

***Atlantic States Marine Fisheries Commission***

**ADDENDUM VI TO THE INTERSTATE FISHERY  
MANAGEMENT PLAN FOR AMERICAN EEL**

***Commercial Glass/Elver Eel Management***



**Approved May 2024**



**Sustainable and Cooperative Management of Atlantic Coastal Fisheries**

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## **1.0 Introduction**

The Atlantic States Marine Fisheries Commission (Commission) has coordinated interstate management of American eels (*Anguilla rostrata*) from 0-3 miles offshore since 2000. American eel is currently managed under the Interstate Fishery Management Plan (FMP) and Addenda I-V to the FMP. Management authority in the exclusive economic zone (EEZ) from 3-200 miles from shore lies with NOAA Fisheries. The management unit is defined as the portion of the American eel population occurring in the territorial seas and inland waters along the Atlantic coast from Maine to Florida.

This Addendum maintains the commercial quota for Maine's glass eel fishery for three years (2025 – 2027).

## **2.0 Overview**

### **2.1 Statement of Problem**

Addendum V, approved in August 2018, examined Maine's glass/elver eel quota based on updated information but made no changes to the state's quota of 9,688 pounds. The Addendum specified Maine's 9,688 pound glass eel quota be set for three years (starting in 2019; from 2019-2021), and could be revisited before year four (2022). At that point, the quota of 9,688 pounds was extended for an additional three years (2022-2024) without requiring a new addendum. A new addendum was needed to address fishing beyond 2024.

### **2.2 Background**

American eels inhabit fresh, brackish, and coastal waters along the Atlantic, from the southern tip of Greenland to Brazil. American eel eggs are spawned and hatch in the Sargasso Sea. After hatching, leptocephali (the larval stage) are transported to the coasts of North America and the upper portions of South America by ocean currents. Leptocephali then transform into glass eels via metamorphosis. In most areas, glass eels enter nearshore waters and begin to migrate up-river, although there have been reports of leptocephali found in freshwater in Florida. Glass eels settle in fresh, brackish, and marine waters, where they undergo pigmentation, reaching the elver life stage. Elvers subsequently mature into the yellow eel phase, most by the age of two years.

The Commission's American Eel Board first convened in November 1995 and finalized the FMP for American Eel in November 1999. The goal of the FMP is to conserve and protect the American eel resource to ensure its continued role in its ecosystems while providing the opportunity for commercial, recreational, scientific, and educational uses. The FMP requires a minimum recreational size and possession limit and a state license for recreational harvesters 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.

Since the FMP was approved in 1999, it has been modified four times. Addendum IV (2014) specified an annual glass eel commercial quota for Maine of 9,688 pounds for the 2015-2017 fishing seasons, and that it be re-evaluated after 3 years (prior to the start of the 2018 fishing season). In October 2017, the Board specified a glass eel commercial quota for Maine of 9,688 pounds for the 2018 fishing season. Addendum V (2018) examined Maine's glass/elver eel quota based on updated information but made no changes to the state's quota. In 2021 the Board extended the quota of 9,688 pounds through 2024.

Addendum V also maintained other provisions of Addendum IV relevant to the glass eel/elver fishery. Overages of any state's commercial glass/elver eel quota would require that state or jurisdiction to deduct their entire overage from their quota the following year, on a pound for pound basis. Any state or jurisdiction with a commercial glass eel fishery harvesting at least 750 pounds is required to implement daily trip-level reporting with daily electronic accounting to the state for both harvesters and dealers. Additionally, any state or jurisdiction with a commercial glass eel fishery harvesting at least 750 pounds must implement a fishery-independent life cycle survey covering glass/elver, yellow, and silver eels within at least one river system. Any state or jurisdiction can request an allowance for commercial harvest of glass eels based on stock enhancement programs implemented after January 1, 2011, subject to TC review and Board approval. To qualify for the allowance the state must demonstrate that the stock enhancement program has resulted in a measurable increase in glass eel passage and/or survival.

## **2.3 Description of the Fishery**

### **2.3.1 Glass Eel/Elver Fishery**

Life stage glass and elver eel harvest along the Atlantic coast is prohibited in all states except Maine and South Carolina. Prior to the implementation of the FMP, Maine was the only state compiling glass eel and elver fishery catch statistics. Under the FMP, all states are now required to submit fishery-dependent information. In recent years, Maine was the only state reporting substantial glass eel or elver harvest.

#### *Maine Glass Eel/Elver Fishery*

Since the implementation of the 9,688 pound Maine glass eel quota in 2015, landings have tracked closely with the quota. Since 2016, landings have remained above 94% of the quota, but have not exceeded it.

In 2012, Maine's glass eel landings hit an all-time high of 21,610 pounds with a landed value of over \$38 million. This huge spike in price per pound created a gold rush mentality that brought with it poaching problems that most thought Maine could not overcome, and there was a call to close the fishery all together. Over the next two years, the Maine Department of Marine Resources (ME DMR) responded by instituting a voluntary reduction in harvest of 35% from the 18,076 pounds that was landed in 2013. This established the first glass eel quota for Maine at 11,749 pounds. With the implementation of Addendum IV, the elver quota was cut another 11%, reducing Maine's glass eel quota to 9,688 pounds. Since the implementation of the 9,688

pound glass eel quota, landings have tracked closely with the quota with the exception of 2015 where a late spring with ice and high water contributed to a drop in landings down to 5,260 pounds.

**Table 1.** Maine's Glass/Elver Eel Landings in pounds 2007-2022 (Source: Maine DMR)

| Year | Landings | Value        | Year  | Landings | Value        |
|------|----------|--------------|-------|----------|--------------|
| 2007 | 3,714    | \$1,287,479  | 2015  | 5,259    | \$11,422,831 |
| 2008 | 6,951    | \$1,486,353  | 2016  | 9,400    | \$13,446,828 |
| 2009 | 5,199    | \$519,569    | 2017  | 9,343    | \$12,166,417 |
| 2010 | 3,158    | \$584,851    | 2018  | 9,194    | \$21,753,350 |
| 2011 | 8,585    | \$7,653,332  | 2019  | 9,620    | \$20,119,194 |
| 2012 | 21,611   | \$40,384,618 | 2020  | 9,652    | \$5,067,521  |
| 2013 | 18,080   | \$32,931,077 | 2021  | 9,106    | \$16,681,103 |
| 2014 | 9,690    | \$8,474,302  | 2022* | 9,429    | \$20,163,965 |

\*Preliminary landings

In 2013, Maine instituted individual fishing quotas, and penalties were moved from civil to criminal and included a “two-strike” provision where a harvester license would be permanently revoked. Also in 2013, ME DMR developed a swipe card program that allows dealers to enter daily landings data and allows ME DMR to analyze that data within 24 hours of receipt; it also serves as a fishery management tool to implement an individual fishing quota (IFQ) for harvesters. The program was expanded in 2015 to include dealer-to-dealer transactions. Using the swipe card program, ME DMR has effectively tracked the overall quota by closely monitoring the IFQs of over 1,000 harvesters, which includes quota for the four indigenous tribes and non-tribal quota. In 2022 and 2023 over 5,500 daily landings reports did not need to be key-entered as a result of the swipe card program, which has reduced the burden on ME DMR staff. The swipe card program has also shown to be reliable with no card failures reported in the last 3 years (2020 to 2023).

In addition, the number of fishery-related infractions reported by the ME Marine Patrol dropped from over 200 in 2013 to under 20 in 2014 through 2016. Elver related violations have continued to remain low in 2016 through 2023. The addition of the dealer-to-dealer swipe card program allows the ME DMR to track the glass eels from initial purchase to export out of the state. For a dealer to export out of Maine, they are required to have a separate “export” license and ME Marine Patrol must be present to weigh the shipment. ME Marine Patrol will also weigh the glass eels at the dealer facilities and report that verified amount along with the amount the swipe card program indicates should be at the facility. ME Marine Patrol can also remove any dead loss to reconcile the dealer’s inventory.

Given the high market value, poaching of glass eels and elvers remains a serious concern in several states. Enforcement of the regulations is challenging due to the nature of the fishery (very mobile, nighttime operation, and high value for product). Cooperation between the State’s enforcement agencies and the U.S. Fish and Wildlife Service remains a high priority. This

cooperation resulted in several convictions for violation of the Lacey Act in 2013 through 2016. From 2016 through 2023, the number of federal investigations and violations followed the same decreasing trend as fishery-related infractions.

### *Aquaculture*

Addendum IV to the FMP also allows approved Aquaculture Plans from states and jurisdictions to harvest up to 200 pounds of glass/elver eel annually from within their state waters for use in domestic aquaculture activities. Aquaculture Plans have been approved each year for Maine starting in 2018 for the 2019 fishing season.

## **2.4 Status of the Stock**

The last peer reviewed and accepted benchmark stock assessment was approved for management use in 2023. The Assessment and Peer Review Reports indicate the American eel stock is depleted and has likely been experiencing overfishing in the last few decades. The stock assessment recommended a drastic reduction to the yellow eel coastwide cap to between 21% and 33% of the current cap. The stock assessment did not provide recommendations regarding glass eel harvest.

The abundance indices developed and used in the 2023 assessment are more robust and better defined than previous assessments. State-mandated young-of-year (YOY) surveys have been in operation for twenty years or more in some cases. From Maine to Florida, 25 surveys were developed into individual indices of relative abundance and then combined into a coastwide YOY index using a multivariate auto-regressive state-space (MARSS) model. A slightly declining trend in coastwide YOY abundance was observed from 1987-2020 but the 95% confidence intervals on population growth rate estimates overlapped 0 suggesting a stable population. Ten elver indices were developed from multiple surveys from Maine to Virginia that were combined into a coastwide index using the MARSS model. The coastwide index indicated no trend in elvers from 1999-2020. There were also 14 yellow eel indices developed from multiple surveys from New Hampshire to South Carolina that were combined into a coastwide index using the MARSS model. There was a declining trend in coastwide yellow eel abundance from 1974-2020.

Additional analyses provide convergent results indicating the stock has decreased over the monitored time series. The Mann-Kendall test detected significant trends in 6 of the 26 YOY indices; of these two (33%) were increasing (Maine and New York) and four (67%) decreasing. For elver, two of nine indices had significant Mann-Kendall detected trends with one increasing and one decreasing (both in Virginia). For the yellow eel indices, the Mann-Kendall test detected significant trends in 7 of the 15 Yellow Eel indices; of these two (29%) were increasing and five (71%) decreasing. The Traffic Light method also showed similar results for both YOY and yellow eel indices, indicating green values for the 1980s, changing to orange, then to red by the end of the time series.

### **2.4.1 Maine Eel Lifecycle Monitoring**

In 2011, the glass eel life stage was identified as a unique opportunity to assess the annual recruitment of each year's cohort, because glass eels result from the previous year's spawning

activity and are all the same age. In order to assess the annual variation in recruitment of American eel, Addendum III (2011) required that each member state conduct an annual survey of YOY abundance. In 2018, Addendum V further required: *“Any state or jurisdiction with a commercial glass eel fishery must implement a fishery-independent life cycle survey covering glass/elver, yellow, and silver eels within at least one river system. If possible and appropriate, the survey should be implemented in the river system where the glass eel survey (as required under Addendum III) is being conducted to take advantage of the long-term glass eel survey data collection.”* Maine’s YOY survey has been running since 2001 and the yellow and silver eel surveys since 2018. Each year ME DMR staff summarize the results of the YOY, yellow, and silver eel lifecycle surveys into a compliance report. The methods and a summary of results are described below.

### *Methods*

Fishery-independent monitoring for young-of-year eels at West Harbor Pond in Maine has been carried out continuously since 2001. Each year eel ramps with collection traps are installed at the site in early spring, typically in March, and are checked daily throughout the run, which typically ends in late June. Glass eels and elvers are separated and enumerated before being released into the pond.

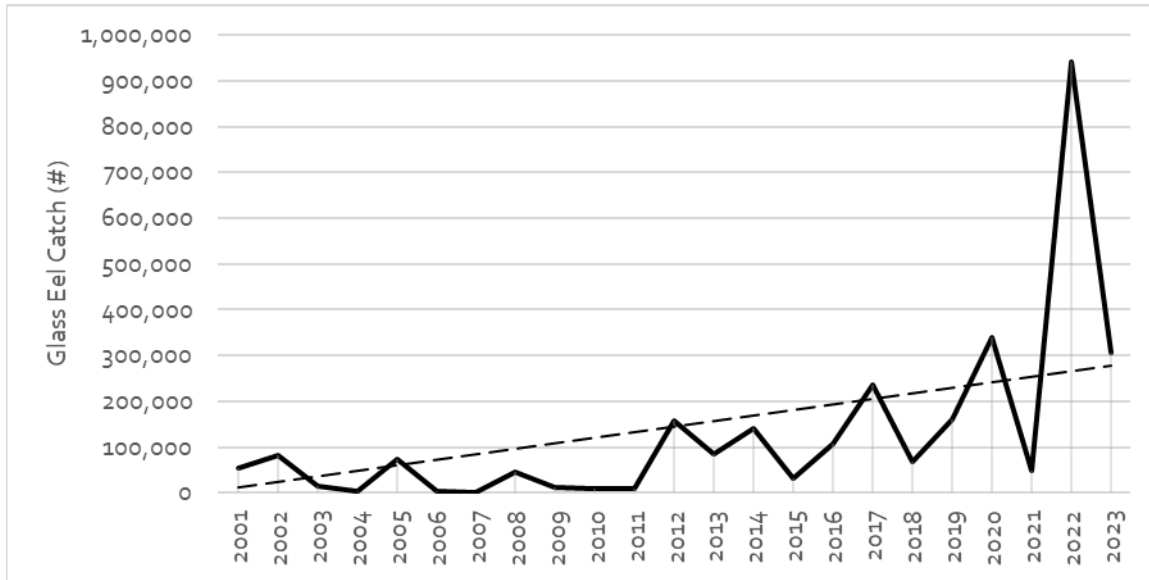
Monitoring of yellow and silver eels was initiated in 2018. The survey was initially on Cobbosseecontee Stream, but ME DMR moved the surveys to West Harbor Pond in 2019. Monitoring for yellow eels includes sampling with baited eel pots beginning in July and continuing through September of each year. Each time the pots are checked all eels are removed, measured for length and weight, tagged with a PIT tag if they are not already tagged, and released. Monitoring for silver eels includes daily checking of a fyke net set at the outlet of West Harbor Pond. The fyke net is set starting in September and continues until December. All eels are removed from the fyke net each day, scanned for a PIT tag, a subsample is measured for length and weight, and released downstream.

### *Results*

A total of 942,327 glass eels were captured during 2022. The catch of glass eels in 2022 far exceeded any previous catches and was more than seven times the average of 127,591 since 2001. Preliminary data from 2023 indicate a total of 307,216 glass eels were captured in 2023, more than double the average, which continues a trend five of the last seven years significantly exceeding average annual catch since 2001 (Figure 1). A total of 4,356 elvers were also captured in the trap boxes during 2022, which was the second largest catch of elvers from 2001 through 2022. Preliminary data from 2023 report a total of 6,344 elvers were captured in trap boxes, which is the highest amount to date.

A total of 459 yellow eels were caught in baited pots in West Harbor Pond at least once in 2022, with many being caught multiple times (up to 4 recaptures). Of the yellow eels caught in 2022, 51 were tagged in 2018, 77 were tagged in 2019, 92 were tagged in 2020, 123 were tagged in 2021, and 116 eels were untagged when captured in 2022 and received a PIT tag before

release. 1,019 yellow eels have been caught, tagged, and released into West Harbor Pond as of December 2022.



**Figure 1. Glass eel capture at West Harbor Pond Maine as part of the ME DMR Eel Lifecycle study (solid line). The linear trendline, with the intercept set to zero and an  $R^2$  value of 0.5009, shows an increase over time (dashed line).**

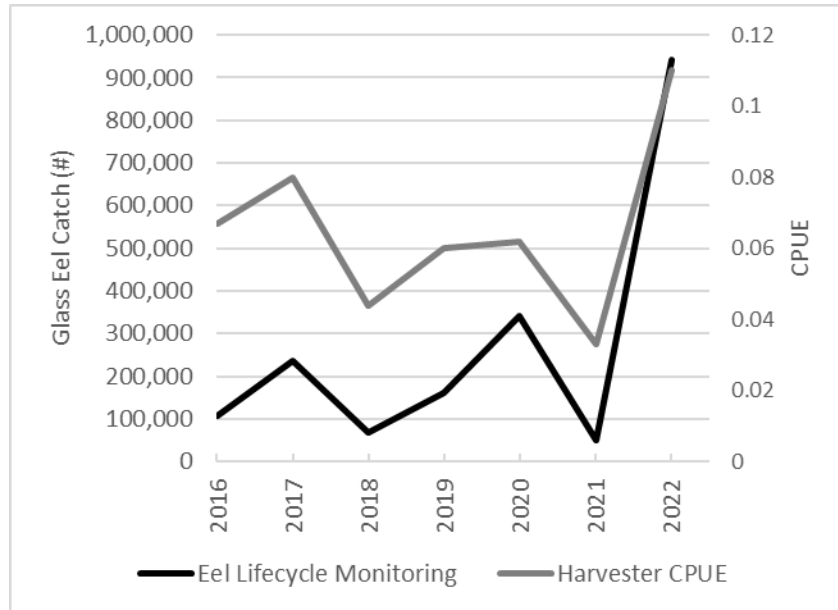
In 2022, a total of 269 eels were caught in the fyke net set at the outlet of West Harbor Pond, all of which were silver phase. Including the 2022 season, 5,888 silver eels have been captured and released at the site since 2018 and the annual average catch is 1,178. In 2022, length ranged from 24.8 cm to 102.6 cm TL, with an average of 34.6 cm TL, and weight ranged from 25.7 g to 2600 g, with an average of 119.7g. These lengths and weights did not differ significantly from previous years.

#### **2.4.2 Maine Glass/Elver Eel Index**

In addition to the in-season reporting of landings that allows for the close management of the Glass/Elver eel fishery in Maine, ME DMR also requires each harvester to report gear type, location, and set time for each gear type. These data were analyzed to produce a catch-per-unit-effort (CPUE) index for the Glass/Elver Eel fishery, which adds additional context to the proposed management options. Data from 2016-2022 were reviewed and a subset of that data was included in this analysis. Due to the difference between fyke nets and dip nets, in terms of the method for fishing each and the impact on set times, dip nets were excluded from the analysis to standardize the results. In addition, harvesters had the option to report set times in minutes, hours, days, and weeks. However, only those harvesters that reported in hours were included in the analysis due to irregularities in reporting in other units of time (e.g., reporting of: '0 days'; '1300 days'). With the exclusions described above, the remaining data accounted for the majority of harvesters in all years. For example, harvesters that reported both the use of fyke nets and set times in hours accounted for 75.5% of harvesters in 2022.



The CPUE for catches in fyke nets in the glass/elver fishery, expressed as pounds caught per one hour unit, ranged from 0.033 to 0.110 from 2016 to 2022 with an average of 0.065. CPUE was greatest in 2022, at nearly double the average, but otherwise CPUE decreased slightly from 2016-2021. In addition, CPUE for harvesters is closely correlated to the glass eel capture at West Harbor Pond as part of the Maine Eel Lifecycle Monitoring Program (Figure 2).



**Figure 2. Glass eel capture at West Harbor Pond Maine as part of the ME DMR Eel Lifecycle Study (black line) and CPUE of Harvesters from 2016-2022 (gray line).**

### 3.0 Management Program

#### 3.1 Maine Glass Eel Quota

Under this Addendum, the annual quota for Maine’s commercial glass eel fishery is 9,688 pounds. The 9,688 pound quota for Maine’s glass eel fishery is established for three years (2025-2027). If no change to Maine’s quota is desired, the Board may extend the selected quota for up to three years at a time via Board action, until this provision is modified by an addendum or amendment to the FMP. If a change to the quota is desired for 2028 or earlier, the Board must initiate an addendum or amendment to establish Maine’s glass eel commercial quota.

#### 4.0 Compliance

The provisions of Addendum VI are effective January 1, 2025.

#### 5.0 References

Atlantic States Marine Fisheries Commission (ASMFC). 2000. [Interstate Fishery Management Plan for American Eel \(\*Anquilla rostrata\*\)](#). Washington D.C.

ASMFC. 2014. [Addendum IV to the Interstate Management Plan for American Eel](#). Arlington, VA.

ASMFC. 2018. [Addendum V to the Interstate Management Plan for American Eel](#). Arlington, VA.

ASMFC. 2023. [American Eel Benchmark Stock Assessment and Peer Review Reports](#). Arlington, VA.