

2016 REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
FISHERY MANAGEMENT PLAN FOR
AMERICAN EEL
(Anguilla rostrata)

2015 FISHING YEAR



Prepared by the American Eel Plan Review Team
July 2017

Approved by the American Eel Management Board
August 2017

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(*Anguilla rostrata*)**

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) Addendum IV (October 2014)
<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 all states and jurisdictions to 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 size and possession limit and a state license for recreational fishermen to sell eels. The FMP requires that states and jurisdictions maintain existing or more conservative American eel commercial fishery regulations for all life stages, including minimum size limits. Each state is responsible for implementing management measures within its jurisdiction to ensure the sustainability of its American eel population.

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 a draft addendum with the goal of increasing escapement of silver eels to the spawning grounds. In October 2008, the Management Board approved Addendum II, which placed increased emphasis on improving the upstream and downstream passage of American eel. 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 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.

Addendum III requires states to reduce the yellow eel recreational possession limit to 25 eel/person/day, with the option to allow an exception of 50 eel/person/day for party/charter employees for bait purposes. The recreational and commercial size limit increased to a minimum of 9". Eel pots are required to be ½" by ½" minimum mesh size or have at least a 4" by 4" escape panel of ½" by ½" mesh escape panel. The glass eel fishery is required to implement a maximum tolerance of 25 pigmented eels per pound of glass eel catch. The silver eel fishery is prohibited to take eels from September 1st to December 31st from any gear type other than baited traps/pots or spears. The addendum also set minimum monitoring standards for states and required dealer and harvester reporting in the commercial fishery.

In October 2014, the Board approved Addendum IV. The addendum was also initiated in response to 2012 American Eel Benchmark Stock Assessment and the need to reduce mortality on all life stages. The Addendum established a coast-wide cap of 907,671 pounds of yellow eel, reduced Maine's glass eel quota to 9,688 pounds (2014 landings), and allowed for the continuation of New York's silver eel weir fishery in the Delaware River. For yellow eel fisheries, the coast-wide cap was implemented for the 2015 fishing year and established two management triggers: (1) if the cap is exceeded by more than 10% in a given year, or (2) the coast-wide quota is exceeded for two consecutive years regardless of the percent overage. If either one of the triggers are met then states would implement state-specific allocation based on average landings from 2011-2013.

II. Status of the Stock

In 2009, the Management Board initiated a benchmark stock assessment. After reviewing over 100 surveys and studies, the American Eel Stock Assessment Subcommittee (SAS) selected 19 YOY 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 indicated that the American eel stock 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, although overfishing and

overfished status in relation to the reference points could not be used with confidence. 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 SAS as an approach for the next assessment.

The next stock assessment update is scheduled to be completed by fall 2017.

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 and a silver eel weir fishery exists in New York's Delaware River, whereas yellow 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 of 641,225 pounds occurring in 2002. Because fishing effort data are 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 2015 totaled 865,070 pounds¹ (Table 1), which represents a 18.3% decrease in landings from 2014 (1,059,840 pounds). Yellow eel landings increased in New York but decreased in all other states and jurisdictions. In 2015, state reported landings from Maryland and Virginia together accounted for 66% of the coast-wide commercial total landings. Landings of glass eels were reported from Maine and South Carolina, totaling 5,442 pounds.

¹ Harvest data for 2015 comes from the 2016 State Compliance Reports.

Table 1. 2015 Commercial Landings by state and Life Stage¹

	State Reported	
	Glass	Yellow
Maine	5,259.44	4,130
New Hampshire	No Fishery	0
Massachusetts	No Fishery	2,502
Rhode Island	No Fishery	1,538
Connecticut	No Fishery	3,052
New York	No Fishery	53,389
New Jersey	No Fishery	88,828
Pennsylvania	No Fishery	No Fishery
Delaware	No Fishery	44,708
Maryland	No Fishery	493,043
D.C.	No Fishery	No Fishery
PRFC	No Fishery	31,588
Virginia	No Fishery	78,869
North Carolina	No Fishery	57,791
South Carolina	Glass: 182.29	Confidential
Georgia	No Fishery	Confidential
Florida	Glass: 0 Elver: 0	5,632
Total	Glass: 5,442 Elver: 0	865,070

Table 2. State commercial regulations for the 2015 fishing year.*

State	Min Size Limit	License/Permit	Other
ME	Glass no min size	Daily dealer reports/swipe card program; monthly harvester report of daily landings. Tribal permit system in place for some Native American groups.	Harvester license lottery system.
	Yellow 9"	Harvester/dealer license and monthly reporting. Tribal permit system in place for some Native American groups.	Seasonal closures. Gear restrictions. Weekly closures.
NH	9"	Commercial saltwater license and wholesaler license. No dealer reports. Monthly harvester reporting includes dealer information.	Gear restrictions in freshwater.
MA	9"	Commercial permit with annual catch report requirement. Registration for dealers with purchase record requirement. Dealer/harvester reporting.	Traps, pots, spears, and angling only. Mesh restrictions.
RI	9"	Commercial fishing license. Dealer/harvester reporting.	Gear restrictions.
CT	9"	Commercial license (not required for personal use). Dealer/harvester reporting.	Gear restrictions.
NY	9"	Harvester/dealer license and reporting.	Gear restrictions. Maximum limit of 14" in some rivers.
NJ	9"	License required. No dealer reports. Monthly harvester reporting includes dealer information.	Gear restrictions.
PA	NO COMMERCIAL FISHERY		
DE	9"	Harvester reporting, no dealer reporting. License required.	Commercial fishing in tidal waters only. Gear restrictions.
MD	9"	Dealer/harvester license and monthly reporting.	Prohibited in non-tidal waters. Gear restrictions. Commercial crabbers may fish 50 pots per day, must submit catch reports.
DC	NO COMMERCIAL FISHERY		

Table 2. State commercial regulations for the 2015 fishing year.* (continued)

State	Min Size Limit	License/Permit	Other
PRFC	9"	Harvester license and reporting. No dealer reporting.	Gear restrictions.
VA	9"	Harvester license required. Dealer/harvester monthly reporting.	Mesh size restrictions on eel pots. Seasonal closures.
NC	9"	Standard Commercial Fishing License for all commercial fishing. Dealer/harvester monthly combined reports on trip ticket.	Mesh size restrictions on eel pots. Seasonal closures.
SC	Glass no min size	Fyke and dip net only permitted. Dealer/harvester monthly combined reports on trip ticket.	Max 10 individuals. gear and area restrictions.
	Yellow 9"	Pots only permitted. Dealer/harvester monthly combined reports on trip ticket.	Gear restrictions.
GA	9"	Personal commercial fishing license and commercial fishing boat license. Dealer/harvester monthly combined reports on trip ticket.	Gear restrictions on traps and pots. Area restrictions.
FL	9"	Permits and licenses. Harvester reporting. No dealer reporting.	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 American eel. For the most part, hook-and-line fishermen catch eel incidentally when fishing for other species. American 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 to use 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 2015 fishing year.*

State	Size Limit	Possession Limit	Other
ME	9"	25 eels/person/day	Gear restrictions. License requirement and seasonal closures (inland waters only). Bait limit of 50 eels/day for party/charter boat captain and crew.
NH	9"	25 eels/person/day	Coastal harvest permit needed if taking eels other than by angling. Gear restrictions in freshwater.
MA	9"	25 eels/person/day	Nets, Pots, traps, spears, and angling only; seasonal gear restrictions and mesh requirements.
RI	9"	25 eels/person/day	
CT	9"	25 eels/person/day	
NY	9"	25 eels/person/day	Maximum limit of 14" in some rivers. Bait limit of 50 eels/day for party/charter boat captain and crew.
NJ	9"	25 eels/person/day	Bait limit of 50 eels/day for party/charter boat captain and crew.
PA	9"	25 eels/person/day	Gear restrictions. Bait limit of 50 eels/day for party/charter boat captain and crew.
DE	9"	25 eels/person/day	Two pot limit/person.
MD	9"	25 eels/person/day	Gear restrictions.
DC	9"	10 eels/person/day	
PRFC	9"	25 eels/person/day	
VA	9"	25 eels/person/day	Recreational license. Two pot limit. Mandatory annual catch report. Gear restrictions. Bait limit of 50 eels/day for party/charter boat captain and crew.
NC	9"	25 eels/person/day	Gear restrictions. Non-commercial special device license. Two eel pots allowed under Recreational Commercial Gear license. Bait limit of 50 eels/day for party/charter boat captain and crew.
SC	9"	25 eels/person/day	Gear restrictions. Permits and licenses. Two pot limit
GA	9"	25 eels/person/day	
FL	9"	25 eels/person/day	Gear restrictions. Wholesale/Retail purchase exemption applies to possession limit for bait.

* 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 YOY survey to monitor annual recruitment of each year's cohort. In 2015, the states of Rhode Island (Gilbert Stuart), New Jersey (Patcong Creek) and Maryland (Turville Creek) had above average YOY counts. Rhode Island's Irish elver ramp at Gilbert Stuart recorded its third highest count in the time series and significantly higher than 2014. The 2015 catch at New Jersey's Patcong Creek site was the third highest in the 15 year time series. The 2015 CPUE at Maryland's Irish elver ramp on Turville Creek exceeded levels seen in 10 of the last 13 years. All other states with YOY surveys (Maine through Massachusetts; Connecticut-New York, Delaware, PRFC, Carolina, and Florida had below average survey counts. Pennsylvania, D.C., North Carolina, and Georgia do not have YOY surveys, but instead have yellow eel surveys.

The FMP does not require any other research initiatives in participating states and jurisdictions. Nonetheless, the American Eel TC has identified several research topics to 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 requires that all states and jurisdictions implement an annual YOY abundance survey by 2001 in order to monitor annual recruitment of each year's cohort. Addendum III requires a 9 inch minimum size restriction in the commercial and recreational yellow eel fisheries, as well as the use of ½ by ½ mesh in the commercial yellow eel pot fishery. The recreational bag limit is

25 fish/angler/day, and the silver eel fishery is restricted, as is the development of pigmented eel fisheries.

Proposed Endangered Species Act Listing of American Eel

The US Fish and Wildlife Service (USFWS) reviewed the status of American eel in 2007 and found that, at that time, protection under the Endangered Species Act was not warranted. The American eel were later 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). The USFWS published a positive 90 day finding on the petition in September 2011, acknowledging that the petition may be warranted and that a status review would be conducted. CESAR filed a lawsuit in August 2012 against the 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, which required the USFWS to publish a 12-month finding by September 30, 2015. In the published finding, the USFWS determined that a listing under the ESA was not warranted.

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

The PRT reviewed the state compliance reports for 2015. The PRT notes the following changes with states implementing the required provisions of the American Eel Fishery Management Plan:

Glass Eel Fishery Measures:

- The Board exempted Florida from establishing size and bag limits until there is evidence that a fishery exists. In 2013 and 2014 glass eel harvest occurred, but FL imposed a 9" min size in both the recreational and commercial fisheries to end the emerging glass eel fishery in 2015.

Yellow Eel Fishery Measures:

- Connecticut implemented gear specifications for pots to use either constructed of ½" by ½" mesh or that include a 4" by 4" panel of such mesh to allow escape panels. Steps were taken to bring gear into compliance by October 31, 2015.

Silver Eel Fishery Measures:

- Florida does not have a regulation preventing harvest of eels from pound nets from September 1 through December 31, but the state is unaware of any active pound net fishery in the past 10-15 years.

Reporting Measures:

- New Hampshire and New Jersey do not have dealer reporting, but harvesters report some information on dealers. Delaware, the Potomac River Fisheries Commission, and Florida do not have dealer reporting.

In addition to the monitoring program changes implemented with Addendum III and Addendum IV, the following changes were made to the YOY survey in 2015:

- Maine- implemented initiated planning of an eel life cycle study, with the first year to be implemented in 2016.
- New Hampshire – An Irish elver trap was installed on the Lamprey River and a box trap was installed on the Oyster river in order to expand the YOY monitoring program. Sampling occurred on the Oysters River in 2014 and 2015.
- Massachusetts – An Irish elver trap sampled on the Parker River was discontinued due to low to intermittent catches.
- Georgia – Due to changes in the American eel FMP, Georgia ceased to conduct the YOY survey in 2014. It was replaced with a pot survey designed to capture information on yellow-phase eels occurring in the Altamaha River. GA has decided to cease creel survey sampling on the Satilla River in 2015 and solely concentrate on sampling on the Altamaha River.

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 coast-wide 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.

Qualification for *de minimis* is determined from state reported landings found in compliance reports. In 2015, New Hampshire, Massachusetts, Pennsylvania, the District of Columbia, South Carolina, and Georgia requested *de minimis* status for their yellow eel fisheries. All states that applied for *de minimis* of the yellow eel fishery meet the *de minimis* criteria. The state of South Carolina requested *de minimis* status for its glass eel fishery, but does not meet the 1% landings criteria for this life stage.

VII. Recommendations/Findings of the Plan Review Team

1. The PRT recommends the Board consider state compliance issues as detailed in Section VI.
2. The PRT recommends *de minimis* be granted to New Hampshire, Massachusetts, Pennsylvania, the District of Columbia, South Carolina, and Georgia for their yellow eel fisheries.
3. 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.

4. The PRT requests that states collect biological data from both commercial and recreational landings.
5. 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.
6. 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.