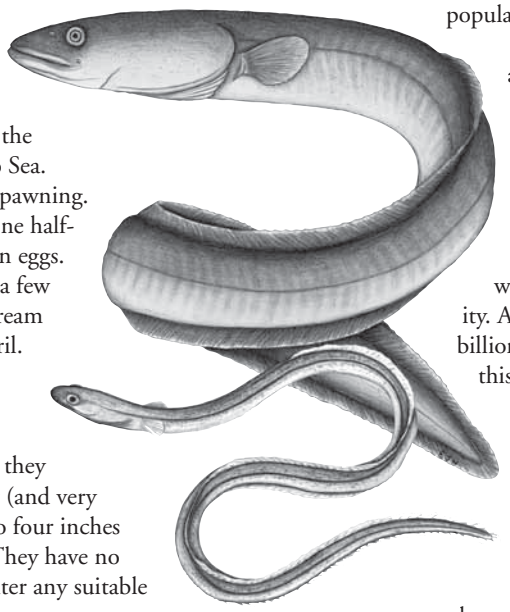
CLEARWATER
Navigator
SPRING 2006

Are Eels Victims of Global Warming?

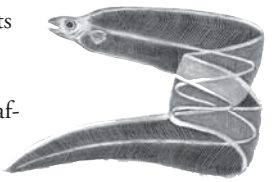
American eels (*Anguilla rostrata)* are amazing animals; it's as simple as that. They spend their lives in east coast tributaries, living up to fifty years. At some point, sometimes as early as four years, the adult yellow-phase eel gets a signal – how, and from where, no one knows. Its eyes grow large and change color. Its skin turns silver. Its body thickens, and its digestive tract begins to atrophy as it stops eating. It begins an epic voyage from its home waters, which may be as far north as Labrador and the St. Lawrence River, swimming only by night thousands of miles to an area of the North Atlantic between Bermuda and the Bahamas known as the Sargasso Sea.

No one has observed eels spawning. Female eels can produce from one half-million to more than ten million eggs. The eggs become larvae within a few days, and appear in the Gulf Stream between February and early April.

As the planktonic larvae approach the coastline and pass over the continental shelf into water less than 3,000 feet deep, they metamorphose into transparent (and very marketable) "glass eels," three to four inches long, then swim for the coast. They have no known homing instinct, and enter any suitable tributary.



Eels travel upstream into their new habitats from May through October. Once they swim into brackish water, they develop pigmentation and become known as elvers. About two years after hatching, they become yellow-phase eels, and have attained their adult configuration. Female eels grow to approximately 18" in length and inhabit freshwater habitats. Males typically reach about 11" long, and inhabit brackish habitats.



The population of *A. rostrata* has declined about 75% overall since the mid-1980s, although some areas, e.g. the Bay of Fundy, have seen increases. This decline seems to be steady and continuing. A number of factors are thought to have contributed to the decline: massive habitat loss (77%-91%); overfishing; a new invasive parasite; inadequate regulatory mechanisms; mortality at dam turbines, and contaminants.

While all of these factors certainly have an impact on eels, none of them have the requisite smoking gun of temporal correlation – all of these variables have been around for a long time, a lot longer than the eels' population decline.

There is one remaining variable that may meet the temporal correlation test: changes in ocean currents. Ocean current variations are a staple of global warming literature, and eel populations would be highly vulnerable to shifts in current width, direction, speed, or seasonality. A fairly modest change would leave billions of eel larvae adrift at sea. Could this be happening?

There are two species of eel in the Atlantic: American, and European eel (*Anguilla anguilla*). American eels spawn very close to, though somewhat to the west of European eels, and are therefore more likely to be taken by westward and northward currents. European eels are taken by currents that sweep them northwards and to the east – toward Europe. A current shift hypothesis, at its simplest, would require both populations to be impacted similarly.

And that is precisely what Castonguay *et al* (1994, cited in ASMFC 2000 and Federal Register 2005) found: a similarity in the rate of decline of both species, and of the years in which the decline began. In response to evidence of eel population decline, protective measures are being explored by scientists and government agencies. We will report on trends and new developments.

– Andre Mele

Center illustration represents the life of an American eel, from leptocephalus (at bottom) to young elver (middle) to yellow eel (top). (Mature adult silver eel and glass eel not pictured.) Illustration: Copyright Ethan Nedeau, www.biodrawversity.com.