

**Amendment 1**  
**to the 1991 Chesapeake Bay American Eel Fishery Management Plan**  
**May 2016**

**Introduction**

American eels (*Anguilla rostrata*) have a unique and complex life history that encompasses freshwater, estuarine and marine waters from the southern tip of Greenland, south along the Atlantic and Gulf coasts of North America and Central America to the northeast coast of South America. Increasing market demands for eels in the mid-1990s and concern about increased harvest and limited stock assessment data prompted the Atlantic States Marine Fisheries Commission (ASMFC) to develop the Interstate Fishery Management Plan for American Eel in 1999. In addition to the plan, four addenda (2006, 2008, 2013 and 2014) have been adopted to manage eels along the Atlantic coast (Maine to Florida). In accordance with the Atlantic Coastal Fisheries Cooperative Management Act (Title 16, Chapter 71, Section 5104), Atlantic coastal states shall implement fishery management plans developed by the ASMFC and adhere to the Commission's compliance requirements.

**Statement of the Problem**

Since the 1991 Chesapeake Bay American Eel Fishery Management Plan (Chesapeake AE FMP) was completed before the development of the ASMFC Interstate Fishery Management Plan for American Eel (ASMFC Interstate FMP), the Chesapeake plan does not include an objective to follow the guidelines established under the ASMFC. Amendment 1 to the 1991 Chesapeake Bay American Eel Fishery Management Plan includes a provision for the adoption of current and future management requirements established by the ASMFC, updates the status of the eel resource, and provides a framework for managing and monitoring the American eel fishery in Maryland waters.

**Background**

A Chesapeake AE FMP was developed and completed in 1991. The Chesapeake AE FMP management framework is broadly defined by four categories: stock status, the bait fishery, research needs, and habitat and water quality issues. The Bay jurisdictions adopted a conservative approach to managing American eels with a goal to reduce the possibility of growth overfishing and to prevent the waste of small eels. Management strategies included improving harvest reports, promoting biological research, addressing water quality issues and providing upstream access for migratory fishes.

The Chesapeake AE FMP has been reviewed eight times since its completion and has been annually updated since 2007 as part of the Fishery Management Plan Report to the Legislative Committees under Natural Resources Article §4-215, Annotated Code of Maryland. The Plan Review Team for the 2014 Chesapeake AE FMP Review recommended the development of an amendment to ensure management flexibility when

the ASMFC compliance requirements change over time. Recently, some segments of the American eel population along the coast have exhibited a decline in abundance. To date, additional management strategies have been implemented and include: a young-of-the-year abundance survey, a recreational possession limit and minimum size limit, an improved commercial licensing and reporting system, upstream and downstream passage requirements, a minimum mesh size for eel pots, and a reduction in overall fishing mortality.

### **Maryland Goal and Objectives**

The goal of managing the American eel resource in Maryland tributaries, bay and coastal waters is to *“protect and conserve the ecological value of the resource while allowing optimum economic and social benefits over time.”*

In order to achieve this goal, the objectives have been updated and replace the objectives stated in the 1991 Chesapeake Bay American Eel Fishery Management Plan:

1. Follow the guidelines established by the Atlantic States Marine Fisheries Commission for the coastwide management of American eel and make Maryland regulatory actions compatible with Chesapeake Bay jurisdictions where possible and practical.
2. Promote protection of the resource by protecting and enhancing all life stages of the American eel.
3. Implement appropriate monitoring programs for collecting stock assessment data and assessing the status of American eels in Maryland waters.
4. Provide for fair allocation of allowable harvest, consistent with traditional uses, among the various components of the fishery.
5. Improve harvest statistics by implementing a reporting system that is timely, accurate and verifiable.
6. Promote studies to improve the understanding of biological, economic and social aspects of the fishery.
7. Enhance American eel habitat by removing dams or providing fish passage to reopen upstream and downstream river/stream habitat.
8. Continue to pursue and enforce standards of environmental water quality and habitat protection necessary to protect the American eel population within Maryland waters.

### **Stock Status**

American eel are part of a single stock that spawn in the Sargasso Sea. They inhabit marine, estuarine and freshwater habitats along the entire North Atlantic coast from Maine to Florida. All eel fishing mortality and some natural mortality occur before spawning. Glass, elver, yellow, and silver life history stages are all subject to fishing pressure at different temporal and spatial scales. Glass eel typically refers to the translucent state after the larval stage until full pigmentation. An elver is a young eel of

fresh or brackish waters that is fully pigmented and from three to twelve months old. A yellow eel is the sexually immature and growth stage which varies from five to twenty years and occurs in fresh and coastal waters. A silver eel is the stage when sexual maturity takes place and the eel undergoes several physiological changes. This is the stage when an eel starts its migration to the ocean and eventually spawns in the Sargasso Sea. Once an eel spawns, it dies.

The ASMFC conducted an American eel stock assessment in 2012. Compiled data from the Atlantic Coast indicate that trends in yellow eel abundance indices have been variable. For example, the Hudson River and south Atlantic indices indicated decreasing abundance, no trends were evident in the Delaware Bay/mid-Atlantic Coastal Bay indices, and there has been relatively stable abundance in the Chesapeake Bay. As a whole, the stock assessment models identified declines in abundance for young-of-year (elver) and yellow-phase American eel. The prevalence of declining indices resulted in a determination that the American eel stock is depleted. The term “depleted” refers to “catches that are well below historical levels, irrespective of the amount of fishing effort exerted.” This designation is in contrast to an “overfishing” definition: “a fishery that is being exploited above a level which is believed to be sustainable in the long term, with no potential room for further expansion and a higher risk of stock depletion/collapse” (ASMFC 2012). The depleted nature of the eel stock is attributed to the synergistic effect of harvest pressure, reduced habitat availability (blockages), increased habitat impairment (pollution), introduction of a swim bladder parasite, and climate change. The 2012 coastal stock assessment is considered a benchmark or baseline assessment. Although decreasing trends in abundance suggest overfishing may have been occurring, the overfishing and overfished status could not be determined (ASMFC 2012). Additional data and model development are required before reference points and maximum sustainable yield can be developed. Until biological reference points can be determined, a conservative management strategy that reduces overall mortality is warranted.

### **Stock Status Strategy**

Since the American eel resource consists of a single, migratory stock along the Atlantic coast, Maryland will support and cooperate with the Atlantic States Marine Fisheries Commission’s (ASMFC) data collection and stock assessment processes.

#### **Action 1**

Follow the ASMFC guidance and compliance requirements for American eel.

#### **Action 2**

Continue to collect biological data to support coastal stock assessments and contribute to the development of biological reference points.

#### **Action 3**

Improve stock status by reducing overall mortality and enhancing population levels by increasing the availability of habitat, especially through the removal of blockages to upstream and downstream migration.

#### **Action 4**

As the status of the American eel stock changes over time, adjust management strategies to meet conservation and protection objectives.

#### **Status of the Fishery**

The commercial harvest of eels from the Atlantic coast has ranged between 640,000 pounds (1964) and 3.95 million pounds (1979) (Figure 1). After a peak in landings during the 1970s and 1980s, landings have generally decreased to less than 1.0 million pounds. From 2010 to 2014, landings have been increasing and Maryland has been harvesting approximately 60% of the coastwide total. The estimated value of American eel coastwide landings has varied between a few hundred thousand dollars and a peak value of \$40.1 million (2012). The commercial value of eels has dramatically increased over the last few years (2011-2014) (NOAA Fishery Statistics), driven by the value of the glass eel fishery in Maine and South Carolina.

The commercial fishery primarily targets yellow stage eels with some silver eels caught during the fall migration. Eels are mainly caught by eel pots and traps. In Maryland, 99% of the harvest is caught by pots (Whiteford 2015). Although the status of American eels is considered depleted along the Atlantic coast, Maryland harvest trends have been relatively stable and have increased in recent years. Maryland's long-term (1994-2014) average harvest by the commercial fishery is 381,000 pounds. Since 2010, the average harvest has almost doubled (Figure 2). In addition to directed eel harvest, licensed commercial crabbers are allowed to harvest eels for use as crab trotline bait. Eels caught by licensed commercial crabbers have not been included in the fishery statistics sent to the National Marine Fisheries Service (NMFS). In 2014, licensed commercial crabbers reported catching 2,397 pounds of eels for crab trotline bait. This was well below the 21- year time series mean harvest of 24,517 pounds (Whiteford 2015). The reporting of eel harvest by licensed commercial crabbers has been sporadic and variable over time.

There is very little data available on the recreational eel fishery. The Marine Recreational Fisheries Statistical Survey (currently the Marine Recreational Information Program, MRIP) calculated catch estimates during the 1980s and the 2000s but no catches have been reported since 2009. There is some evidence to suggest that annual estimates were greater in the 1980s and decreased by the 2000s. Maryland has no estimates of recreational harvest but eels are often purchased by recreational fishermen for use as bait usually in late summer and fall in the Chesapeake Bay.

Since the completion of the 2012 coastal stock assessment for American eels, the ASMFC has recommended a reduction in mortality for all life stages. The ASMFC Addendum I (2006, effective 2007) established a mandatory catch and effort monitoring program. The ASMFC Addendum II (2008) made recommendations for improving upstream and downstream passage for eels. The ASMFC Addendum III (2013)

implemented restrictions on pigmented eels, increased the minimum size limit from 6" to 9" for yellow eels, and reduced the recreational creel limit from 50 fish to 25 fish per person per day. The ASMFC Addendum IV (2014) implemented management measures to reduce overall mortality. Atlantic coast states must maintain their existing commercial fishery regulations or may implement more conservative regulations. A special quota management system and monitoring requirements are necessary for a glass eel fishery. A 9" minimum size limit and a ½ by ½ inch minimum mesh size for eel pots are required for the commercial yellow eel fishery. In addition, the ASMFC Addendum IV established a coastwide catch cap of 907,671 pounds: a precautionary approach that reduces the commercial harvest by 12% from the 1998-2010 average. The catch cap allows flexibility since it does not require specific allocation by jurisdiction and reduces some administrative work.

The coastwide catch cap has two management triggers that would result in the implementation of a state-by-state commercial yellow eel quota: if the catch cap is exceeded by more than 10% in a given year (998,438 pounds) or if the catch cap is exceeded for two consecutive years, regardless of the percent. If either of these two management triggers are met, all jurisdictions along the Atlantic coast including Maryland, will need to implement a quota. If a jurisdiction exceeds its quota in a given year, then that jurisdiction is required to reduce their following year's quota by the same amount the quota was exceeded. Jurisdictions will have the opportunity to transfer quota to one or more states as long as the transfer is consistent with the objectives of the management plan. Quota allocation and adjustments to the quota may be necessary as the status of the stock changes and/or additional monitoring data is obtained.

### **Fishery Management Strategy**

Maryland will reduce overall mortality on the American eel resource as required by the Atlantic States Marine Fisheries Commission (ASMFC). When the American eel stock is rebuilt, management strategies may become less restrictive.

#### **Action 5**

Maryland will establish an eel harvester permit for all commercial eel harvesters including crab license holders, in order to obtain timely, accurate and verifiable harvest reporting for American eels caught from Maryland waters. If a state quota is implemented, the Department will require daily reporting with the procedures and protocols to be determined.

#### **Action 6**

Maryland will continue to implement minimum size limits, possession limits, mesh size requirements, seasonal restrictions, gear restrictions and other management measures as necessary to meet the management framework for protecting and conserving the American eel resource.

#### **Action 7**

Maryland will implement and manage the commercial eel fishery by a quota system when one of the ASMFC management triggers is met.

**Action 8**

Maryland will continue to prohibit an elver fishery.

**Action 9**

Maryland will work with the stakeholders to evaluate and discuss challenges and priorities in managing the American eel fishery.

**Monitoring**

With the adoption of the ASMFC Addendum I (2006, effective 2007), coastal states must implement a mandatory catch and effort monitoring program for American eel. States are required to report commercial estimates of directed harvest by month, pounds landing by life stage and gear type, biological data (sex ration, age, length and weight), estimates of exports by season, harvest data as catch-per-unit-effort (CPUE), and permitted catch for personal use. For the recreational fishery, states must provide estimates of harvest by season and biological data, if available. In addition, states are required to implement an annual young-of-year (YOY) abundance survey (2001-present) to monitor annual recruitment.

Maryland conducts both fishery dependent and independent monitoring surveys. The commercial eel pot fishery is subsampled to obtain biological data and CPUE is determined from harvest data. The eel pot CPUE has been variable over time but has shown an overall positive trend (Figure 3) (Whiteford 2015). Fishery independent monitoring occurs in the Coastal Bays (Turville Creek and Bishopville Prong) for the annual YOY abundance survey which assesses recruitment. The YOY indices have been variable without trend. Two other fishery independent surveys occur in Maryland: a Sassafras River Eel Pot Survey and Gravel Run Silver Eel Sampling. CPUE has more than doubled since the late 1990s and early 2000s except for 2012.

**Monitoring Strategy**

Maryland will continue to conduct fishery dependent and fishery independent monitoring in the Chesapeake and Atlantic Coastal Bays to collect biological data essential for stock assessments and managing the American eel resource.

**Action 10**

Maryland will continue to conduct an annual YOY survey, the fishery independent adult surveys and the commercial harvest survey.

**References**

Atlantic States Marine Fisheries Commission (ASMFC). 2006. Addendum I to the Interstate Fishery Management Plan for American Eel. February 2006.

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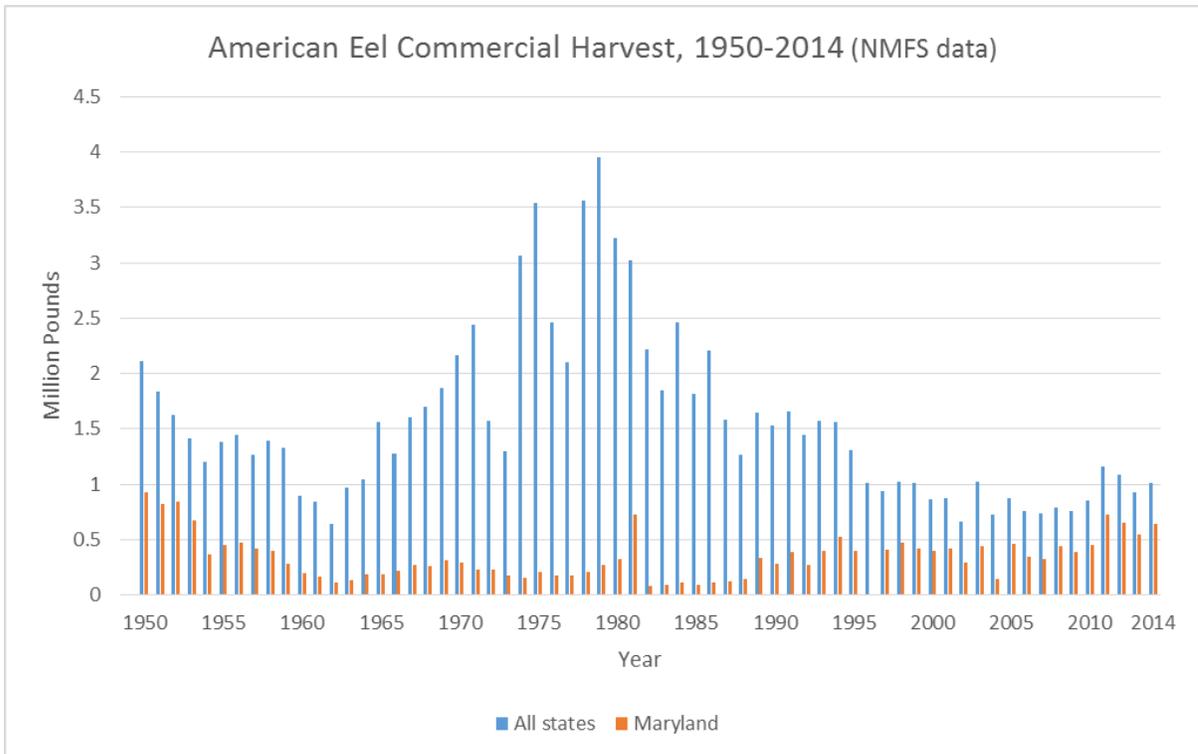
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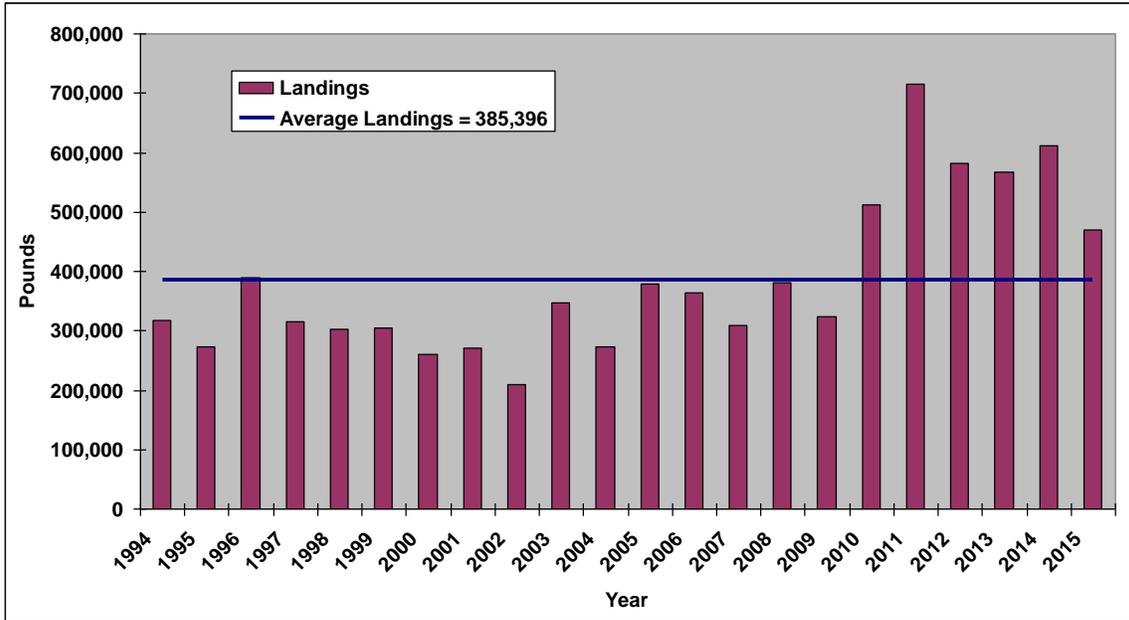
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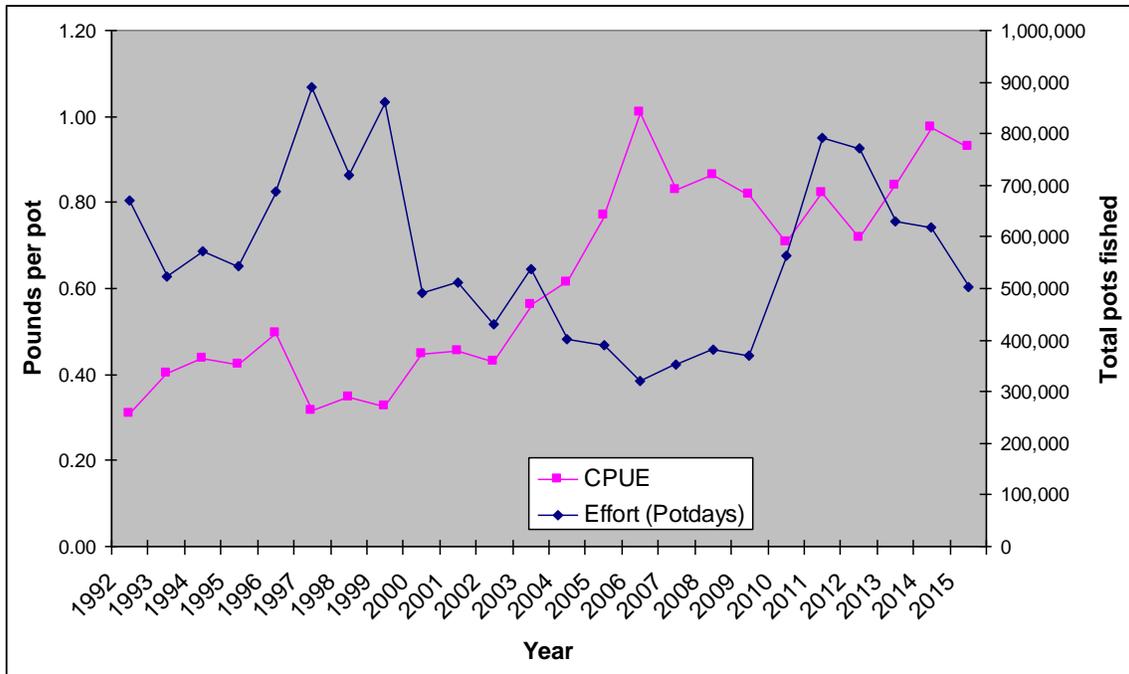
**Figure 1.**



**Figure 2. Reported American eel harvest from Maryland Chesapeake Bay, 1994-2015\* (personal comm., K. Whiteford).**



**Figure 3. Annual CPUE and effort, from the Maryland commercial eel pot fishery, 1992-2015\* (personal comm. K. Whiteford)**



\*Preliminary data for 2015