Korea and Japan since 1972-1992. The catch revealed an approximately 11-year cycle with a peak in 1979 and a drastic decline in recent years. This corresponds to trends in the American (A. rostrata) and European (A. anguilla) eels. Overfishing and habitat degradation were probably the main causes of the recent declines.

New Zealand eels Anguilla australis and Anguilla dieffenbachii:
Glova, G. J., Jellyman, D. J. and Bonnett, M. L. 2001. Spatiotemporal variation in the distribution of eel (Anguilla spp.) populations in three New Zealand lowland streams. Ecology of Freshwater Fish 10:147-153. The density of small longfin eels, Anguilla dieffenbachii (< 100 mm) in three study streams was consistently lower for three years of study, indicating poor recruitment of this species. This report reviewed available data for evidence of recruitment of longfins—it included information on glass eel and elver catches and species proportions, age composition of both juvenile and adult eels, changes in abundance and size distribution of longfins; computer models were used to simulate the influence of changes in recruitment on size and age composition of populations. The report concluded that longfins are being overfished and this has significantly affected recruitment.