

**2014 REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
FISHERY MANAGEMENT PLAN FOR
AMERICAN EEL
(*Anguilla rostrata*)**

2013 FISHING YEAR



Prepared by the American Eel Plan Review Team
September 2015

Accepted by the American Eel Management Board
November 2015

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I. Status of the Fishery Management Plan

<u>Date of FMP approval:</u>	November 1999
<u>Addenda:</u>	Addendum I (February 2006) Addendum II (October 2008) Addendum III (August 2013)
<u>Management unit:</u>	Migratory stocks of American Eel from Maine through Florida
<u>States with a declared interest:</u>	Maine through Florida, including the District of Columbia and the Potomac River Fisheries Commission
<u>Active committees:</u>	American Eel Management Board, Plan Review Team, Technical Committee, Stock Assessment Subcommittee, and Advisory Panel.

The ASMFC American Eel Management Board first convened in November 1995 and finalized the Fishery Management Plan (FMP) for American Eel in November 1999 (ASMFC 2000a). The goal of the FMP is to conserve and protect the American eel resource to ensure ecological stability while providing for sustainable fisheries. In support of this goal, the following objectives are included:

The FMP requires that all states and jurisdictions implement an annual young-of-year (YOY) abundance survey to monitor annual recruitment of each year's cohort. In addition, the FMP requires a minimum recreational and commercial size limit of six inches and a recreational possession limit of no more than 50 eels per person, including crew members involved in party or charter (for-hire) employment for bait purposes during fishing. Recreational fishermen are not allowed to sell eels without a state license. Commercial fisheries management measures stipulate that states and jurisdictions shall maintain existing or more conservative American eel commercial fishery regulations for all life stages. Each state is responsible for implementing management measures within its jurisdiction to ensure the sustainability of the American eel population that resides within state boundaries.

In August 2005, the American Eel Management Board directed the American Eel Plan Development Team (PDT) to initiate an addendum to establish a mandatory catch and effort monitoring program for American eel. The Board approved Addendum I at the February 2006 Board meeting.

In January 2007, the Management Board initiated the development of a draft Addendum with the goal of increasing the escapement of silver eels to the spawning grounds. In October 2008, the Management Board approved Addendum II to the American Eel FMP, with some modification. The Addendum placed increased emphasis on improving the upstream and downstream passage of American eel and maintained the status quo on management measures. The Management Board chose to delay action on management measures in order to incorporate the results of the 2012 stock assessment.

In August 2012, the Management Board initiated the development of Draft Addendum III with the goal of reducing mortality on all life stages of American eel. The addendum was initiated in response to the findings of the 2012 Benchmark stock assessment which declared American eel stock along the US East Coast as depleted. The Management Board approved Addendum III in August 2013 and this addendum will come into effect on January 1, 2014. The addendum requires states to implement a 9 inch minimum size restriction in the commercial and recreational yellow eel fisheries, requires the use of ½" by ½" mesh in the commercial yellow eel pot fishery, decreases the recreational bag limit to 25 fish/angler/day, restricts the silver eel fishery, and restricts the development of pigmented eel fisheries. The addendum

also sets the minimum monitoring standards for states and requires increased reporting in the commercial fishery. The Board chose to delay action on the glass eel management measures and will address this fishery through Draft Addendum IV.

II. Status of the Stock

In 2009, the Management Board initiated the start of a new assessment. After reviewing over 100 surveys and studies, the American Eel Stock Assessment Subcommittee selected 19 young-of-year surveys and 15 yellow eel surveys along the East Coast for use as indices of abundance in the assessment. Despite the large number of surveys and studies available for use, the American eel stock is still considered data-poor because very few surveys target eels and collect information on length, age, and sex of the animals caught. Additionally, eels have an extremely complex life history that is difficult to describe using traditional stock assessment models. Therefore, several data-poor methods were used to assess the American eel resource.

The first set of analyses (trend analyses) aimed to determine if there was a statistically significant trend in the fishery-independent survey data and whether or not there was evidence for significant trends on the regional and coast-wide scales. The second approach involved a Depletion-Based Stock Reduction Analysis (DB-SRA) model, which uses trends in historical catch to estimate biomass trends and maximum sustainable yield. Both the trend analyses and DB-SRA results indicate that the American eel stock has declined in recent decades, and the prevalence of significant downward trends in multiple surveys across the coast is cause for concern. Therefore, the stock status for American eels is depleted. The Benchmark Stock Assessment was peer reviewed in March 2012 and was approved for management use in May 2012.

In 2003, declarations from the International Eel Symposium (AFS 2003, Quebec City, Quebec, Canada) and the Great Lakes Fisheries Commission (GLFC) highlighted concerns regarding the health of eel stocks worldwide. In 2010, Canada Department of Fisheries and Oceans (DFO) conducted a stock assessment on American eels in Canadian waters and found that region-specific status indices show that abundance is very low in comparison to levels in the 1980s for Lake Ontario and upper St. Lawrence River stock, and is either unchanged or increasing in the Atlantic Provinces. A joint stock assessment by both Canada DFO and the Commission was recommended by the American Eel Stock Assessment Subcommittee as an approach for the next assessment.

III. Status of the Fishery

American eel currently support commercial fisheries throughout their range in North America, with significant fisheries occurring in the US Mid-Atlantic region and Canada. These fisheries are executed in riverine, estuarine, and ocean waters. In the US, commercial fisheries for glass eel/elver exist in Maine and South Carolina, whereas yellow/silver eel fisheries exist in all states and jurisdictions with the exception of Pennsylvania and the District of Columbia.

Although eel have been continuously harvested, consistent data on harvest are often not available. Harvest data from the Atlantic coastal states (Maine to Florida) indicate that the harvest fluctuated widely between 1970 and 1980, but showed an increasing trend that peaked in 1979 at 3,951,936 pounds. Harvest has declined since then, with the lowest harvest occurring at 641,225 pounds in 2002. Because fishing effort data is unavailable for the entire time series, finding a correlation between population numbers and landings data is difficult.

Commercial

Commercial landings have decreased from the high of 3.95 million pounds in 1979 to a low of 641,000 pounds in 2002, and have only recently begun to exceed one million pounds. State reported landings of yellow/silver eels in 2013 totaled 1,008,003 pounds¹ (Table 1), which represents a 6% decrease (~67,000) in landings from 2012 (1,074,724 pounds). Landings increased in Massachusetts, Rhode Island, New York, Delaware, Maryland, and Florida, and declined in Maine, Connecticut, New Jersey, PRFC, Virginia, and North Carolina. In 2013, state reported landings from Maryland and Virginia each totaled over 100,000 pounds of eel, and together accounted for 67% of the coastwide commercial total landings. Landings of glass eels were reported from Maine, South Carolina, and Florida and totaled 20,663 pounds. Combined yellow and glass eel landings reported by NMFS totaled 931,562 pounds.

Table 1. 2013 Commercial Landings by state and Life Stage¹

	State Reported		NMFS
	Glass	Yellow	
Maine	18,075.78	6,406.75	19,470*
New Hampshire		0	107
Massachusetts		2,499	1,845
Rhode Island		2,244	2,248
Connecticut		2,638	655
New York		61,580	34,697
New Jersey		89,300	100,865
Pennsylvania		No Fishery	
Delaware		80,811	82,991
Maryland		568,199	551,890
D.C.		No Fishery	
PRFC		32,290	
Virginia		110,809	100,298
North Carolina		33,980	33,980
South Carolina	2,243.9	0	2,516*
Georgia[^]		Confidential	
Florida	Glass: 154 Elver: 189	17,246	
Total	20,663	1,008,003	931,562

[^]Landings are confidential

* Glass and yellow eel landings not differentiated.

¹ Harvest data for 2013 comes from the 2014 State Compliance Reports. All landings are preliminary and some are incomplete.

Table 2. State commercial regulations for the 2013 fishing year.*

State	Size Limit	License/Permit	Other
ME		Harvester license. Dealer license and reporting. Tribal permit system in place for some Native American groups.	Seasonal closures. Gear restrictions. Weekly closures.
NH	6"	Commercial saltwater license and wholesaler license. Monthly reporting.	50/day for bait. Gear restrictions in freshwater.
MA	6"	Commercial permit with annual catch report requirement. Registration for dealers with purchase record requirement.	Nets, pots, spears, and angling only. Mesh restrictions. Each of 52 coastal towns has its own regulations.
RI	6"	Commercial fishing license.	
CT	6"	Commercial license (not required for personal use). Dealer reporting.	Gear restrictions
NY	6"	Commercial harvester license and reporting. Dealer license and reporting.	Gear restrictions.
NJ	6"	License required. Monthly pot harvester reporting.	Gear restrictions.
PA	NO COMMERCIAL FISHERY		
DE	6"	License required.	Commercial fishing in tidal waters only. Gear restrictions.
MD	6"	Licensed required with monthly reporting.	Prohibited in non-tidal waters. Gear restrictions.
DC	NO COMMERCIAL FISHERY		
PRFC	6"	Harvester license and reporting.	Gear restrictions.
VA	6"	Harvester license required. Monthly reporting.	Mesh size restrictions on eel pots. Bait limit of 50 eels/day. Seasonal closures.
NC	6"	Standard Commercial Fishing License for all commercial fishing	Mesh size restrictions on eel pots. Bait limit of 50 eels/day. Seasonal closures.
SC		License for commercial fishing and sale. Permits by gear and area fished. Monthly reporting.	Gear restrictions.
GA	6"	Personal commercial fishing license and commercial fishing boat license. Harvester/dealer reporting.	Gear restrictions on traps and pots. Area restrictions.
FL		Permits and licenses.	Gear restrictions.

* For specifics on licenses, gear restrictions, and area restrictions, please contact the individual state.

Recreational

Available information indicates that few recreational anglers directly target eel. For the most part, hook-and-line fishermen catch eel incidentally when fishing for other species. Eel are often purchased by recreational fishermen for use as bait for larger gamefish such as striped bass, and some recreational fishermen may catch their own eels to utilize as bait.

The National Marine Fisheries Service (NMFS) Marine Recreational Information Program (MRIP, formerly the Marine Recreational Fisheries Statistics Survey) shows a declining trend in the catch of eel

during the latter part of the 1990s. As of 2009, recreational data are no longer provided for American eel, due to the unreliable design of MRIP that focuses on active fishing sites along coastal and estuarine areas.

Table 3. State recreational regulations for the 2013 fishing year.**

State	Size Limit	Possession Limit	Other
ME	6"	50 eels/person/day	Gear restrictions. License requirement and seasonal closures (inland waters only).
NH	6"	50 eels/person/day	Coastal harvest permit needed if taking eels other than by angling. Gear restrictions in freshwater.
MA	6"	50 eels/person/day	Nets, pots, spears, and angling only; mesh restrictions. Each of 52 coastal towns has its own regulations.
RI	6"	50 eels/person/day	
CT	6"	50 eels/person/day	
NY	6"	50 eels/person/day	Additional length restrictions in specific inland waters.
NJ	6"	50 eels/person/day	
PA	6"	50 eels/person/day	Gear restrictions.
DE	6"	50 eels/person/day	Two pot limit/person.
MD	6"	25 eels/person/day	Gear restrictions.
DC	6"	10 eels/person/day	
PRFC	6"	50 eels/person/day	
VA	6"	50 eels/person/day	Recreational license. Two pot limit. Mandatory annual catch report. Mesh size restrictions on eel pots.
NC	6"	50 eels/person/day	Gear restrictions. Non-commercial special device license. Two eel pots allowed under Recreational Commercial Gear license.
SC	None	None	Gear restrictions. Permits and licenses.
GA	9"	25 eels/person/day	
FL	None	None	Gear restrictions.

** For specifics on licenses, gear restrictions, and area restrictions, please contact the individual state.

IV. Status of Research and Monitoring

The FMP requires states and jurisdictions with a declared interest in the species to conduct an annual young-of-the-year (YOY) survey for the purpose of monitoring annual recruitment of each year's cohort. In 2013, the states of Maine, New Hampshire, Rhode Island, New York, Delaware, and Georgia, as well as D.C. and the PRFC, had above average YOY counts. New Hampshire, Delaware, and Rhode Island measured an all-time high YOY level in at least one sampling site. New York and the PRFC measured second highest in the time series in at least one sampling site. Maine and Georgia's counts were above previous years but below a spike in 2012 levels.

The states of Connecticut, New Jersey, Maryland, Virginia, South Carolina, and Florida had below average survey counts. South Carolina and Maryland showed a particularly drastic decline. Pennsylvania is exempt from the YOY survey. North Carolina eliminated the survey due to budgeting issues. Georgia will cease to conduct the survey in 2014.

The FMP does not require any other research initiatives in participating states and jurisdictions. Nonetheless, the American Eel TC has identified several research topics that could further understanding of the species' life history, behavior, and biology. Research needs for American eel include:

High Priority

- Accurately document the commercial eel fishery to understand participation in the fishery and the amount of directed effort.
- Investigate, develop, and improve technologies for American eel passage upstream and downstream at various barriers for each life stage. In particular, investigate low-cost alternatives to traditional fishway designs for passage of eel.
- A coastwide sampling program for yellow and silver American eels should be formulated using standardized and statistically robust methodologies.
- Regular periodic stock assessments and the establishment of sustainable reference points for eel are required to develop a sustainable harvest rate and to determine whether the population is stable, decreasing, or increasing.
- Research the effects of the swim bladder parasite *Anguillacolla crassus* on the American eel's growth and maturation, migration to the Sargasso Sea, and the spawning potential.
- Evaluate the impact, both upstream and downstream, of barriers to eel movement with respect to population and distribution effects. Determine relative contribution of historic loss of habitat to potential eel population and reproductive capacity.

Medium Priority

- Investigate survival and mortality rates of different life stages (leptocephalus, glass eel, yellow eel, and silver eel) to assist in the assessment of annual recruitment. Continuing and initiating new tagging programs with individual states could aid such research.
- Tagging Programs: A number of issues could be addressed with a properly designed tagging program. These include:
 - Natural, fishing, and/or discard mortality; survival
 - Growth
 - Validation of aging method(s)
 - Reporting rates
 - Tag shedding or tag attrition rate
- Research contaminant effects on eel and the effects of bioaccumulation with respect to impacts on survival and growth (by age) and effect on maturation and reproductive success.

- Investigate fecundity, length, and weight relationships for females throughout their range; growth rates for males and females throughout their range; predator-prey relationships; behavior and movement of eel during their freshwater residency; oceanic-behavior, movement, and spawning location of adult mature eel; and all information on the leptocephalus stage of eel.
- Assess characteristics and distribution of eel habitat and the value of habitat with respect to growth and sex determination.
- Identify triggering mechanism for metamorphosis to mature adult, silver eel life stage, with specific emphasis on the size and age of the onset of maturity, by sex. A maturity schedule (proportion mature by size or age) would be extremely useful in combination with migration rates.

Low Priority

- Perform economics studies to determine the value of the fishery and the impact of regulatory management.
- Review the historic participation level of subsistence fishers in wildlife management planning and relevant issues brought forth with respect to those subsistence fishers involved with American eel.
- Examine the mechanisms for exit from the Sargasso Sea and transport across the continental shelf.
- Research mechanisms of recognition of the spawning area by silver eel, mate location in the Sargasso Sea, spawning behavior, and gonadal development in maturation.
- Examine age at entry of glass eel into estuaries and fresh waters.
- Examine migratory routes and guidance mechanisms for silver eel in the ocean.
- Investigate the degree of dependence on the American eel resource by subsistence harvesters (e.g., Native American Tribes, Asian and European ethnic groups).
- Examine the mode of nutrition for leptocephalus in the ocean.
- Provide analysis of food habits of glass eel while at sea.

V. Status of Management Measures and Issues

The FMP required that all states and jurisdictions implement an annual young-of-the-year (YOY) abundance survey by 2001 in order to monitor annual recruitment of each year's cohort. In addition, the FMP required all states and jurisdictions to establish a minimum recreational size limit of six inches and a recreational possession limit of no more than 50 eels per person, including crew members involved in party or charter (for-hire) employment, for bait purposes during fishing. Under the FMP, commercial fisheries management measures stipulate that states and jurisdictions shall maintain existing or more conservative American eel commercial fishery regulations for all life stages. Through Addendum III, as of January 1, 2014, states and jurisdictions must implement a 9 inch minimum size restriction in the commercial and recreational yellow eel fisheries, require the use of ½ by ½ mesh in the commercial yellow eel pot fishery, decrease the recreational bag limit to 25 fish/angler/day, restrict their silver eel fishery, and restrict the development of pigmented eel fisheries.

Proposed Endangered Species Act Listing of American Eel

American eel were petitioned for listing as threatened under the Endangered Species Act (ESA) in April 2010 by the Center for Environmental Science, Accuracy, and Reliability (CESAR, formally the Council for Endangered Species Act Reliability). USFWS published a positive 90 day finding on the petition in September 2011, stating that the petition may be warranted and a status review will be conducted. CESAR filed a lawsuit in August 2012 against USFWS for failure to comply with the statutes of the ESA, which specifies a proposed rule based on the status review be published within one year of the receipt of the petition. A Settlement Agreement was approved by the court in April 2013. The settlement requires USFWS to publish a 12-month finding by September 30, 2015. The USFWS previously reviewed the

status of the American eel in 2007 and found that, at that time, protection under the Endangered Species Act was not warranted.

VI. Current State-by-State Implementation of FMP Compliance Requirements

The following monitoring program changes occurred in 2013:

- Pennsylvania – Due to continued lack of success in the YOY survey, ASMFC gave PA the option to sample small yellow eels (pencil eels). A brief pencil eel survey was conducted with some success.
- Maryland – In addition to the primary YOY site, a second site was sampled in 2013.
- District of Columbia – Due to continued lack of success in the YOY survey, an electrofishing survey was again conducted.
- Georgia – Due to changes in the American eel FMP, fishery managers with the GADNR have opted to cease conducting the YOY survey as of January 1, 2014. The YOY survey will be replaced with a pot survey designed to capture information on yellow-phase eels occurring in the Altamaha River.

The following regulatory changes for 2013 were documented in the compliance reports:

- Maine - Legislation was passed in 2012 to exempt tribal members from having to hold state licenses to fish for elvers; each group was allowed to issue a specific number of tribal permits for the fishery.
- Maine – Implementation authority to suspend or revoke glass eel fishing licenses for violating glass eel fishing laws.
- Georgia – A 25 fish/person creel limit and 9 inch minimum size was implemented for the recreational fishery

The PRT reviewed the state compliance reports for 2013. The PRT finds that all states are currently implementing the required provisions of the American Eel Fishery Management Plan.

Section 4.4.2 of the FMP stipulates that states may apply for *de minimis* status for each life stage if (given the availability of data), for the preceding two years, their average commercial landings (by weight) of that life stage constitute less than 1% of the coastwide commercial landings for that life stage for the same two-year period. States meeting this criterion are exempted from having to adopt commercial and recreational fishery regulations for a particular life stage listed in Section 4 and any fishery dependent monitoring elements for that life-stage listed in Section 3.4.1.

In 2013, New Hampshire, Massachusetts, Pennsylvania, the District of Columbia, South Carolina, and Georgia requested *de minimis* status for their yellow eel fisheries. Qualification for *de minimis* was determined from state reported landings found in compliance reports. All states that applied for *de minimis* for their yellow eel fishery meet the *de minimis* standard.

VII. Recommendations/Findings of the Plan Review Team

1. The PRT recommends *de minimis* be granted to New Hampshire, Massachusetts, Pennsylvania, the District of Columbia, South Carolina, and Georgia.
2. The PRT requests that state personnel highlight notable trends in annual reports. The PRT also requests that state personnel describe any circumstances that prevented sampling from occurring as required in the FMP and Addendum I, or reasoning for sampling not occurring in a manner consistent with previous years.

3. The PRT requests that states collect biological data from both commercial and recreational landings.
4. The PRT requests that states provide estimates of the percent of harvest going to food versus bait, and of exports by season. The PDT requests that states work with the law enforcement agencies to include information on any confiscated poundage from illegal or undocumented fisheries.
5. The PRT requests that states that do not regulate their personal use fishery be required, at a minimum, to permit participants in this fishery and collect harvest data in order to provide an estimate of effort and catch.