

THREATS TO THE AMERICAN EEL: AN OVERVIEW

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My job: To set the Table for this Panel... But





Fried Eel Recipe courtesy of Bobby Flay

<http://www.foodnetwork.com/recipes/bobby-flay/fried-eel-recipe.html>

Eel Threats.... 1) Too much love?



www.cornwallseawaynews.com2818 × 1915Search by image
**St. Lawrence River Institute scientist Matt Windle gets up close
and personal with an American eel**

1a) Commercial Elvers



Image credit: http://www.nytimes.com/2012/03/30/us/in-maine-fishing-for-tiny-eels-and-big-profits.html?_r=0

Commercial Harvesting of Elvers

**Maine and South Carolina only states where fisheries are allowed.
Need has exploded since Asia markets are increasingly demanding more elvers.**

In 2013, 18,076 landings of Glass eels were report in Maine with a value of \$32,926,991

In 2015 the price of eels skyrocketed in Maine to approximately \$1,900 per pound

Commercial fishing of eels does not go unregulated in Maine.

Maine's commercial eel quota for the 2015-2017 fishing seasons is set at 9,688 pounds annually.

2) Predation: Striped bass, certain sharks...



3) Parasites

Three exotic parasites affect eels in North America.

The parasitic nematode *Anguillicoloide crassus* is the most prevalent in fresh water in America and is widely distributed in the northeast and in Maine.

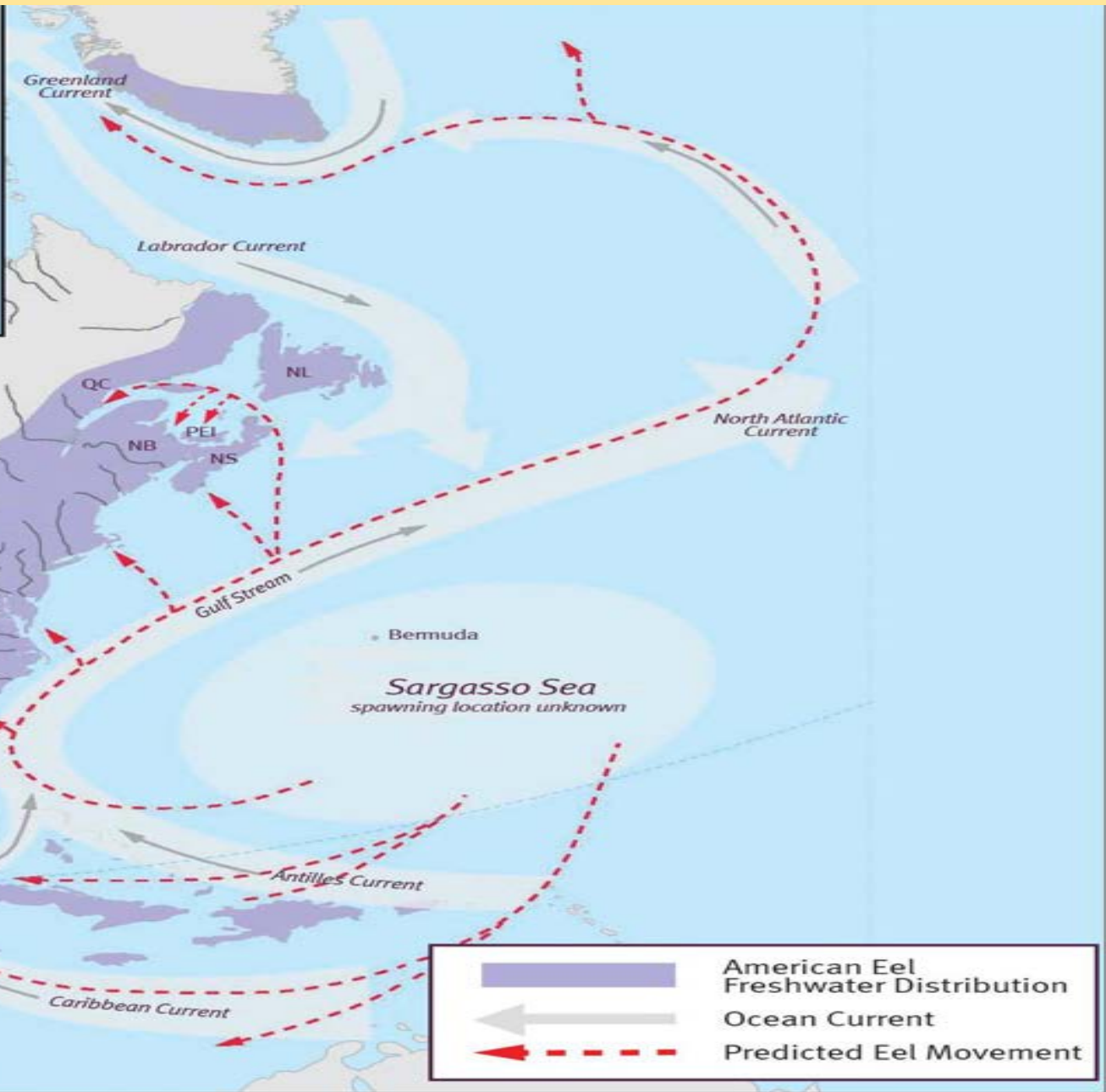
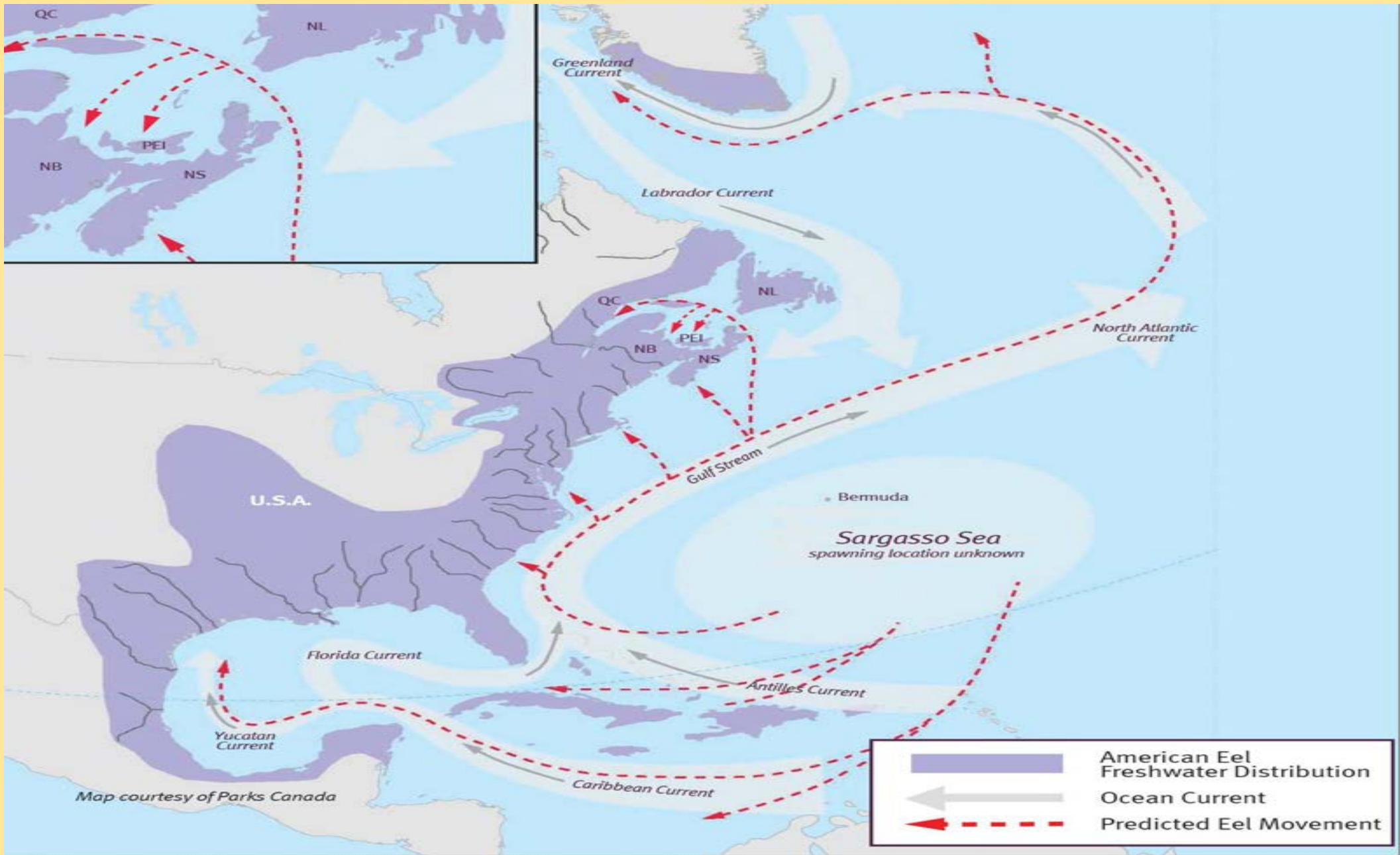
A. crassus is highly infectious and affects the swimbladder of eels. Studies indicate these parasites cause starvation, reproductive failure, and high mortality at temperatures below 4°C

Pseudodactylogyrus bini and *P. anguillae* are two other parasitic species but cause few if any problems.

Anguillicola crassus dissected from an american eel



https://en.wikipedia.org/wiki/Anguillicoloides_crassus#/media/File:Anguillicola_crassus.jpg



4) Global Warming and Climate Changes

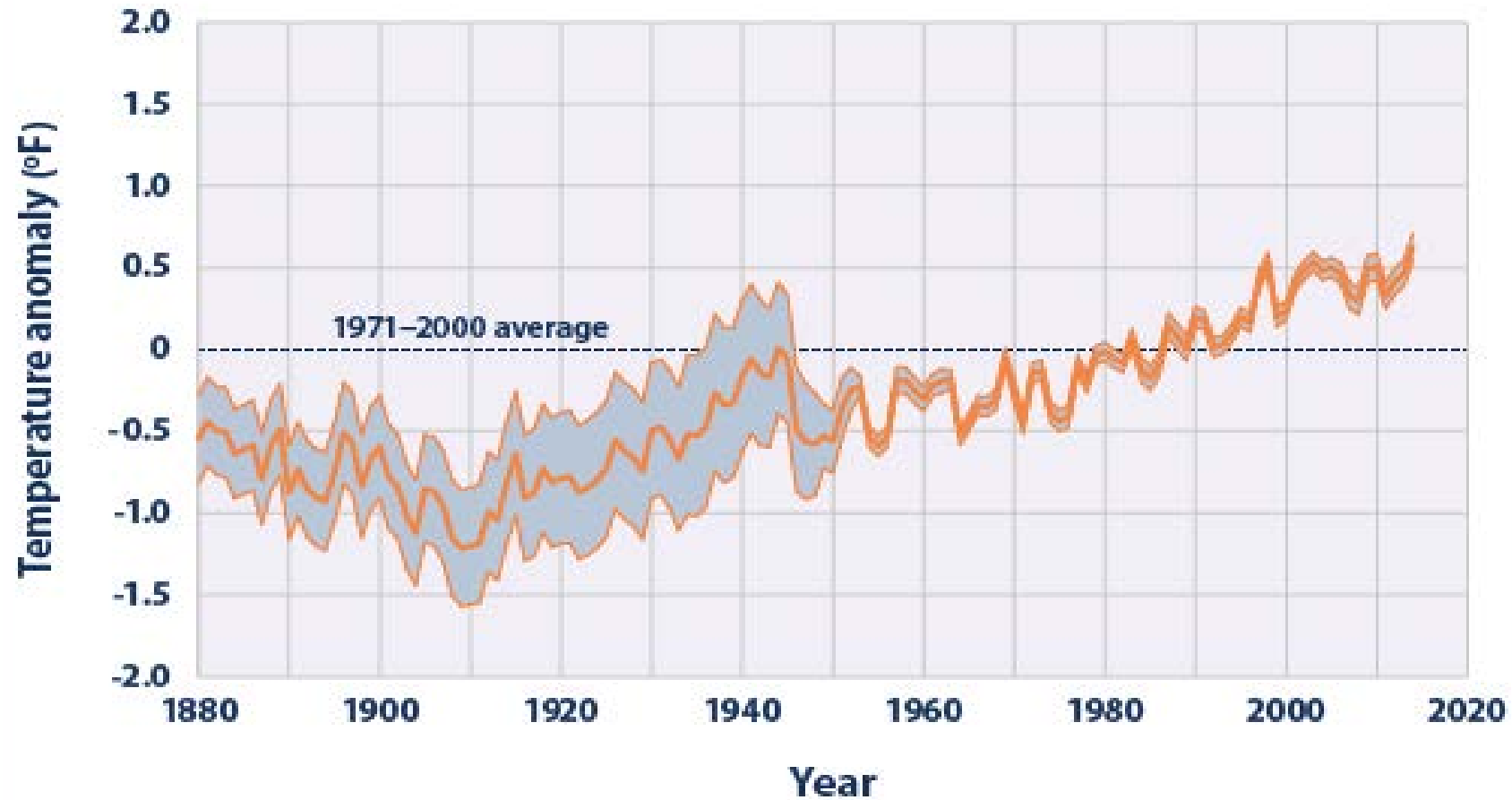
Full affects of climate change and ocean warming is not currently known and more research is needed, but may have significant impacts on eels.

Rising ocean temperatures in Sargasso Sea is affecting spawning habitats, creating habitat conditions not suitable for larval survival.

Changing ocean currents affect larval migration to favorable continental waters.

Decreasing food availability to larval eels.

Figure 1. Average Global Sea Surface Temperature, 1880–2014



Picture credit: <http://www3.epa.gov/climatechange/science/indicators/oceans/sea-surface-temp.html>

(a)

Observed globally averaged combined land and ocean surface temperature anomaly 1850–2012

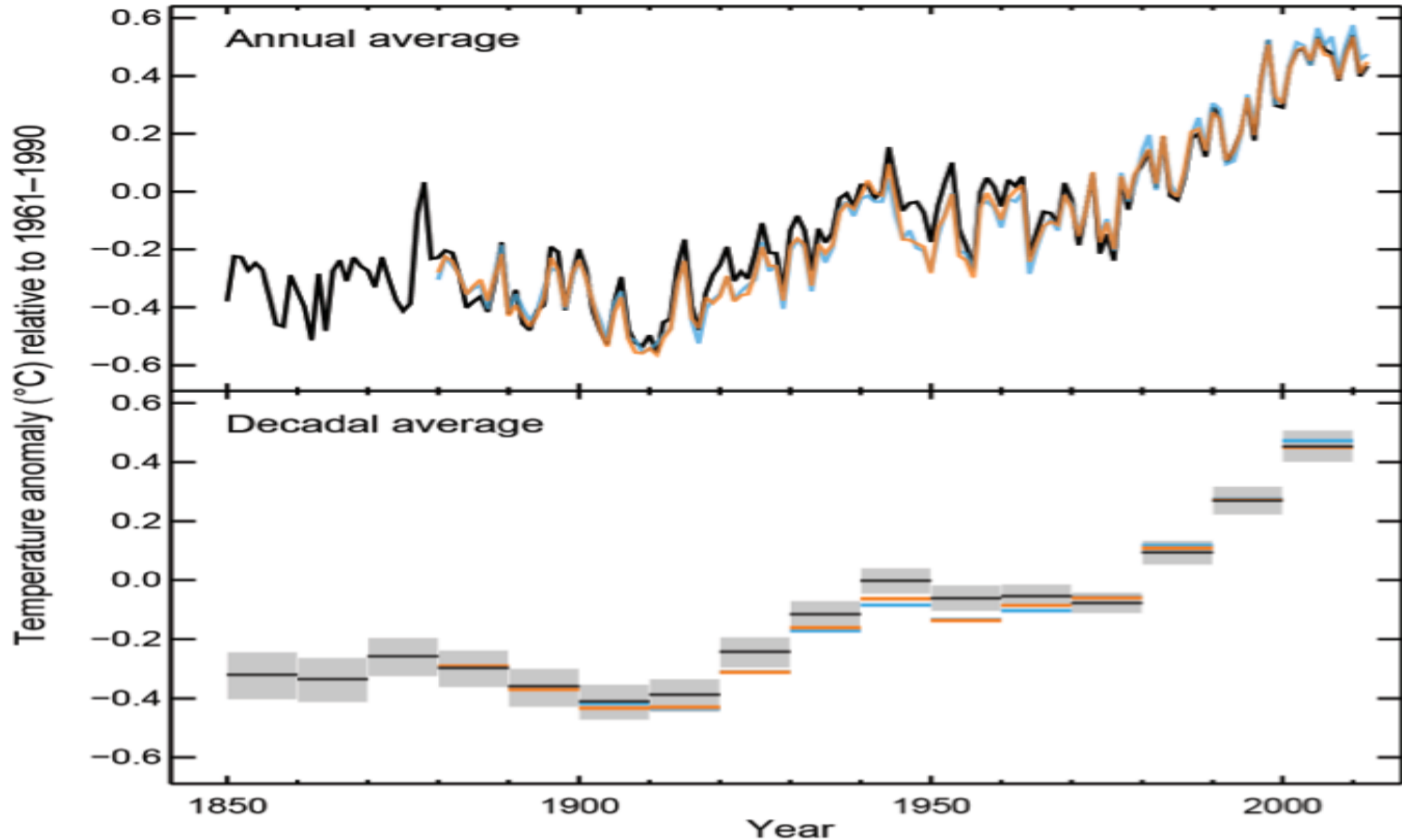
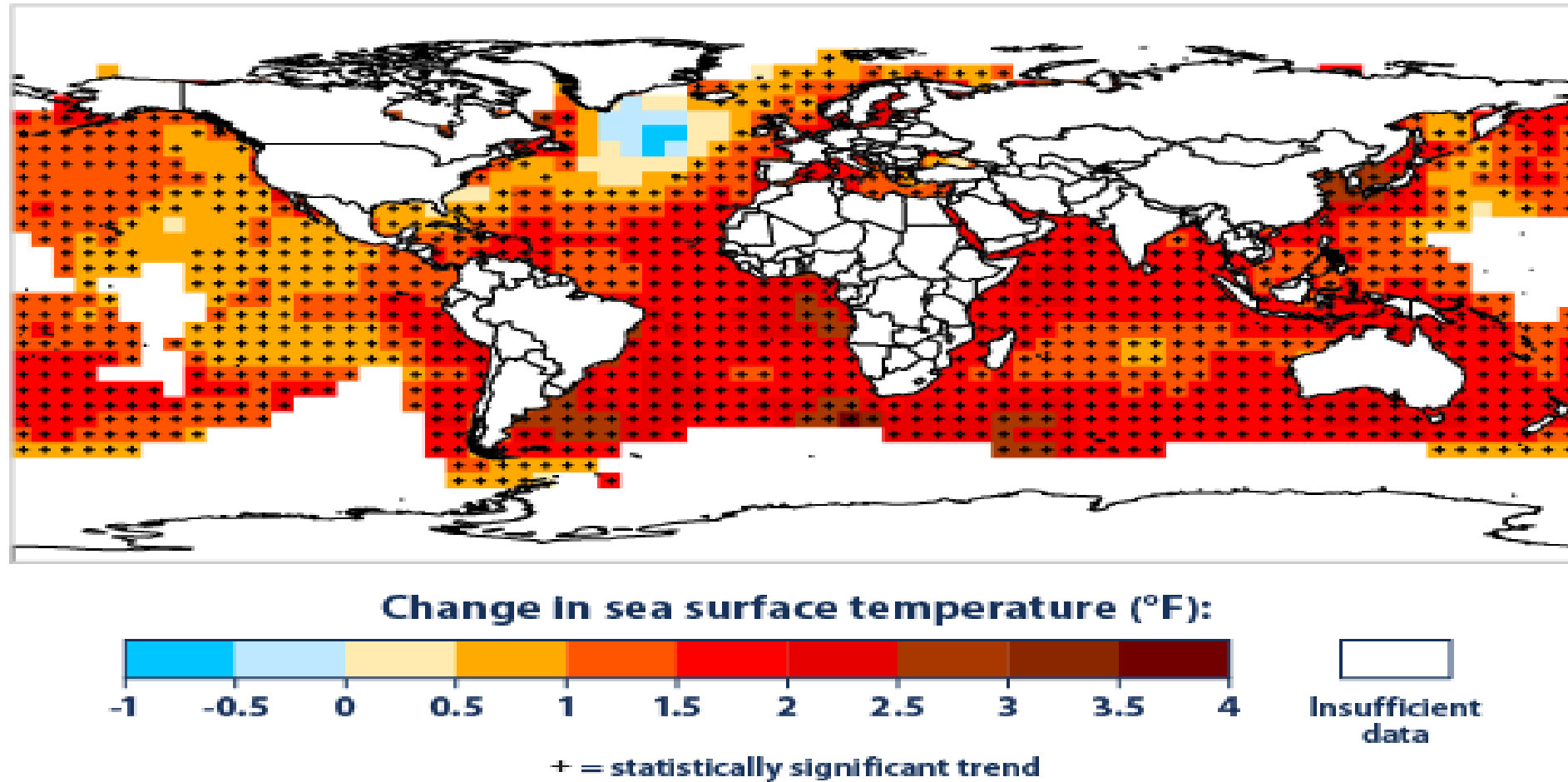


Figure 2. Change in Sea Surface Temperature, 1901–2014



Shows average sea surface temperature change between 1901 and 2014. Based on direct and satellite measurements.

Credit: <http://www3.epa.gov/climatechange/science/indicators/oceans/sea-surface-temp.html>

Knights 2003

“It is hypothesised that, associated with global warming trends, STG warming inhibits spring thermocline mixing and nutrient circulation, with negative impacts on productivity and hence food for leptocephalus larvae. Concurrent gyre spin-up also affects major currents and slowing of oceanic migration has probably enhanced starvation and predation losses.

Translation: Positive NA Oscillation Index = prolonged migration times and lower transport rates to continents, along with lower nutrition and increased predation.

<http://www.sciencedirect.com/science/article/pii/S0048969702006447>

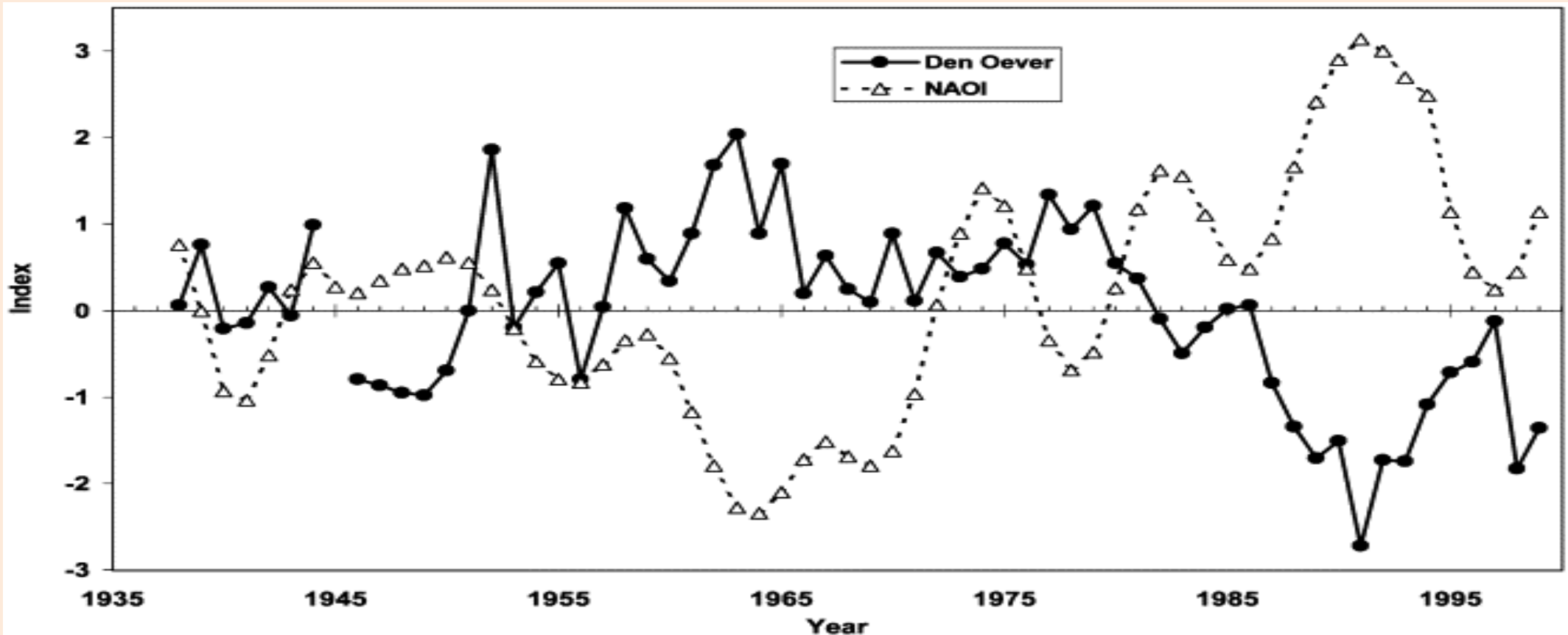
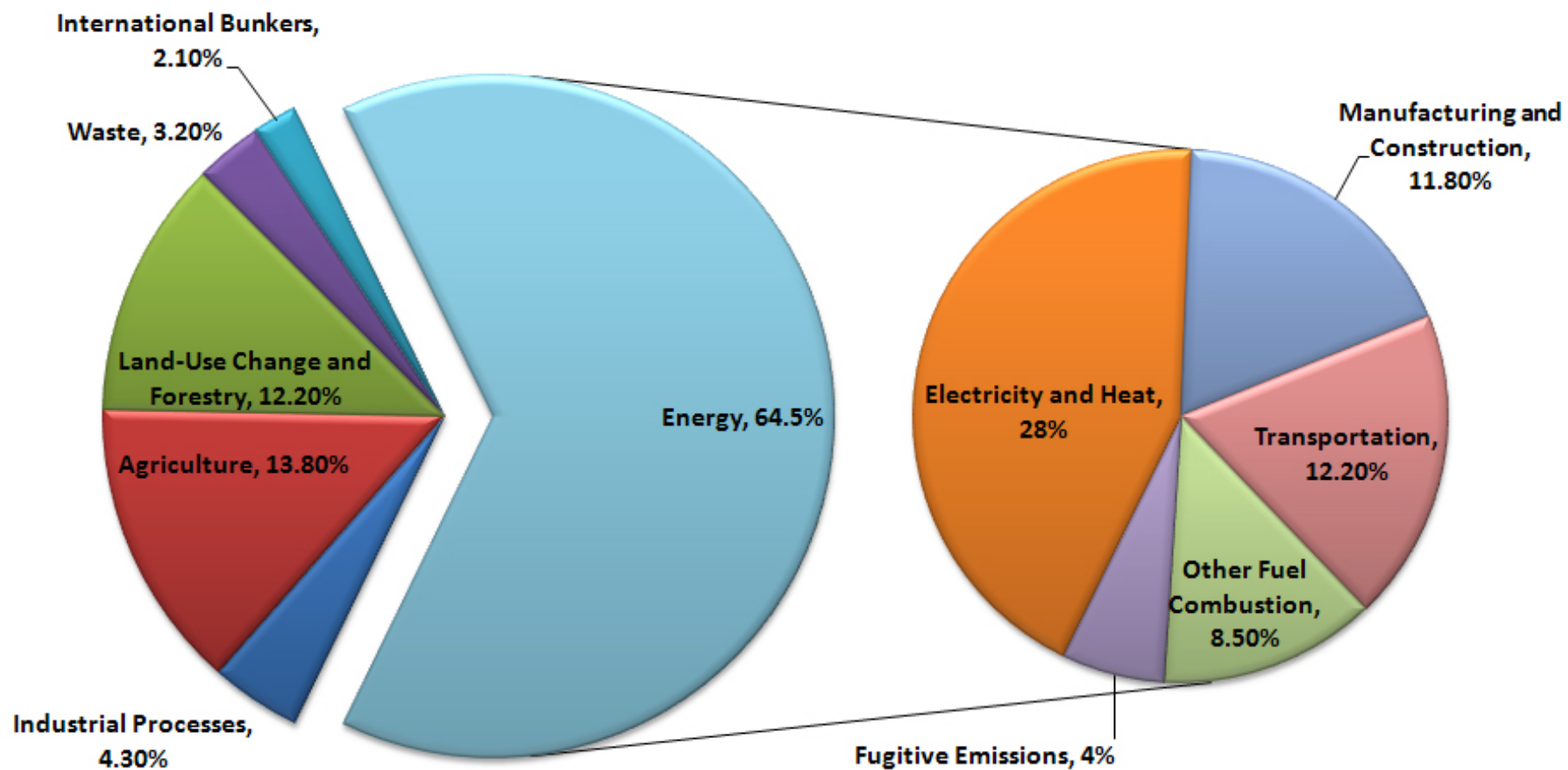


Fig. 1. DOI (5 year average, dots) and NAOI (5 year Fast Fourier Transform average, open triangles) over 1938–1999 (replotted from Westerberg, in ICES, 2001).

**A review of the possible impacts of long-term oceanic and climate changes and fishing mortality on recruitment of anguillid eels of the Northern Hemisphere ☆ B Knights
 Science of The Total Environment, Volume 310, Issues 1–3, 2003, 237–244**

Global Anthropogenic GHG Emissions by Sector 2005



To Reduce Carbon emissions by Adding Renewable Hydropower =



Wyman Dam, Maine <http://www.centralmaine.com/2012/12/29/few-ripples-seenfrom-dam-deal> 2012-12-29/

5) Tens of Thousands of Barriers

Hydroelectric dams and other manmade and natural barriers can prevent eels from swimming upstream and prevent downstream passage.

Measures that can be taken to allow for greater eel passage:

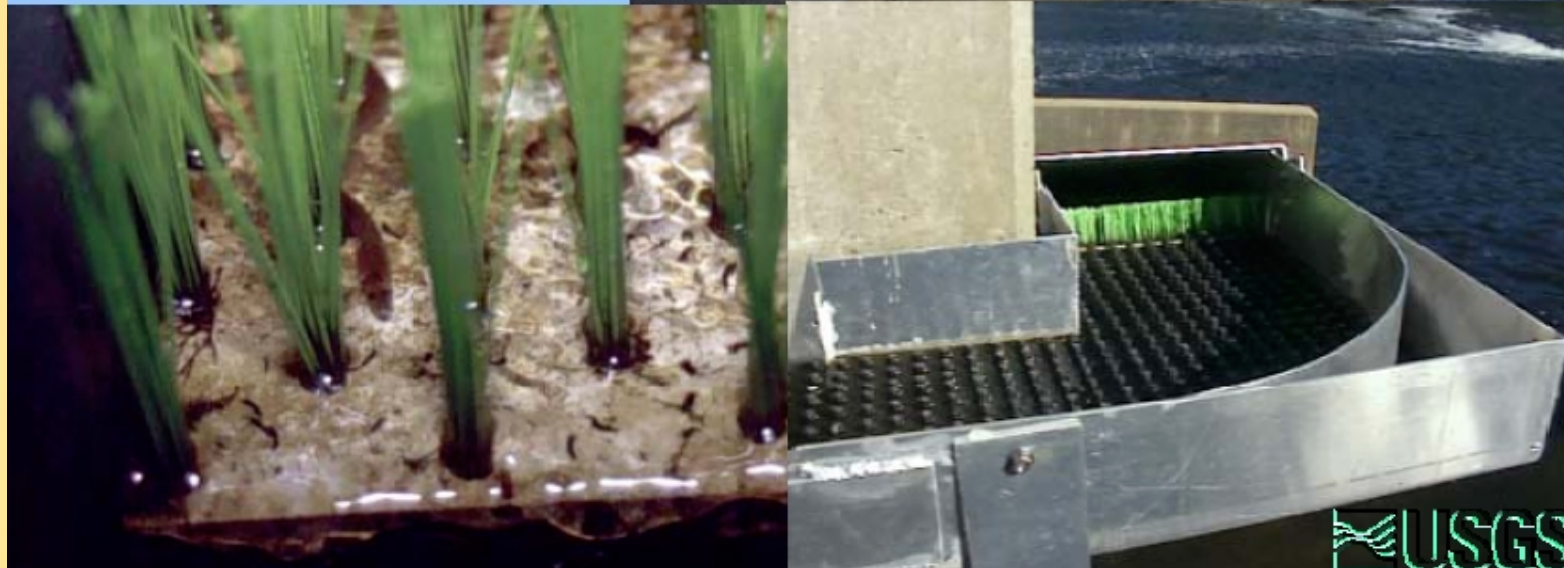
Removal of dams

Installation of Eelways or fishways

Curtailment of hydro dam turbines to allow for eel passage

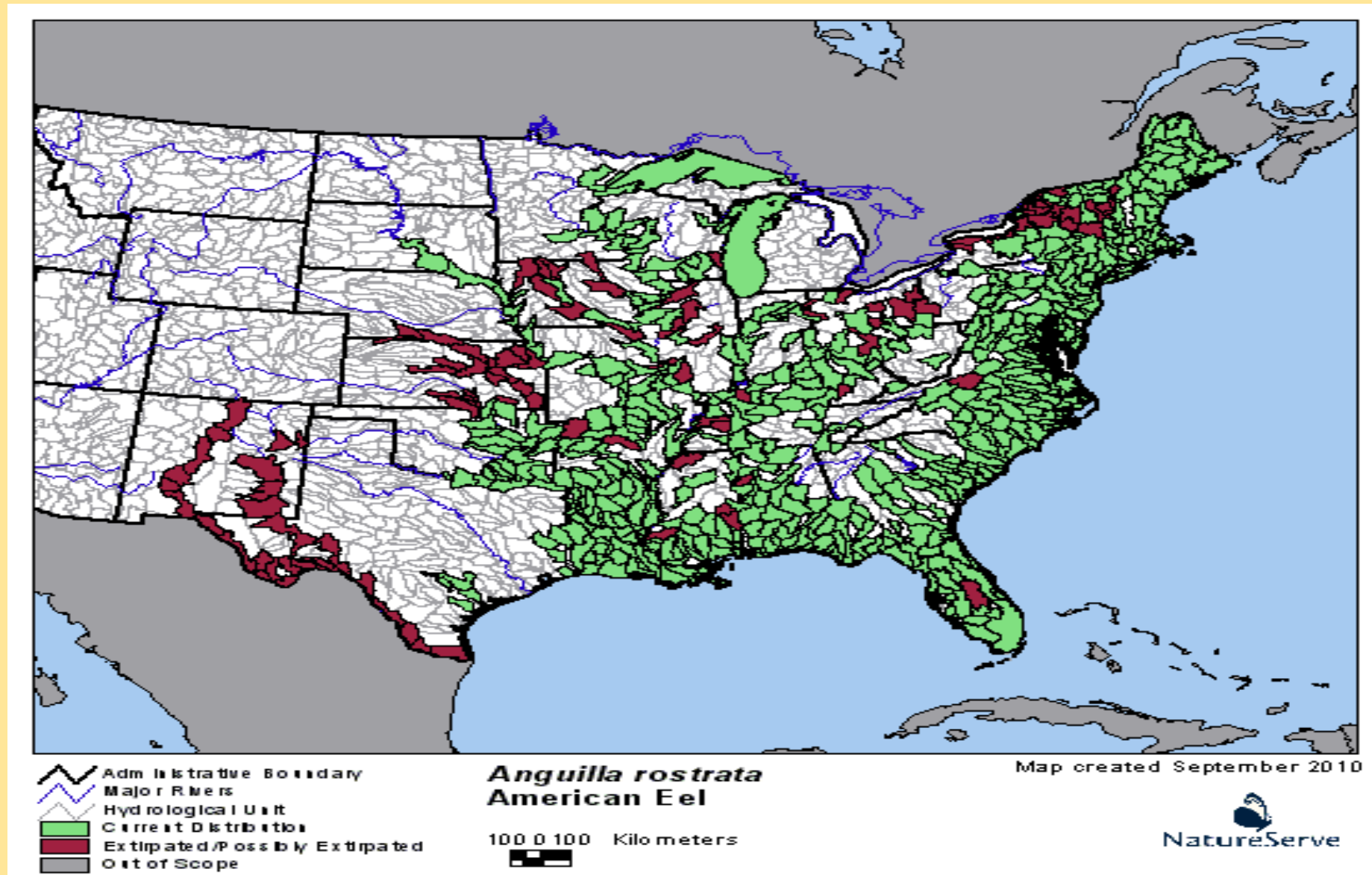
Upstream Eel Passage

Greeneville Dam (CT)
eel pass - >8000 eels
passed annually



U.S. Distribution of the American eel: NatureServe 2010

<http://explorer.natureserve.org/servlet/NatureServe?searchName=Anguilla+rostrata>



6) Habitat Loss

Estuary habitats have been lost due to dredging and filling for residential and commercial developments and for navigation.

Dredging changes estuary depth and salinity

Overboard disposal of contaminants

Hurricanes and non-tropical coastal storms can change coastal wetlands and estuaries

Water quality issues in lakes, reservoirs, and wetlands affect the maturation of female eels in particular.