

# *Atlantic States Marine Fisheries Commission*

## **DRAFT ADDENDUM IV TO THE FISHERY MANAGEMENT PLAN FOR AMERICAN EEL FOR PUBLIC COMMENT**



*ASMFC Vision Statement:  
Sustainably Managing Atlantic Coastal Fisheries*

**June 2014**

**Revised June 20, 2014**

**Parts of Section 3.1.2 Yellow Eel Fisheries Management Options were revised, including Tables 5-7. Changes are highlighted in yellow.**

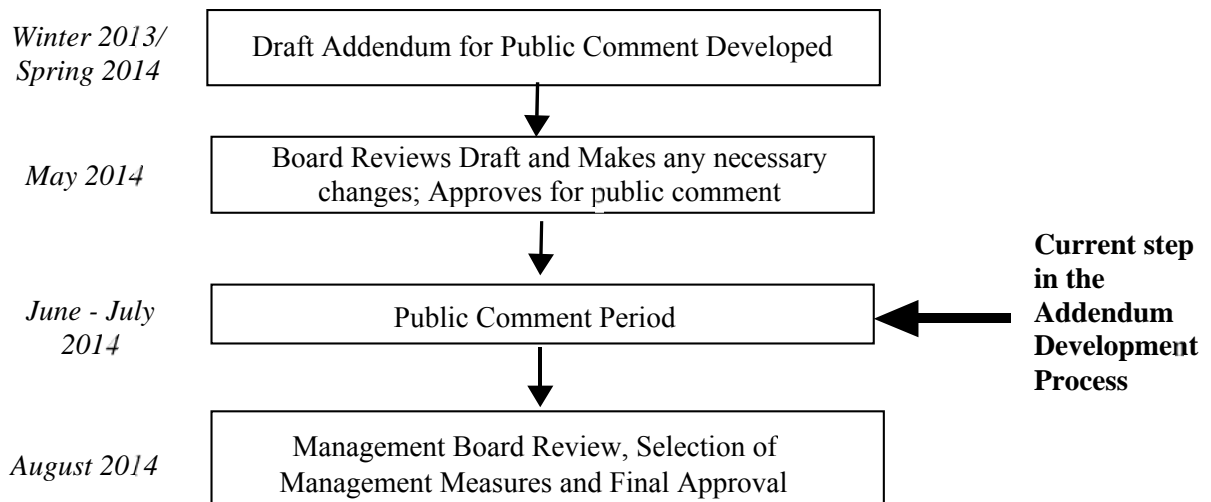
## PUBLIC COMMENT PROCESS AND TIME LINE

The public is encouraged to submit comments regarding this document at any time during the public comment period. Regardless of how they were sent, comments will be accepted until 11:59 P.M. (EST) on July 17, 2014. Comments received after that time will not be included in the official record. The American Eel Management Board will use public comment on this Draft Addendum to develop the final management options in Addendum IV to the American Eel Fishery Management Plan.

You may submit public comment in one or more of the following ways:

1. Attend public hearings in your state or jurisdiction.
2. Refer comments to your state's members on the American Eel Management Board or Advisory Panel, if applicable.
3. Mail, fax or email written comment to the following address:

Kate Taylor  
Senior FMP Coordinator  
1050 North Highland Street  
Suite 200A-N  
Arlington, Virginia 22201  
[comments@asmfc.org](mailto:comments@asmfc.org) (Subject line: American Eel)



## EXECUTIVE SUMMARY

The Commission's American Eel Management Board (Board) initiated the development of Draft Addendum III in August 2012 in response to the 2012 Benchmark American Eel Stock Assessment, which found the American eel population in U.S. waters is depleted. The assessment found the stock is at or near historically low levels due to a combination of historical overfishing, habitat loss and alteration, productivity and food web alterations, predation, turbine mortality, changing climatic and oceanic conditions, toxins and contaminants, and disease. Draft Addendum III included a range of options for the commercial glass, yellow, and silver eel fisheries, as well as the recreational fishery. In August 2013, the Board approved some of the measures from Draft Addendum III (predominately the commercial yellow eel and recreational fishery management measures) and split out the remainder of the management measures for further development in Draft Addendum IV. This Draft Addendum proposes additional management measures for the commercial glass, yellow, and silver eel fisheries. No additional changes to the recreational fishery are proposed in this Draft Addendum. The goal of Draft Addendum IV is to reduce overall mortality and increase conservation of American eel stocks. Specifically, the management options under consideration are:

### **Commercial Glass Eel Fisheries Management Options**

- |  |  |
|--|--|
| <i>Option 1</i> – Status Quo                         | <i>Option 6</i> – Glass Eel Harvest Allowance<br>Based on Stock Enhancement Programs |
| <i>Option 2</i> – 2014 Management Measures           | <i>Option 7</i> – Aquaculture Quota  |
| <i>Option 3</i> – Closure of the Glass Eel Fisheries | <i>Option 8</i> – Aquaculture Permitting   |
| <i>Option 4</i> – Glass Eel Quota                    | <i>Option 9</i> – Reporting Requirements   |
| <i>Option 5</i> – Quota Overages                     | <i>Option 10</i> – Monitoring Requirements   |

### **Commercial Yellow Eel Fisheries Options**

- |  |  |
|--|--|
| <i>Option 1</i> – Status Quo   | <i>Option 4</i> – Yellow Eel Quota based on 2010<br>Landings |
| <i>Option 2</i> – Adjusted Yellow Eel Quota<br>(Allocation Base Years = 2011 – 2013) | <i>Option 5</i> – Weighted Yellow Eel Quota                  |
| <i>Option 3</i> – Adjusted Yellow Eel Quota<br>(Allocation Base Years = 2002 -2012)  | <i>Option 6</i> – Quota Overages                             |
|  | <i>Option 7</i> – Quota Transfers                            |
|  | <i>Option 8</i> – Catch Cap                                  |

### **Commercial Silver Eel Fisheries Measures**

- |  |  |
|--|--|
| <i>Option 1</i> – Status Quo                     | <i>Option 3</i> – Effort Reduction/Time Closures |
| <i>Option 2</i> – Extension of Sunset Provisions | <i>Option 4</i> – License Cap                    |

### **Sustainable Fishing Plans for American Eel**

- Fishing Mortality Based Plan*
- Transfer Plan*
- Aquaculture Plan*

## TABLE OF CONTENTS

<b>PUBLIC COMMENT PROCESS AND TIME LINE .....</b>	<b>i</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>ii</b>
<b>1. INTRODUCTION.....</b>	<b>1</b>
<b>2. BACKGROUND .....</b>	<b>1</b>
2.1. STATEMENT OF THE PROBLEM .....	1
2.2. LIFE HISTORY .....	1
2.3. STATUS OF MANAGEMENT .....	2
2.3.1. <i>International Management</i> .....	2
2.3.1.1. European Management .....	2
2.3.1.2. Canadian Management.....	4
2.3.2. <i>Endangered Species Act Consideration</i> .....	6
2.4. STATUS OF THE STOCK.....	7
2.5. STATUS OF THE FISHERY .....	8
<b>3. MANAGEMENT OPTIONS .....</b>	<b>11</b>
3.1 COMMERCIAL FISHERY MANAGEMENT OPTIONS.....	11
3.1.1. <i>Glass Eel Fisheries Management Options</i> .....	12
3.1.2. <i>Yellow Eel Fisheries Management Options</i> .....	17
3.1.3. <i>Silver Eel Fisheries</i> .....	27
3.1.4. <i>State Specific Sustainable Fishery Management Plans for American Eel</i> .....	29
<b>4. LAW ENFORCEMENT RECOMMENDATIONS.....</b>	<b>31</b>
<b>5. COMPLIANCE.....</b>	<b>32</b>
<b>6. LITERATURE CITED .....</b>	<b>33</b>

## **1. INTRODUCTION**

The Atlantic States Marine Fisheries Commission (Commission) has coordinated interstate management of American eel (*Anguilla rostrata*) from 0-3 miles offshore since 2000. American eel is currently managed under the Interstate Fishery Management Plan (FMP) and Addenda I-III 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.

## **2. BACKGROUND**

### **2.1. STATEMENT OF THE PROBLEM**

The Commission's American Eel Management Board (Board) initiated the development of Draft Addendum III in August 2012 in response to the 2012 American Eel Benchmark Stock Assessment, which found the American eel population in U.S. waters is depleted. The assessment found the stock is at or near historically low levels due to a combination of historical overfishing, habitat loss and alteration, productivity and food web alterations, predation, turbine mortality, changing climatic and oceanic conditions, toxins and contaminants, and disease. Draft Addendum III for Public Comment included a range of options for the commercial glass, yellow, and silver eel fisheries, as well as the recreational fishery. In August 2013, the Board approved some of the measures from Draft Addendum III for Public Comment (predominately the commercial yellow eel and recreational fishery management measures) and split out the remainder of the management measures (commercial glass and silver eel fisheries) for further development in Draft Addendum IV. At that time, the Board directed the American Eel Plan Development Team (PDT) to develop Draft Addendum IV to include, but not limited to, 1) a coastwide glass eel quota, 2) adequate monitoring requirements, 3) adequate enforcement measures and penalties, 4) transferability, and 5) timely reporting. The goal of Draft Addendum IV is to reduce overall mortality and increase overall conservation of American eel stocks.

### **2.2. LIFE HISTORY**

American eel (*Anguilla rostrata*) 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 at random to the coasts of North America and the upper portions of South America by ocean currents. Leptocephali are then transformed into glass eels via metamorphosis. In most areas, glass eel 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, subsequently maturing into yellow eels. Yellow eel can metamorphose into a silver eel (termed *silvering*) beginning at age three and up to twenty-four years old, with the mean age of silvering increasing with increasing latitude. Environmental factors (e.g., food availability and temperature) may play a role in the triggering of silvering. Males and females differ in the size at which they begin to silver. Males begin silvering at a size typically greater than 14 inches and females begin at a size greater than 16-

20 inches (Goodwin and Angermeier 2003). However, this is thought to vary by latitudinal dispersal. Actual metamorphosis is a gradual process and eels typically reach the silver eel stage during their migration back to the Sargasso Sea, where they spawn and die.

Eels make extensive use of freshwater systems, but they may migrate to and from or remain in brackish and marine waters. Therefore, a comprehensive eel management plan and set of regulations must consider the various unique life stages and the diverse habitats of American eel, in addition to society's interest and use of this resource.

### **2.3. STATUS OF MANAGEMENT**

American eel occupy a significant and unique niche in the Atlantic coastal reaches and tributaries. Historically, American eels were very abundant in East Coast streams, comprising more than 25 percent of the total fish biomass. Eel abundance had declined from historic levels but remained relatively stable until the 1970s. Fishermen, resource managers, and scientists postulated a further decline in abundance based on harvest information and limited assessment data during the 1980s and 1990s. This resulted in the development of the Commission's Interstate Fishery Management Plan (FMP) for American Eel, which was approved in 1999. The FMP required that all states maintain as conservative or more conservative management measures at the time of implementation for their commercial fisheries and implement a 50 fish per day bag limit for the recreational fishery. The FMP also required mandatory reporting of harvest and effort by commercial fishers and/or dealers and specific fisheries independent surveys to be conducted annually by the states.

Since then the FMP was modified three times. Addendum I (approved in February 2006) established a mandatory catch and effort monitoring program for American eel. Addendum II (approved in October 2008) made recommendations for improving upstream and downstream passage for American eels. Most recently, Addendum III (approved in August 2013) made changes to the commercial fishery, specifically implementing restrictions on pigmented eels, increasing the yellow eel size limit from 6 to 9 inches, and reducing the recreational creel limit from 50 fish to 25 fish per day.

#### **2.3.1. INTERNATIONAL MANAGEMENT**

Despite data uncertainties with European eels and American eels in Canada, both the European Union and the Department of Fisheries and Oceans Canada have taken recent management actions to promote the rebuilding of local stocks.

##### **2.3.1.1. EUROPEAN MANAGEMENT**

While American and European eels (*Anguilla anguilla*) are two separate species, the spawning grounds and early life history habitats are believed to overlap. Therefore oceanographic changes could influence both stocks. Currently, the European eel stock is considered severely depleted (ICES, 2013). Major fisheries occur in the Netherlands, France, Sweden, and the United Kingdom, with total 2012 commercial harvest in the EU estimated at 5.2 million pounds and recreational harvest estimated at 1.1 million pounds (Figure 1; ICES, 2013). In 2007, the European Union (EU) passed legislation which required EU countries to develop and

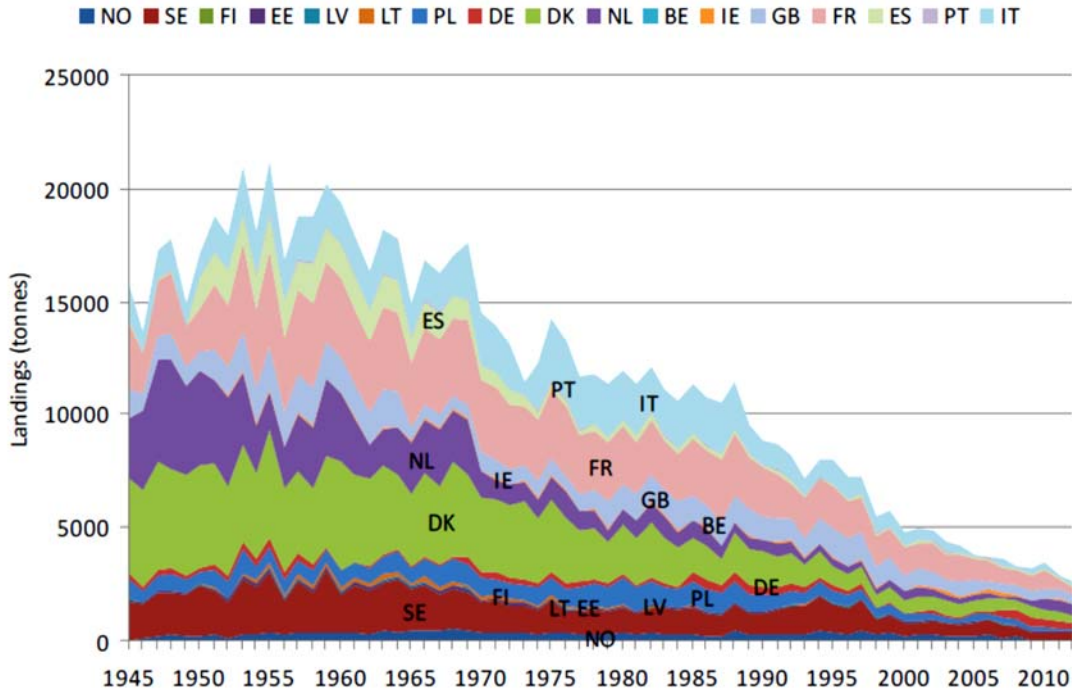
implement measures to allow 40% of adult eels to escape from inland waters to the sea for spawning purposes. In addition, beginning in 2008, EU countries that catch glass eel (defined as juvenile eels less than 4.7 inches long) were required to use 35% of their catch for restocking within the EU and increase this to at least 60% by 2013.

To demonstrate how they intend to meet the target, EU countries were required to develop national eel management plans at river-basin level. To date, the European Commission has adopted all plans submitted by 19 EU countries, plus a joint plan for the Minho River (Spain/Portugal). Management measures implemented though these plans vary from country to country, but are similar to most management measures considered or implemented in the U.S. The management measures include:

- Seasonal closures
- Size limits (11 – 21.6 inches)
- Recreational bag limit (2 - 5 fish/angler/day)
- Gear restrictions (banning fyke nets, increasing mesh size)
- Reducing effort (e.g. by at least 50%)
- Prohibiting glass, silver or all commercial fishing
- Commercial quotas
- Implementing catch and release recreational fisheries only
- Reducing illegal harvest and poaching
- Increasing fish passage
- Restocking suitable inland waters with glass eels

In 2013 the International Council on the Exploration of the Seas (ICES) completed an evaluation on the implementation of the national management plans (ICES, 2013a). ICES concluded that, given the short time since implementation, restrictions on commercial and recreational fisheries for silver eel has contributed the most to increases in silver eel escapement. The effectiveness of restocking remains uncertain (ICES, 2013a). ICES advises that data collection, analysis, and reporting should be standardized and coordinated to facilitate the production of stock-wide indicators to assess the status of the stock and to evaluate the effect of management regulations.

In response to the evaluation, European Parliament passed a resolution in September 2013 requesting the European Commission present new legislation to further conserve European eel populations. The new law must close the loopholes allowing the continued overfishing and illegal trade; evaluate current restocking measures and their contribution to eel recovery; require more timely reporting on the impact of eel stock management measures; and require member states that do not comply with the reporting and evaluation requirements to reduce their eel fishing effort by 50%. The European Commission's new legislative proposal, which is expected to be presented in Summer 2014, must aim to achieve the recovery of the stock "with high probability".



**Figure 1.** Total landings of European eel (all life stages) from 2013 Country Reports (Note: not all countries reported). NO = Norway, SE = Sweden, FI – Finland, EE = Estonia, LV = Latvia, LT = Lithuania, PL = Poland, DE = Germany, DK = Denmark, NL = Netherlands, BE = Belgium, IE = Ireland, GB = Great Britain, FR = France, ES = Spain, PT = Portugal, IT = Italy. *From ICES, 2013a.*

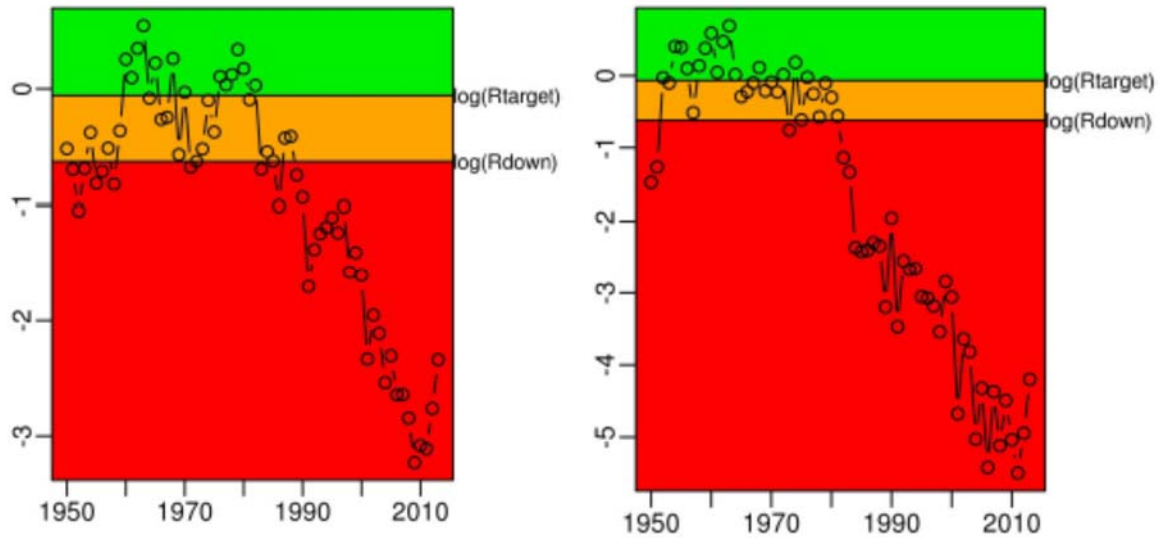
In November 2013, ICES completed an update on European stock status to provide management advice for the 2014 fishing year (ICES, 2013b). The update found that annual recruitment of glass eel to European waters has increased over the last two years, from less than 1% to 1.5% of the reference level in the “North Sea” series, and from 5% to 10% in the “Elsewhere” series<sup>1</sup>, which may or may not be the result of the regulatory changes (Figure 2). However, despite recent increases, production of offspring is very low and there is a risk that the adult stock size is too small to produce sufficient amount of offspring to maintain the stock (ICES, 2013b). The biomass of escaping silver eel is estimated to be well below the target (ICES, 2013b). ICES continues to recommend that all anthropogenic mortality affecting production and escapement of silver eels should be reduced to as close as possible to zero, until there is clear evidence of sustained increase in both recruitment and the adult stock. The stock remains critical and urgent action is needed (ICES, 2013b).

### 2.3.1.2. CANADIAN MANAGEMENT

American eel are widespread in eastern Canada, but there are dramatic declines throughout its range, including Lake Ontario and the upper St. Lawrence. Although trends in abundance are highly variable, strong declines are apparent in several indices. The American eel was

<sup>1</sup> The North Sea series are from Norway, Sweden, Germany, Denmark, Netherlands, and Belgium. The Elsewhere series are from UK, Ireland, France, Spain, Portugal, and Italy.





**Figure 2.** Trends in recruitment (“Elsewhere”, left, and “North-Sea”, right) of European eels with respect to healthy zone (green), cautious zone (orange) and critical zone (red). *From ICES, 2013b.*

first assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2006 and was designated as a species of “Special Concern.” The status was re-examined by COSEWIC in 2012 and it was recommended to list the species as Threatened under the Canadian Species at Risk Act (similar to the U.S. Endangered Species Act). A National Management Plan for American Eel in Canada was developed by the Canadian Eel Working Group which specifies short and long term goals for recovery (DFO, 2010). One of the short-term goals of the plan is to reduce eel mortality from all anthropogenic sources by 50% relative to the 1997-2002 average. Long-term management goals include rebuilding overall abundance of the American eel in Canada to its mid-1980s levels.

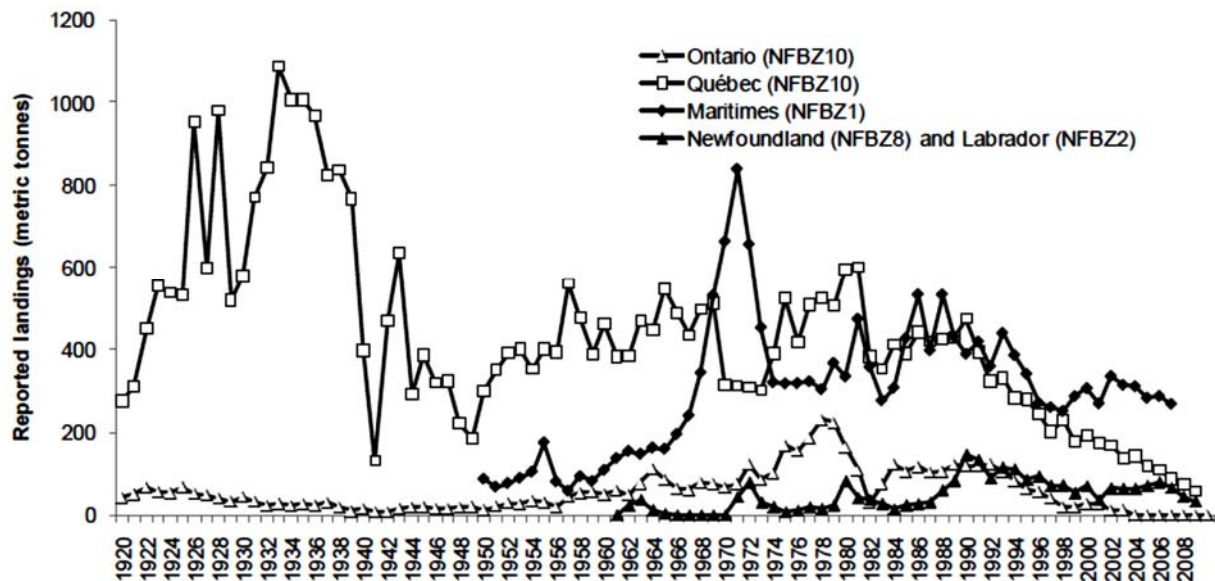
Canadian commercial yellow and silver American eel fisheries occur in New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland and Labrador, and Québec (Figure 3). Fishing occurs in both fresh and marine waters, but many rivers and coastal habitats remain unfished. Elver fisheries in Canada occur only in Scotia-Fundy and the south coast of Newfoundland. Overall total reported American eel landings in Canada declined through the early 1960s, increased to a peak in the late 1970s, and have since declined to the lowest level in recent history (Cairns et al, 2014). Winter recreational spear fisheries of yellow eels also occur in the Southern Gulf of St. Lawrence.

Recent management measures to meet the goals of the National Management Plan have included:

- Minimum size limits raised to 20.8 inches (Gulf region), 13.75 inches (Maritimes region) and 11.8 inches (southwestern New Brunswick, Newfoundland and Labrador)
- Reduction to seasons
- Area closures
- Buyouts of licenses
- Glass eel fisheries are not permitted in areas where fisheries exist for larger eels
- Enforcement of regulatory definitions on fyke nets

- Measures to reduce high grading
- License caps, limited entry, and license reductions
- Gear restrictions, including a 1" x ½" escapement panel
- Quota reductions, including 10% cut in glass eel fisheries

The first large-scale eel stocking experiment occurred in the Richelieu River, a tributary to Lake Champlain, in 2005. Since then, a total of seven million elvers have been stocked in Canadian waters. Stocking initiatives can be considered as a potential threat because their effects are uncertain, manifestation of some effects may only be apparent years after, and because of the documented negative effects of stocking of on other fish, particularly salmon (COSEWIC, 2012). Continuing habitat degradation, especially owing to dams and pollution, and existing fisheries in Canada and elsewhere may constrain recovery (COSEWIC, 2102).



**Figure 3.** Reported landings of all life stages from Quebec, Ontario, the Maritime Provinces, and Newfoundland and Labrador from 1920 – 2010. *From COSEWIC, 2012.*

### 2.3.2. ENDANGERED SPECIES ACT CONSIDERATION

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). The U.S. Fish and Wildlife Service (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 statues 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 and 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.

The five factors on which listing is considered include:

1. Present or threatened destruction, modification, or curtailment of its habitat or range;
2. Over-utilization of the species for commercial, recreational, scientific, or educational purposes;
3. Disease or predation;
4. Inadequacy of existing regulatory mechanisms; and
5. Other natural or manmade factors affecting its continued existence.

#### **2.4. STATUS OF THE STOCK**

The Benchmark Stock Assessment was completed and accepted for management use in May 2012. The assessment indicated 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 (ASMFC, 2012). The stock is considered depleted, however no overfishing determination can be made at this time based solely on the trend analyses performed (ASMFC, 2012). The ASMFC American Eel Technical Committee (TC) and Stock Assessment Subcommittee (SAS) caution that although commercial fishery landings and effort have declined from high levels in the 1970s and 1980s (with the recent exception of the glass eel fishery), current levels of fishing effort may still be too high given the additional stressors affecting the stock such as habitat loss, passage mortality, and disease as well as potentially shifting oceanographic conditions. Fishing on all life stages of eels, particularly young-of-the-year and in-river silver eels migrating to the spawning grounds, could be particularly detrimental to the stock, especially if other sources of mortality (e.g., turbine mortality, changing oceanographic conditions) cannot be readily controlled.

In 2014 the TC and Stock Assessment Subcommittee (SAS) completed an update of the young of the year (YOY) indices included in the benchmark stock assessment. The FMP requires states and jurisdictions with a declared interest in the species to conduct an annual YOY survey for the purpose of monitoring annual recruitment of each year's cohort. The benchmark assessment included data only through 2010. Since that time some states have heard anecdotal information about increased recruitment as well as recorded evidence of increased recruitment in their fisheries independent YOY surveys.

Based on the update of the YOY indices, the TC found no change in the YOY status from the benchmark assessment with the exception of one survey in Goose Creek, SC (Table 1). YOY trends are influenced by many local environmental factors, such as rainfall and spring temperatures. While some regions along the coast have experienced high catches in 2011, 2012, and/or 2013, other regions have experienced average or lower catches. For example in 2012, Rhode Island and Florida had below average counts, with Florida having its lowest catch of their time series; New Hampshire, New York, Virginia, and Georgia had average counts; and Maine, Connecticut, New Jersey, Delaware, and Maryland had their highest YOY catches on record. The TC stresses high YOY catches in a few consecutive years do not necessarily correspond to an increasing trend since the YOY surveys can fluctuate greatly. Additionally, due to the limited extent of sampling, trends at the state level may not be reflective of what is actually occurring statewide or coastwide. The YOY indices were only one factor in the determination of the depleted stock status for American eel, so therefore there is no

recommended change in the conclusions of the benchmark assessment and the depleted stock status is still warranted.

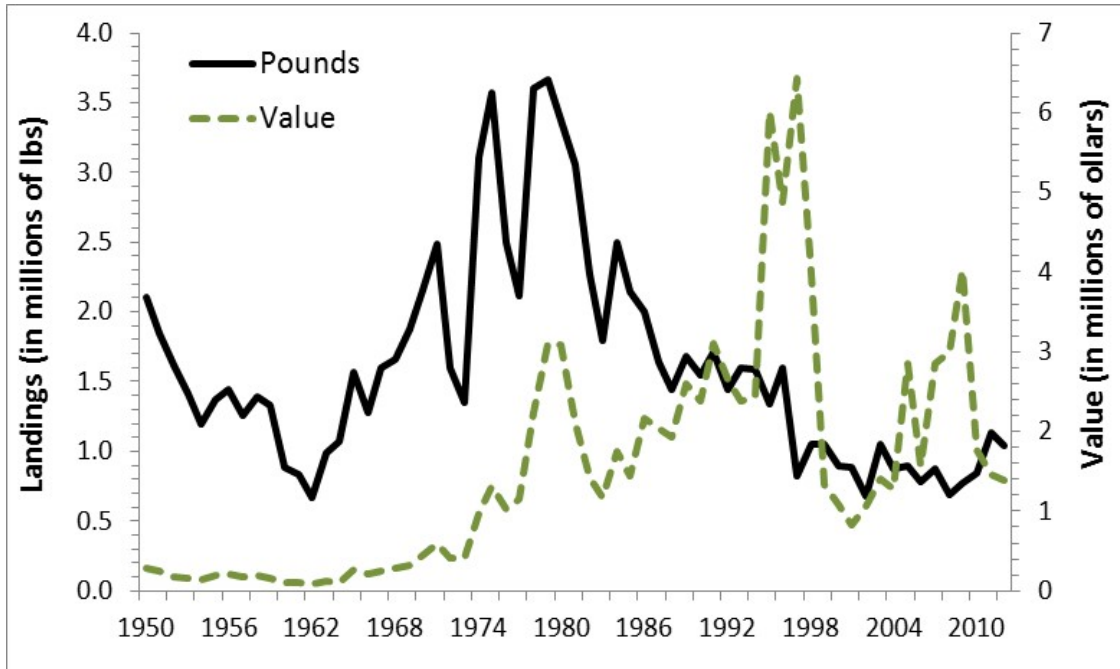
Region	State	Site	SA Result	Update
Gulf of Maine	ME	West Harbor Pond	NS	NS
	NH	Lamprey River	NS	NS
	MA	Jones River	NS	NS
	MA	Parker River	NS	NS
Southern New England	RI	Gilbert Stuart Dam	NS	NS
	RI	Hamilton Fish Ladder	NS	NS
	NY	Carmans River	NS	NS
Delaware Bay/ Mid-Atlantic Coastal Bays	NJ	Patcong Creek	NS	NS
	DE	Millsboro Dam	NS	NS
	MD	Turville Creek	NS	NS
Chesapeake Bay	PRFC	Clarks Millpond	NS	NS
	PRFC	Gardys Millpond	NS	NS
	VA	Brackens Pond	NS	NS
	VA	Kamps Millpond	NS	NS
	VA	Warehams Pond	NS	NS
	VA	Wormley Creek	NS	NS
South Atlantic	SC	Goose Creek	NS	↓
	GA	Altamaha Canal	NS	NS
	GA	Hudson Creek	NS	NS
	FL	Guana River Dam	NS	NS

**Table 1.** Results of the Mann-Kendall trend analysis applied to 2012 Benchmark Stock Assessment (SA) and updated YOY indices developed from the ASMFC-mandated recruitment surveys. Trend indicates the direction of the trend if a statistically significant temporal trend was detected ( $P$ -value  $< \alpha$ ;  $\alpha = 0.05$ ). NS = not significant.

## 2.5. STATUS OF THE FISHERY

The American eel fishery primarily targets yellow stage eel. Silver eels are caught during their fall migration as well. Eel pots are the most typical gear used; however, weirs, fyke nets, and other fishing methods are also employed. Yellow eels were harvested for food historically, today's fishery sells yellow eels primarily as bait for recreational fisheries. From 1950 to 2012, U.S. Atlantic coast landings ranged from a low of approximately 664,000 pounds in 1962 to a high of 3.67 million pounds in 1979 (Figure 4). After an initial decline in the 1950s, landings increased to a peak in the 1970s and early 1980s in response to higher demand from European food markets. In most regions, landings declined sharply by the late 1980s and have fluctuated around one million pounds for the past decade. The value of U.S. commercial yellow eel landings as estimated by NOAA Fisheries has varied from less than a \$100,000 (prior to the 1980s) to a peak of \$6.4 million in 1997.

State reported landings of yellow eels in 2013 totaled 907,671 pounds (Table 2) which represents an 17% decrease (~187,000) in landings from 2012 (1,104,429 pounds). Since 2000, yellow eel landings have increased in the Mid-Atlantic region (NY, NJ, and MD) with the exception of Delaware and the Potomac River. Additionally, yellow eel landings have declined in the New England region (ME, NH, MA, CT) with the exception of Rhode Island. Within the Southern region, since 2000 landings have declined in North Carolina but increase in Florida. In 2013, state reported landings from New Jersey, Delaware, Maryland, and Virginia each totaled over 80,000 pounds of eel, and together accounted for 86% of the coastwide commercial total landings.



**Figure 4.** Total commercial landings (in pounds) and value (in millions of dollars) of yellow eels along the U.S. Atlantic Coast, 1950–2012.

Glass eel fisheries along the Atlantic coast are prohibited in all states except Maine and South Carolina. In recent years, Maine is the only state reporting significant harvest (Table 3). Harvest has increased the last few years as the market price has risen to more than \$2,000 per pound, although in 2014 prices were recorded between \$400 and \$650 per pound. Glass eels are exported to Asia to serve as seed stock for aquaculture facilities. Landings of glass eels in 2012 were reported from Maine and South Carolina and totaled 22,215 pounds.

Because eel is managed by the states and is not a target species for the NMFS, landings information for states that rely on the NMFS estimates may be underreported. In addition, at least a portion of commercial eel landings typically come from non-marine water bodies. Even in states with mandatory reporting, these requirements may not extend outside the marine district, resulting in a potential underestimate of total landings. Despite concern about the level of under reporting, reported landings are likely indicative of the trend in total landings over time.

**Table 2.** Harvest (in pounds) by state of yellow eels from 1998 - 2013. *NA = Not available, \* Confidential*

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	PRFC	VA	NC	SC	GA	FL	Total
1998	20,671	459	5,606	967	5,606	16,896	94,327	131,478	301,833	209,008	123,819	91,084		*	13,819	1,015,649
1999	36,087	245	10,281	140	10,281	7,945	90,252	128,978	305,812	163,351	183,255	99,939	*		17,533	1,054,121
2000	14,349	310	5,158	25	5,158	5,852	45,393	119,180	259,552	208,549	114,972	127,099	*		6,054	911,824
2001	9,007	185	3867	329	1,724	19,187	57,700	120,634	271,178	213,440	96,998	107,070	*	*	14,218	915,585
2002	11,616	67	3842	234	3,710	26,824	64,600	90,353	208,659	128,595	75,549	59,940	*	*	7,587	681,609
2003	15,312	36	4,047	246	1,868	3,881	100,701	155,515	346,412	123,450	121,043	172,065		*	8,486	1,053,119
2004	29,651	65	5,328	971	1,374	5,386	120,607	141,725	273,142	116,163	123,314	128,875			7,330	953,931
2005	17,189	120	3,073	0	341	25,515	148,127	110,456	378,659	103,628	66,701	49,278			3,913	907,000
2006	17,259	93	3676	1034	3,443	7,673	158,917	120,462	362,966	83,622	82,738	33,581			1,248	876,712
2007	9,309	70	2853	1230	885	15,077	164,331	131,109	309,215	97,361	56,463	34,486			7,379	829,767
2008	7,992	25	6,046	8866	6,012	15,159	140,418	80,003	381,993	71,655	84,789	24,658	*		15,624	843,762
2009	2,525	83	1217	4855	630	13,115	121,471	59,619	324,773	58,863	119,187	65,481			6,824	778,643
2010	2,624	80	277	4642	164	13,220	107,803	68,666	511,201	57,755	78,076	122,104	*	*	11,287	978,004
2011	2,700	129	368	1,521	20	56,963	129,065	90,631	715,162	29,010	103,856	61,960			25,601	1,216,986
2012	10,785	167	532	1,484	3,560	48,637	111,810	54,304	583,057	90,037	122,058	64,110		*	11,845	1,104,429
2013	1,826	106	NA	2,244	2,638	32,573	89,300	80,811	539,775	32,290	84,385	33,980		*	17,246	917,454

**Table 3.** Harvest (in pounds) and value of the glass eel fishery in Maine and South Carolina from 2007 - 2013. \*South Carolina landings are confidential.

Year	Maine		South Carolina	
	Landings	Value	Landings*	Value
2007	3,713	\$1,287,485	No activity reported	
2008	6,951	\$1,486,355	No activity reported	
2009	5,119	\$519,559	No activity reported	
2010	3,158	\$584,850	<500	<\$100,000
2011	8,584	\$7,653,331	<500	<\$500,000
2012	20,764	\$38,760,490	<5,000	<\$2,500,000
2013	18,076	\$32,926,991	<5,000	<\$2,500,000

### 3. MANAGEMENT OPTIONS

It is important to emphasize the 2012 American Eel Stock Assessment was a benchmark or baseline assessment that synthesized all available fishery-dependent and independent data yet it was not able to construct eel population targets that could be related to sustainable fishery harvests. This is not an uncommon result of baseline stock assessments. The development of sustainable population and fishery thresholds will be a priority of future stock assessment. Despite the absence of fishery targets derived from population models, it is clear that high levels of yellow eel fishing occurred in the 1970s and 1980s in response to high prices offered from the export food market (Figure 4). For all coastal regions, peak catches in this period were followed by declining catches in the 1990s and 2000s, with some regions now at historic low levels of harvest. Given that high catches in the past could have contributed to the current depleted status the PDT believes it is prudent to reduce mortality while enhancing and restoring habitat. This approach is further justified in light of the public interest in eel population conservation demonstrated by two recent petitions to list American eel under the Endangered Species Act.

The implemented provisions will be considered a compliance requirement and are effective upon adoption of the Addendum or as specified by the Board. Management measures include all mandatory monitoring and reporting requirements as described in this Section.

#### 3.1 COMMERCIAL FISHERY MANAGEMENT OPTIONS

The 2012 American Eel Stock Benchmark Stock Assessment recommended mortality should be reduced on all life stages. Therefore, this draft addendum proposes a suite of management options to reduce overall mortality that may be used in combination in order to maximize the conservation benefit to American eel stocks. If new regulations are implemented by the Management Board through this addendum, these regulations will be implemented in combination with the regulations as specified under Addendum III, unless otherwise approved by the Board. States /jurisdictions shall maintain existing or more conservative American eel commercial fishery regulations, unless otherwise approved by the Board.

### **3.1.1. GLASS EEL FISHERIES MANAGEMENT OPTIONS**

The following options apply to the glass eel fisheries operating in Maine and South Carolina. For all other jurisdictions, states are required to maintain existing or more conservative measures at the time of implementation of the American Eel FMP. These measures prohibit the development of glass eel fisheries in the remaining states and jurisdictions. Addendum III restricts the development of pigmented eel fisheries in states that allow glass eel harvest.

#### **Option 1 – Status Quo**

Under this option the current regulations for glass eel fisheries as specified under the FMP and Addenda I-III will remain in place.

#### **Option 2 – 2014 Management Measures**

Under this option, the current 2014 fishing regulations for glass eel fisheries in Maine and South Carolina will be required to be maintained. In 2014 Maine pro-actively implemented new regulations to manage the glass eel fishery through output controls (quota management) instead of input control (gear and licenses restrictions). The state worked with industry and tribal representatives to develop a quota that was a 35% reduction from 2012 landings. South Carolina made no changes to their management program for the 2014 glass eel fishing season. Less conservative management measures than those in place in 2014 will require approval by the Management Board. States may always implement more conservative management measures.

The PDT commends Maine Department of Marine Resources for implementing a quota system to management the glass eel fishery. Quota management provides a more reliable method to track mortality, increases accuracy of harvest data, and reduces opportunities for illegal harvest. However, the PDT notes that the 2014 quota was reduced from the 2012 landings, which were the highest landings on record. This still represents an increase from average landings in the past decade (2004 – 2013) and the baseline year of 2010 (last year included in the benchmark stock assessment) from which a reduction was recommended. Further reductions may be warranted. Quota allocation and levels are subject to Board revision or update as a result of a new benchmark stock assessment or other information on stock status. The Board may choose to implement this option for one or both applicable states (i.e. for only Maine, only South Carolina, or for both states.)

In 2014, Maine regulations included, but were not limited to:

- 11,749 pound annual quota
- Individual tribal and non-tribal quotas
- Penalties for exceeding quota (license suspension for a year for a first offense and permanent revocation for a second offense; mandatory fine of \$2,000 for anyone who continues to fish after reaching his or her quota.)
- A swipe card system to track catch from harvester to a licensed dealer
- Set-aside of up to 10% to prevent exceeding the overall quota
- March 22 start date with a 10 week season<sup>2</sup>

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<sup>2</sup> In 2014 the season began later than March 22<sup>nd</sup> as a result of the time needed to implement the new regulations.



In 2014, South Carolina regulations included, but were not limited to:

- A maximum of 10 individuals are issued permits with approved gears
- A limit on gear and operation per permit
- Fishing allowed in only specific areas
- Monthly effort and harvest reporting

The PDT recognizes that harvest in South Carolina may be drastically reduced beginning in 2014 as a result of Addendum III which prevents landing of pigmented eels in the glass eel fishery. In 2013, glass eel account for ~23% of the total catch. If landings of glass eels in South Carolina exceed 500 pounds in 2014, the Board will consider additional management restrictions.

### **Option 3 – Closure of Glass Eel Fisheries**

Under this option no glass fisheries will be allowed to operate within state and jurisdictional waters.

#### Sub-Option 3a – Immediate Closure

Under this sub-option all glass eel fisheries will close upon final approval of the addendum.

#### Sub-Option 3b – Delayed Closure

Under this sub-option the glass eel fisheries will be closed within five years after final approval of the addendum or at another timeframe specified by the Management Board.

### **Option 4 – Glass Eel Quota Based on Landings**

Under this option glass eel harvest for states and jurisdictions with a glass eel fishery will be regulated annually through a quota system. Examples for quota management are described in the following sub-options. The PDT cautions that recent research by Carruthers et al (2014) has found that methods to set catch limits at or above the average of recent catches has led to some of the highest probabilities of overfishing. Additionally, the PDT cautions the use of data outside of stock assessment period (2011 - present), especially when taking into account the market influences on landings and unprecedented level of illegal harvest in recent years. The Board may choose to implement this option for either one or both states (i.e. for only Maine, only South Carolina, or for both states) or different sub-options for each state (i.e. Sub-option 4b for Maine and Sub-option 4a for South Carolina).

#### Sub Option 4a – Average Landings from 2004 - 2013

Under this option, glass eel landings will be managed through a quota system, with allocation based on the average landings from 2004 - 2013. The annual quota would be set at 8,257 pounds, with 97% (8,008 pounds) allocated to Maine and 3% (250 pounds) allocated to South Carolina (Table 4). This period was chosen as it includes harvest from recent years and it includes the time period covered by the 2012 American Eel Stock Assessment. However, the PDT cautions the use of data outside

of stock assessment period, especially when taking into the market influences on landings and unprecedented level of illegal harvest in recent years. The Board has the ability to re-visit quota allocation through subsequent addenda.

Sub Option 4b - 20% reduction from 2004 - 2013 landings average

Under this option, glass eel landings will be managed through a quota system, with allocation based on the average landings from 2004 - 2013. The annual quota would be set at 6,606 pounds, with 97% (6,406 pounds) allocated to Maine and 3% (200 pounds) allocated to South Carolina (Table 4). This period was chosen as it includes harvest from recent years and it includes the time period covered by the 2012 American Eel Stock Assessment. The Board has the ability to re-visit quota allocation through subsequent addenda.

Sub Option 4c - 2010 Landings

Under this option, glass eel landings will be managed through a quota system, with allocation based on the landings from 2010. The annual quota would be set at 3,397 pounds, with 93% (3,158 pounds) allocated to Maine and 7% (239 pounds) allocated to South Carolina (Table 4). 2010 was chosen as it was terminal year in the 2012 American Eel Stock Assessment. The Board has the ability to re-visit quota allocation through subsequent addenda. This is the preferred PDT option.

**Table 4.** Proposed quota allocations (in pounds) for Maine and South Carolina.

	<b>Sub-option 4a: Average 2004 - 2013 Landings</b>	<b>Sub-option 4b: 20% reduction</b>	<b>Sub-option 4c: 2010 Landings</b>
<b>Maine</b>	8,008	6,406	3,158
<b>South Carolina</b>	250	200	239
<b>Total</b>	8,257	6,606	3,397

**Option 5 – Quota Overages**

*This option is only applicable if quota management is chosen (Option 4 of this Section).*

If a quota system is implemented in a state, the Board may choose to implement a mechanism to address quota overages. If overages occur, the state will be required to deduct their entire overage from the quota the following year, pound for pound.

**Option 6 – Glass Eel Harvest Allowance Based on Stock Enhancement Programs**

Under this option any state or jurisdiction can request an allowances for harvest of glass eels based on stock enhancement programs implemented after January 1, 2013. Stock enhancement programs must show a measurable increase in glass eel passage and/or glass eel survival. Examples of stock enhancement programs include, but are not limited to, habitat restoration projects, fish passage improvements, or fish passage construction. Fish passage projects may

focus on upstream or downstream passage or both. Harvest shall not be restricted to the basin of restoration (i.e. harvest may occur at any approved location within the state or jurisdiction).

Requests for harvest must include a description of the stock enhancement program, fishery requested, monitoring program to ensure harvest is not exceeded, monitoring program to ensure stock enhancement program targets are annually met, adequate enforcement capabilities, and adequate penalties for violations. Requests must be submitted to the Commission by September 1<sup>st</sup> of the preceding fishing year. Requests are subject to TC review and Board approval. After the first year of implementation the TC will evaluate the program and provide recommendations to the Board on the overall impact of and adherence to the plan. If the stock enhancement program cannot be assessed one year post-implementation, then a secondary review must occur within three years post-implementation. If changes to that habitat or fishway occurs in subsequent years, the Commission must be notified through the annual compliance report and a review of the harvest allowance may be initiated. The PDT recommends that the Board implement an overall cap for coastwide harvest.

In addition to the above requirements, the Board will need to select an individual state or jurisdiction harvest cap. The following are proposed options for harvest limits:

Sub-Option 6a – 5% Harvest Cap

Under this sub-option, harvest within a state or jurisdiction shall not exceed 5% of the quantified contribution provided by the stock enhancement program. The stock contribution percentage may be based on, for example, the amount of available suitable habitat that will become accessible, passage numbers, or other appropriate metrics.

Sub-Option 6b – 10% Harvest Cap

Under this sub-option, harvest within a state or jurisdiction shall not exceed 10% of the quantified contribution provided by the stock enhancement program. The stock contribution percentage may be based on, for example, the amount of available suitable habitat that will become accessible, passage numbers, or other appropriate metrics.

Sub-Option 6c – 25% Harvest Cap

Under this sub-option, harvest within a state or jurisdiction shall not exceed 25% of the quantified contribution provided by the stock enhancement program. The stock contribution percentage may be based on, for example, the amount of available suitable habitat that will become accessible, passage numbers, or other appropriate metrics.

**Option 7 – Aquaculture Quota**

*This option is only applicable if Option 2 or 4 of this Section is chosen.*

Under this option, the Board may choose to allocate a percentage of the total quota for approved aquaculture purposes. This amount would first be deducted from the total glass eel quota (as specified under Options 2 or 4), then the remainder of the quota would be distributed as specified under the option. Requests for quota by aquaculture facilities must be submitted to the Board Chair by July 1st of the preceding year. Requests must include:

pounds requested, location of harvest, method of harvest, dates of harvest, prior approval of any applicable permits necessary to harvest, capacity of the facility the glass eels will be held, description of husbandry methods, description of the markets the eels will be distributed to, timeframe for the request (up to three years), monitoring program to ensure harvest is not exceeded, adequate enforcement capabilities, and adequate penalties for violations. Approval of aquaculture quota requests will be determined by the Board by September 1st. Approval of a request does not guarantee approval of a request in future years. Eels produced from aquaculture operations that were harvested under an approved aquaculture permit may not be sold until they reach the legal size in the jurisdiction of operations, unless otherwise specified.

*Example:* The Board approves Sub Option 4a for both Maine and South Carolina and also approves a 10% aquaculture quota. The glass eel quota would be set at 8,257 pounds, with 10% first allocated to aquaculture requests (825 pounds) and the remaining 7,432 pounds distributed to Maine (97%, 7,209 pounds) and South Carolina (3%, 222 pounds).

### **Option 8 – Aquaculture Permitting**

Under this option any harvest of glass eels for commercial aquaculture purposes must be collected under an approved Aquaculture Permit issued by the states or jurisdiction the collection will occur in and subject to any monitoring and reporting requirements as specified by the jurisdiction. Since it is not possible at this time to propagate American eels in captivity, continual harvest of American eels under a research or scientific permit for commercial aquaculture purposes is not recommended by the TC.

### **Option 9 – Reporting Requirements**

Under this option states with a glass eel fishery would be required to implement daily trip level reporting with daily electronic accounting to the state for harvesters and dealers in order to ensure accurate reporting of glass eel harvest. This type of system would be essential for quota monitoring accuracy given the sharp increase in market value and rise in illegal harvest. Increased dealers license requirements would also help address the underreporting problem by preventing people who lack a long-term interest from entering into the fishery.

### **Option 10 – Monitoring Requirements**

Under this option states or jurisdictions with a commercial glass eel fishery must implement a fishery independent life cycle survey covering glass, yellow, and silver eels within at least one river system. The development of life cycle surveys was one of the main recommendations from the 2012 benchmark stock assessment. 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. This survey would include but not be limited to collecting the following information: fisheries independent index of abundance, age of entry into the fishery/survey, biomass and mortality of glass and yellow eels, sex composition, age structure, prevalence of *A. crassus*, and average length and weight of eels in the fishery/survey. Survey proposals will be subject to TC review and Board approval.

### **3.1.2. YELLOW EEL FISHERIES MANAGEMENT OPTIONS**

Currently commercial yellow eel fisheries operate in all states with the exception of Pennsylvania and the District of Columbia. Management measures selected by the Board in Addendum III went into effect January 1, 2014. These measures included a 9 inch minimum size limit for both the commercial and recreational fishery and a ½ by ½ inch minimum mesh requirement for the commercial fishery.

#### **Option 1 – Status Quo**

Under this option the current regulations for yellow eel fisheries as specified under the FMP and Addenda I-III will remain in place.

#### **Option 2 – Adjusted Yellow Eel Quota (Allocation Base Years = 2011 – 2013)**

The use of quotas will provide a flexible management system that will be able to respond to fluctuations in market conditions while providing a quantifiable conservation benefit to the species. Under this option yellow eel harvest for states and jurisdictions with a yellow eel fishery will be regulated annually through a quota system. The coastwide quota is set at the 2010 harvest levels. This year was chosen as the baseline as it represents the last year of data that was included in the benchmark stock assessment and the assessment recommends reducing mortality from this level. Allocation to states and jurisdictions is based on the average harvest from 2011 – 2013 as a way to maintain the current distribution on fishing effort along the coast. The PDT cautions that recent research by Carruthers et al (2013) has found that methods to set catch limits at or above the average of recent catches has led to some of the highest probabilities of overfishing. Additionally, the TC does not recommend implementing a coastwide quota above the 1998-2010 average harvest (907,671 pounds, Table 2). States or jurisdictions will need to ensure that their monitoring and reporting requirements are sufficient to prevent repeated overages. The Board has the ability to re-visit quota allocation through subsequent addenda

The PDT recommends the following criteria be applied to increase equity in the distribution of the quota:

1. States be allocated a minimum allocated quota fixed at 2,000 pounds in order to provide all state's a quota level sufficient to cover any directed or bycatch landings without creating an administrative burden. The 2,000 pounds quota is not expected to promote a notable increase in effort in the fishery.
2. No state is allocated a quota that is more than 10,000 pounds above its 2010 harvest.
3. No state or jurisdiction is allocated a quota that is more than a 15% reduction from its 2010 harvest.

The following sub-options detail the proposed quota allocations:

##### Sub – Option 2a: No Reduction

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and the allocation to states based on the states average harvest from 2011 - 2013. Under this sub-option, the annual quota would originally be set at 978,004 pounds (2010 landings, Table 5). After allocation of

the quota, New Hampshire, Massachusetts, Rhode Island, Connecticut, South Carolina, and Georgia qualify for the 2,000 pound allowance (PDT Criteria #1 above). Additionally, the New York, Maryland, and Virginia quotas would exceed 10,000 pounds and therefore would be reduced accordingly (PDT criteria #2 above). Lastly, the North Carolina and PRFC quotas represents a 60% and 21% reduction, respectively, and therefore would be increased accordingly (PDT Criteria #3 above). **The resulting quota would then be set annually at 986,286 pounds. This represents an 0.8% increase from 2010 landings coastwide.**

Sub-Option 2b: 10% Reduction

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and the allocation to states based on the states average harvest from 2011 - 2013. Under this sub-option, the annual quota would originally be set at 880,203 pounds (2010 landings with a 10% reduction, Table 5).

After allocation of the quota, New Hampshire, Massachusetts, Rhode Island, Connecticut, South Carolina, and Georgia qualify for the 2,000 pound allowance (PDT Criteria #1 above). The New York quota would exceed 10,000 pounds and therefore would be reduced accordingly (PDT criteria #2 above). Additionally, the New Jersey, North Carolina, and PRFC quota represents an 26%, 64%, and 29% reduction, respectively, and therefore would be modified accordingly (PDT criteria #3 above). **The resulting quota would be set annually at 937,701 pounds. The resulting quota represents an actual 4.1% decrease from 2010 landings coastwide.**

Sub-Option 2c: 20 % Reduction

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and the allocation to states based on the states average harvest from 2011 - 2013. Under this sub-option, the annual quota would originally be set at 782,403 pounds (2010 landings with a 20% reduction, Table 5).

After allocation of the quota, New Hampshire, Massachusetts, Rhode Island, Connecticut, South Carolina and Georgia qualify for the 2,000 pound allowance (PDT Criteria #1 above). The New York quota would exceed 10,000 pounds and therefore would be reduced accordingly (PDT criteria #2 above). Additionally, the New Jersey, Delaware, North Carolina , and PRFC quota represents an 26%, 21%, 68%, and 37% reduction, respectively, and therefore would be modified accordingly (PDT criteria #3 above). **The resulting quota would be set annually at 868,939 pounds. The resulting quota represents an actual 11% decrease from 2010 landings coastwide.**

**Table 5.** Quota options under the no reduction, 10% reduction and 20% reduction scenarios, with the total quota based on landings from 2010 and the allocation to states based on the states average harvest from 2011 - 2013. Gray boxes represent states which qualified for Criteria #2. Black boxes represent states which qualifies for Criteria #3. **This Table was revised on June 20, 2014.**

	<b>2010 Landings</b>	<b>Allocation</b>	<b>Option 2a: No Reduction</b>	<b>Option 2b: 10% Reduction</b>	<b>Option 2c: 20% Reduction</b>
<b>Maine</b>	2,624	0.47%	4,597	4,137	3,677
<b>New Hampshire</b>	80	0.01%	2,000	2,000	2,000
<b>Mass</b>	277	0.04%	2,000	2,000	2,000
<b>Rhode Island</b>	4642	0.16%	2,000	2,000	2,000
<b>Connecticut</b>	164	0.19%	2,000	2,000	2,000
<b>New York</b>	13,220	4.26%	<b>23,220</b>	<b>23,220</b>	<b>23,220</b>
<b>New Jersey</b>	107,803	10.19%	99,659	<b>91,633</b>	<b>91,633</b>
<b>Delaware</b>	68,666	6.97%	68,167	61,350	<b>58,366</b>
<b>Maryland</b>	511,201	56.72%	<b>521,201</b>	499,251	443,779
<b>PRFC</b>	57,755	4.67%	<b>49,092</b>	<b>49,092</b>	<b>49,092</b>
<b>Virginia</b>	78,076	9.58%	<b>88,076</b>	84,323	74,954
<b>North Carolina</b>	122,104	4.94%	<b>103,788</b>	<b>103,788</b>	<b>103,788</b>
<b>South Carolina</b>	2		2,000	2,000	2,000
<b>Georgia</b>	103	0.11%	2,000	2,000	2,000
<b>Florida</b>	11,287	1.69%	16,528	14,875	13,223
<b>Total</b>	978,004	100%	986,286	937,701	868,939

### **Option 3 – Adjusted Yellow Eel Quota (Allocation Base Years = 2002 -2012)**

The use of quotas will provide a flexible management system that will be able to respond to fluctuations in market conditions while providing a quantifiable conservation benefit to the species. Under this option yellow eel harvest for states and jurisdictions with a yellow eel fishery will be regulated annually through a quota system. The coastwide quota is set at the 2010 harvest levels. This year was chosen as the baseline as it represents the last year of data that was included in the benchmark stock assessment and the assessment recommends reducing mortality from this level. Allocation is based on the average of the three highest landing values from 2002 – 2012. The PDT cautions that recent research by Carruthers et al (2013) has found that methods to set catch limits at or above the average of recent catches has led to some of the highest probabilities of overfishing. Additionally, the TC does not recommend implementing a coastwide quota above the 1998-2010 average harvest (907,671 pounds, Table 2). States or jurisdictions will need to ensure that their monitoring and reporting requirements are sufficient to prevent repeated overages. The Board has the ability to re-visit quota allocation through subsequent addenda

The PDT recommends the following criteria be applied to increase equity in the distribution of the quota:

1. States be allocated a minimum allocated quota fixed at 2,000 pounds in order to provide all state's a quota level sufficient to cover any directed or bycatch landings without creating an administrative burden. The 2,000 pounds quota is not expected to promote a notable increase in effort in the fishery.
2. No state is allocated a quota that is more than 10,000 pounds above its 2010 harvest.
3. No state or jurisdiction is allocated a quota that is more than a 15% reduction from its 2010 harvest.

The following sub-options detail the proposed quota allocations:

Sub – Option 3a: No Reduction

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and allocation based on the average of the three highest landing values from 2002 – 2012. Under this sub-option, the annual quota would originally be set at 978,004 pounds (2010 landings, Table 6).

After allocation of the quota, New Hampshire, South Carolina, and Georgia qualify for the 2,000 pound allowance (PDT Criteria #1 above). Additionally, the Maine, **New York**, Delaware, and PRFC quotas would be more than 10,000 pounds above its 2010 harvest and therefore would be reduced accordingly (PDT criteria #2 above). Lastly, the Maryland and **North Carolina** quotas represents an **17% and 18%** reduction, respectively, and therefore would be increased accordingly (PDT Criteria #3 above). **The resulting quota would then be set annually at 946,726 pounds. This represents a 3.2% decrease from 2010 landings coastwide.**

Sub-Option 3b: 10% Reduction

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and allocation based on the average of the three highest landing values from 2002 – 2012. Under this sub-option, the annual quota would originally be set at 880,203 pounds (2010 landings with a 10% reduction, Table 6).

After allocation of the quota, New Hampshire, South Carolina, and Georgia qualify for the 2,000 pound allowance (PDT Criteria #1 above). Additionally, the Maine, **New York**, Delaware, and PRFC quotas would be more than 10,000 pounds above its 2010 harvest and therefore would be reduced accordingly (PDT criteria #2 above). Lastly, the Rhode Island, Maryland, and North Carolina quotas represents a **16%, 25%, and 27%** reduction, respectively, and therefore would be increased accordingly (PDT Criteria #3 above). **The resulting quota would be set annually at 924,777 pounds. The resulting quota represents an actual 4.1% decrease from 2010 landings coastwide.**

Sub-Option 3c: 20 % Reduction

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and allocation based on the average of the three highest landing values from 2002 – 2012. Under this sub-option, the annual



quota would originally be set at 782,403 pounds (2010 landings with a 20% reduction, Table 6).

After allocation of the quota, New Hampshire, South Carolina and Georgia qualify for the 2,000 pound allowance (PDT Criteria #1 above). Additionally, the New York, Delaware, and PRFC quotas would be more than 10,000 pounds above its 2010 harvest and therefore would be reduced accordingly (PDT criteria #2 above). Lastly, the Rhode Island, Maryland, and North Carolina quotas represents a 26%, 34%, and 35% reduction, respectively, and therefore would be increased accordingly (PDT Criteria #3 above). **The resulting quota would be set annually at 902,605 pounds. The resulting quota represents an actual 7.7% decrease from 2010 landings coastwide.**

**Table 6.** Quota options under the no reduction, 10% reduction and 20% reduction scenarios, with the total quota based on landings from 2010 and allocation based on the average of the three highest landing values from 2002 – 2012. Gray boxes represent states which qualified for Criteria #2. Black boxes represent states which qualifies for Criteria #3. **This Table was revised on June 20, 2014.**

	2010 Landings	Allocation	Option 3a: Average Landings	Option 3b: 10% Reduction	Option 3c: 20% Reduction
Maine	2,624	1.54%	12,624	12,624	12,036
New Hampshire	80	0.01%	2,000	2,000	2,000
Massachusetts	277	0.37%	3,620	3,258	2,896
Rhode Island	4642	0.44%	4,310	3,946	3,946
Connecticut	164	0.32%	3,118	2,806	2,494
New York	13,220	3.18%	23,220	23,220	23,220
New Jersey	107,803	11.31%	110,642	99,578	88,514
Delaware	68,666	10.28%	78,666	78,666	78,666
Maryland	511,201	43.43%	434,521	434,521	434,521
PRFC	57,755	8.84%	67,755	67,755	67,755
Virginia	78,076	8.79%	86,006	77,405	68,805
North Carolina	122,104	10.15%	103,788	103,788	103,788
South Carolina	2	0.01%	2,000	2,000	2,000
Georgia	103	0.05%	2,000	2,000	2,000
Florida	11,287	1.27%	12,457	11,211	9,965
<b>Total</b>	978,004	100.00%	946,726	924,777	902,605

#### Option 4 - Yellow Eel Quota based on 2010 Landings

The use of quotas will provide a flexible management system that will be able to respond to fluctuations in market conditions while providing a quantifiable conservation benefit to the species. Under this option yellow eel harvest for states and jurisdictions with a yellow eel fishery will be regulated annually through a quota system. The coastwide quota is set at the 2010 harvest levels. This year was chosen as the baseline as it represents the last year of data that was included in the benchmark stock assessment and the assessment recommends reducing mortality from this level. Allocation is based on the average of the three highest landing values from 2002 – 2012. States are allocated a minimum quota fixed at 2,000

pounds in order to provide a quota level sufficient to cover any directed or bycatch landings without creating an administrative burden. The 2,000 pounds quota is not expected to promote a notable increase in effort in the fishery. The PDT cautions that recent research by Carruthers et al (2013) has found that methods to set catch limits at or above the average of recent catches has led to some of the highest probabilities of overfishing. Additionally, the TC does not recommend implementing a coastwide quota above the 1998-2010 average harvest (907,671 pounds, Table 2). States or jurisdictions will need to ensure that their monitoring and reporting requirements are sufficient to prevent repeated overages. The Board has the ability to re-visit quota allocation through subsequent addenda

The following sub-options detail the proposed quota allocations:

Sub – Option 4a: No Reduction

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and allocation based on the average of the three highest landing values from 2002 – 2012. Under this sub-option, the annual quota will be set at 978,004 pounds (2010 landings, Table 7).

After allocation of the quota, New Hampshire, South Carolina, and Georgia qualify for the 2,000 pound allowance. **The resulting quota would then be set annually at 983,260 pounds, which represents a 0.5% increase from 2010 landings coastwide.**

Sub-Option 4b: 10% Reduction

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and allocation based on the average of the three highest landing values from 2002 – 2012. Under this sub-option, the annual quota would originally be set at 880,203 pounds (2010 landings with a 10% reduction, Table 7).

After allocation of the quota, New Hampshire, South Carolina, and Georgia qualify for the 2,000 pound allowance. **The resulting quota would be set annually at 885,534 pounds, which represents an actual 9.5% decrease from 2010 landings coastwide.**

Sub-Option 4c: 20 % Reduction

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and allocation based on the average of the three highest landing values from 2002 – 2012. Under this sub-option, the annual quota would originally be set at 782,403 pounds (2010 landings with a 20% reduction, Table 7).

After allocation of the quota, New Hampshire, South Carolina and Georgia qualify for the 2,000 pound allowance. **The resulting quota would be set annually at 787,808 pounds, which represents an actual 19.4% decrease from 2010 landings coastwide.**

**Table 7.** Quota options under the no reduction, 10% reduction and 20% reduction scenarios, with the total quota based on landings from 2010 and allocation based on the average of the three highest landing values from 2002 – 2012. **This Table was revised on June 20, 2014.**

	<b>2010 Landings</b>	<b>Allocation</b>	<b>Option 4a: Average Landings</b>	<b>Option 4b: 10% Reduction</b>	<b>Option 4c: 20% Reduction</b>
<b>Maine</b>	2,624	1.54%	15,045	13,541	12,036
<b>New Hampshire</b>	80	0.01%	2,000	2,000	2,000
<b>Massachusetts</b>	277	0.37%	3,620	3,258	2,896
<b>Rhode Island</b>	4642	0.44%	4,310	3,879	3,448
<b>Connecticut</b>	164	0.32%	3,118	2,806	2,494
<b>New York</b>	13,220	3.18%	31,083	27,975	24,866
<b>New Jersey</b>	107,803	11.31%	110,642	99,578	88,514
<b>Delaware</b>	68,666	10.28%	100,543	90,489	80,435
<b>Maryland</b>	511,201	43.43%	424,712	382,240	339,769
<b>PRFC</b>	57,755	8.84%	86,427	77,784	69,141
<b>Virginia</b>	78,076	8.79%	86,006	77,405	68,805
<b>North Carolina</b>	122,104	10.15%	99,298	89,368	79,438
<b>South Carolina</b>	2	0.01%	2,000	2,000	2,000
<b>Georgia</b>	103	0.05%	2,000	2,000	2,000
<b>Florida</b>	11,287	1.27%	12,457	11,211	9,965
<b>Total</b>	978,004		983,260	885,534	787,808

### **Option 5 – Weighted Yellow Eel Quota**

The use of quotas will provide a flexible management system that will be able to respond to fluctuations in market conditions while providing a quantifiable conservation benefit to the species. Under this option yellow eel harvest for states and jurisdictions with a yellow eel fishery will be regulated annually through a quota system. The coastwide quota is set at the 2010 harvest levels. This year was chosen as the baseline as it represents the last year of data that was included in the benchmark stock assessment. Allocation to states and jurisdictions is based on a weighted distribution. The three highest landings from the period 2004 – 2013 were averaged and then weighted at 30%. This was combined with the average landings from 2011 – 2013, which was weighted at 70%. The 2004 - 2013 period takes into account the most current distribution on fishing effort as well as captures a more productive time in the fishery in some regions and incorporates the potential that each state’s eel fishery had demonstrated over the past decade. The PDT cautions that recent research by Carruthers et al (2013) has found that methods to set catch limits at or above the average of recent catches has led to some of the highest probabilities of overfishing. Additionally, the TC does not recommend implementing a coastwide quota above the 1998-2010 harvest average (907,671 pounds, Table 2). States or jurisdictions will need to ensure that their monitoring and reporting requirements are sufficient to prevent repeated overages. The Board has the ability to re-visit quota allocation through subsequent addenda.

#### Sub – Option 5a: No Reduction Weighted Quota

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and the allocation to states based on a weighted average (70% to the average landings from 2011 – 2013 and 30% to the average of the three highest landings in the period 2004 – 2013). Under this sub-option, the annual quota would originally be set at 978,004 pounds (2010 landings, Table 8). States would be allocated a minimum quota fixed at 2,000 pounds in order to provide all state's a quota level sufficient to cover any directed or bycatch landings. **The resulting quota would then be set annually at 983,419 pounds. This represents a 0.55% decrease from 2010 landings coastwide.**

#### Sub – Option 5b: 10 % Reduction from Weighted Quota

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and the allocation to states based on a weighted average (70% to the average landings from 2011 – 2013 and 30% to the average of the three highest landings in the period 2004 – 2013). Under this sub-option, the annual quota would originally be set at 880,203 pounds (2010 landings with a 10% reduction, Table 8). States would be allocated a minimum quota fixed at 2,000 pounds in order to provide all state's a quota level sufficient to cover any directed or bycatch landings. **The resulting quota would then be set annually at 885,877 pounds. This represents a 9.4% decrease from 2010 landings coastwide.**

#### Sub – Option 5c: 20 % Reduction from Weighted Quota

Under this sub-option, yellow eel landings will be managed through a quota system, with the total quota based on landings from 2010 and the allocation to states based on a weighted average (70% to the average landings from 2011 – 2013 and 30% to the average of the three highest landings in the period 2004 – 2013). Under this sub-option, the annual quota would originally be set at 782,402 pounds (2010 landings with a 20% reduction, Table 8). States would be allocated a minimum quota fixed at 2,000 pounds in order to provide all state's a quota level sufficient to cover any directed or bycatch landings. **The resulting quota would then be set annually at 788,515 pounds. This represents a 19.4% decrease from 2010 landings coastwide.**

### **Option 6 – Quota Overages**

*This option is applicable only if quota management (Options 2 -5 of this section) is chosen.*

If a quota system is implemented, the Board may choose to implement a mechanism to address quota overages. If overages occur, the state will be required to reduce their following year's quota by the same amount the quota was exceeded, pound for pound. For states that qualify for the automatic 2,000 pound quota, any overages would be deducted from the 2,000 pound allocation. The PDT strongly recommends implementation of a payback mechanism if quota management is approved.

**Table 8.** Quota options under the no reduction, 10% reduction and 20% reduction scenarios based on weighted landings.

	<b>2010 Landings</b>	<b>Allocation</b>	<b>Option 5a: No Reduction</b>	<b>Option 5b: 10% Reduction</b>	<b>Option 5c: 20% Reduction</b>
<b>Maine</b>	2,624	0.9%	8,314	7,483	6,651
<b>New Hampshire</b>	80	0.01%	2,000	2,000	2,000
<b>Mass</b>	277	0.2%	2,000	2,000	2,000
<b>Rhode Island</b>	4642	0.3%	2,549	2,294	2,040
<b>Connecticut</b>	164	0.2%	2,292	2,063	2,000
<b>New York</b>	13,220	3.9%	38,360	34,524	30,688
<b>New Jersey</b>	107,803	10.6%	103,423	93,081	82,739
<b>Delaware</b>	68,666	8.1%	79,546	71,591	63,637
<b>Maryland</b>	511,201	52.2%	510,264	459,238	408,211
<b>PRFC</b>	57,755	5.9%	57,997	52,197	46,398
<b>Virginia</b>	78,076	9.3%	90,819	81,737	72,655
<b>North Carolina</b>	122,104	6.8%	66,337	59,703	53,069
<b>South Carolina</b>	2	0.01%	2,000	2,000	2,000
<b>Georgia</b>	103	0.1%	2,000	2,000	2,000
<b>Florida</b>	11,287	1.6%	15,498	13,949	12,399
<b>Total</b>	978,004	100.00%	983,399	885,859	788,486

### **Option 7 – Quota Transfers**

*This option is applicable only if quota management (Options 2 -5 of this section) is chosen.*

Under this option any state or jurisdiction implementing a commercial quota for American eel may request approval from the Board Chair or Commission Chair to transfer all or part of its annual quota to one or more states. States that receive the automatic 2,000 pound quota are eligible to participate in the transfer management measures. The TC does not recommend allowing quota transfers for a “depleted” species. If the harvest is less than the quota, then the TC recommends the remainder benefit conservation efforts and not be transferred.

Requests for transfers must be made by individual or joint letters signed by the principal state official with marine fishery management authority for each state involved. The Chair will notify the requesting states within ten working days of the disposition of the request. In evaluating the request, the Chair will consider: if the transfer would preclude the overall annual quota from being harvested, the transfer addresses an unforeseen variation or contingency in the fishery, and if the transfer is consistent with the objects of the FMP. Transfer requests for the current fishing year must be submitted by December 31 of that fishing year.

The transfer of quota would be valid for only the calendar year in which the request is made. These transfers do not permanently affect the state-specific shares of the quota, i.e., the state-

specific shares remain fixed. Once quota has been transferred to a state, the state receiving quota becomes responsible for any overages of transferred quota.

### **Option 8 – Catch Cap**

Under this option the commercial yellow eel fishery would be managed under a catch cap. The coastwide catch cap is based off the 2010 harvest levels. This year was chosen as the baseline as it represents the last year of data that was included in the benchmark stock assessment and the assessment recommends reducing mortality from this level. States and jurisdictions would be allowed to fish until the cap is reached. Once the cap or threshold is reached, all states and jurisdictions would be required to close all directed fisheries and prohibit landings. The TC does not recommend implementing a catch cap above the 1998-2010 harvest (907,671 pounds).

One of the benefits of a catch cap could be that it reduces the administrative and legislative burden of implementing a state specific quota system (as described in Option 2 above) while still controlling the total amount of fishing mortality that is occurring annually. Additionally, a coastwide catch cap does not require a specific allocation by state or jurisdiction, which can be problematic due to the fluctuations in landings as a result of environmental and market conditions. However, the PDT notes that under this system states and jurisdiction would still need timely reporting, most likely daily, in place to ensure that that the cap was not exceeded. Additionally, if the cap was exceeded then the only payback mechanism (i.e. reducing the total coastwide cap in the subsequent year) would equally impact all states involved in the fishery even if the overage was largely the result of one state (e.g. possibly due to late reporting or not closing the fishery in a timely manner). A mortality cap may promote a derby style fishery, which could possibly flood the market and drive down prices. Lastly, implementation of a mortality cap could result in early coastwide closures and eventual elimination of historic and profitable fisheries that are prosecuted later in the year (i.e. in the winter months, Figure 5).

#### Sub-option 8a – 2010 harvest level

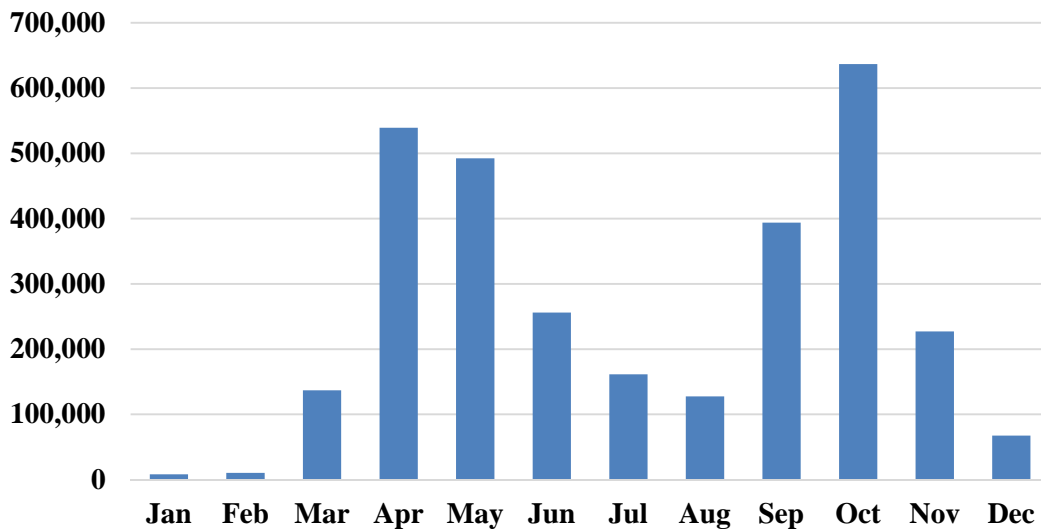
Under this option the mortality cap would be set at 978,004 pounds (2010 landings). States and jurisdictions will be required to close their directed fisheries and prohibit landings once 95% of the cap is reached. The PDT notes that this represents an increase from 2013 landings and may not contribute to reducing mortality at all life stages. If the cap is exceeded in the fishing year, then the cap will be reduced the following year by the same amount the quota was exceeded, pound for pound.

#### Sub-option 8b – 10% reduction

Under this option the mortality cap would be set at 880,203 pounds, which is a 10% reduction from 2010 landings. This represents a 0.3% decrease from 2013 landings. If the cap is exceeded in the fishing year, then the cap will be reduced the following year by the same amount the quota was exceeded, pound for pound.

#### Sub-option 8c – 20% reduction

Under this option the mortality cap would be set at 782,403 pounds, which is a 20% reduction from 2010 landings. This represents an 11% decrease from 2013 landings. If the cap is exceeded in the fishing year, then the cap will be reduced the following year by the same amount the quota was exceeded, pound for pound.



**Figure 5.** Average (2010 – 2012) commercial yellow eel landings (in pounds) by month coastwide.

### 3.1.3. SILVER EEL FISHERIES

The following proposed measures apply only to the commercial weir fishery in the New York portion of the Delaware River and its’ tributaries. New York was granted a one year extension from the requirements as specified under Section 4.1.3 of Addendum III:

*Section 4.1.3: States and jurisdictions are required to implement no take of eels from September 1st through December 31st from any gear type other than baited traps/pots or spears (e.g. fyke nets, pound nets, and weirs). These gears may still be fished, however retention of eels is prohibited. A state or jurisdiction may request an alternative time frame for the closure if it can demonstrate the proposed closure dates encompass the silver eel outmigration period. Any requests will be reviewed by the TC and submitted to the Board for approval.*

The American Eel Benchmark Stock assessment found that “fishing on ... out-migrating silver eels could be particularly detrimental to the stock, especially if other sources of mortality (e.g., turbine mortality, changing oceanographic conditions) cannot be readily controlled.” Conservation efforts on earlier life stages will only delay mortality and provide limited additional benefit to stock health if harvest occurs at later stages.

#### **Option 1 – Status Quo**

Under this option the current regulations will remain in place and the one year extension granted to New York would expire at midnight on December 31, 2014. At that time the regulations as specified under Section 4.1.3 in Addendum III would go into effect.

### Option 2 – Extension of the Sunset Provision

Under this option the sunset provision could be extended by a timeframe as specified by the Board.

### Option 3 – Effort Reduction / Time Closure

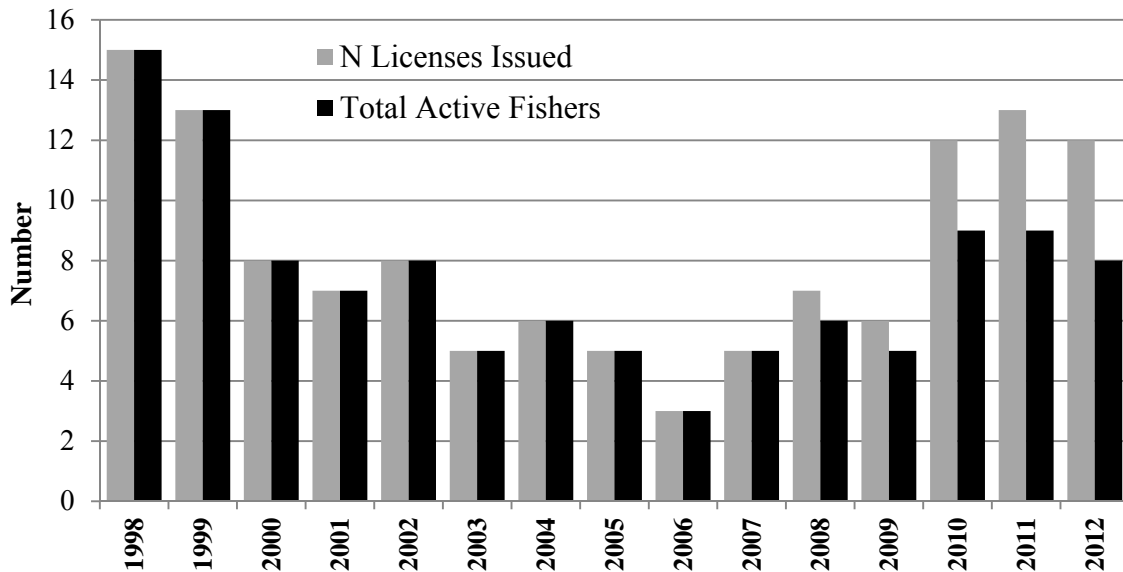
Under this option the state of New York would be required to implement no take of eels in the Delaware River and its tributaries within New York from August 15<sup>th</sup> through September 30<sup>th</sup> from any gear type other than baited traps/pots, or spears and weirs (e.g. fyke nets and pound nets). Refer to Table 9 for a summary of the average landings (2003 – 2012) of American eel by month from the weir fishery in the Delaware River and its tributaries.

**Table 9.** Average American eel landings (2003 – 2012) by month (in pounds) from the weir fishery in NY’s Delaware River and tributaries.

Month	Average Landings (pounds)
July	139
August	1,005
September	2,574
October	1,653
November	2

### Option 4 – License Cap

Under this option, the Delaware River weir fishery would be limited to those permitted New York participants that fished and reported landings anytime during the period from 2010 – 2013. Refer to Figure 6 for the number of licenses issued annually and the number of active participants in the fishery.



**Figure 6.** The number of licenses and active or reporting fishermen in the American eel weir fishery in the Delaware River and its tributaries from 1998 – 2012.



### **3.1.4. STATE SPECIFIC SUSTAINABLE FISHERY MANAGEMENT PLANS FOR AMERICAN EEL**

Under this option states or jurisdictions may petition the Board to allow for a state specific Sustainable Fishery Management Plan (Plan) for American Eel. The basis for this program is the American Shad and River Herring Sustainable Fishery Management Plans as specified in Amendments 2 and 3 to the Shad & River Herring FMP. This approach has also been used to manage eel fisheries by river basin in Europe. However, the TC cautions that the American shad and river herring plans, as well as the European eel management plans were initiated recently and it is difficult to evaluate the effect of their implementation at this time. The preferred Plan for eel would have the same supporting eel population information as the life cycle surveys proposed in Option 10 of Glass Fisheries.

Currently, states and jurisdictions are allowed to petition the Board for an alternative management program, per Section 4.4 of the FMP. This option is not meant to replace Section 4.4 of the FMP, rather it provides guidance on specific types of alternative management that the states would be allowed to request.

The objective of this program would be to allow states and jurisdictions the ability to manage their American eel fishery (glass, yellow, or silver) to both meet the needs of their current fishermen while providing conservation benefit for the American eel population. Three types of Plans (Fishing Mortality Based Plan, Transfer Plan, and Aquaculture Plan) are presented below.

#### *Fishing Mortality Based Plan*

Under this scenario, states and jurisdictions would be allowed to petition the Board for alternative management based on the current level of mortality that is occurring on their population. This Plan shall:

1. Require states or jurisdictions to assess, with some level of confidence, the status of eel abundance and current level of mortality (e.g. fisheries, natural, and other man-made) that is occurring on the American eel populations within their jurisdiction.
2. Once adequately documented, states or jurisdictions will be allowed to allocate their fishing mortality to any American eel fishery (glass, yellow, or silver) even if the state does not currently participate in that fishery (i.e. a state would be allowed to open up a glass eel fishery if they did not currently have one due to the restrictions of the FMP). This could be applied for commercial, recreational, aquaculture industries and/or research set-aside purposes.
3. States would be allowed to increase the fishing mortality rate provided it is offset by decreases in other mortality (e.g. though habitat improvements, increased fish passage, reduced turbine mortality, etc.) and there is an overall net gain to conservation (i.e. overall mortality is reduced, spawner escapement increases, etc...).

The format of the Plan is as follows:

1. Current regulations
2. Proposed change to regulations (e.g. request for fishery, fish passage restrictions, water quality improvements, etc...)
3. Description of fishing monitoring and enforcement capabilities

4. Description and supporting information on eel abundance and current mortality within state or jurisdiction
  - a. Fishing mortality (including but not limited to commercial, recreational, sustenance, and bycatch)
  - b. Natural mortality (including but not limited to predation and disease),
  - c. Other man-made mortality (including but not limited to fish passage, turbines, habitat degradation, and pollution)
  - d. Indices of abundance, age and size structure, and life cycle population metrics
5. Timeline for implementation of regulations, monitoring programs, or other activities
6. Description of conservation benefits of proposed regulatory changes or habitat improvements
7. Description of adaptive management program to evaluate success of proposed regulatory changes or habitat improvements

#### *Transfer Plan*

If states or jurisdictions are unable to assess the current level of mortality and abundance with certainty, and the state or jurisdiction implements quota management for at least one fishery, then a state would be allowed to develop a Plan to request a transfer of quota from one fishery to another (e.g. from yellow to glass) based on the life history characteristic inherent to that area (e.g. state, river, or drainage). The request shall include: description of quota allocation by fishery; scientific analysis that the transfer will not increase overall eel fishing mortality, overall mortality, or reduce spawner escapement, with some level of confidence; description of monitoring program to ensure quota is not exceeded; and adequate enforcement capabilities penalties for violations.

#### *Aquaculture Plan*

States and jurisdictions shall have an option to develop a Plan for aquaculture purposes. Under this scenario, states and jurisdictions would be allowed to harvest a maximum of 200 pounds of glass eel annually from within their waters for use in domestic aquaculture facilities provided they can objectively show that the harvest will occur from a watershed that minimally contributes to the spawning stock of American eel. The request shall include: pounds requested; location, method, and dates of harvest; prior approval of any applicable permits; description of the facility, including the capacity of the facility the glass eels will be held, and husbandry methods; description of the markets the eels will be distributed to; monitoring program to ensure harvest is not exceeded; and adequate enforcement capabilities penalties for violations. Approval of a request does not guarantee approval of a request in future years. Eels harvested under an approved Aquaculture Plan may not be sold until they reach the legal size in the jurisdiction of operations, unless otherwise specified.

All Plans are subject to TC and LEC review and Board approval. It is recommended that the Fishing Mortality Based Plans be submitted by June 1<sup>st</sup> of the preceding fishing year in order to provide enough time for review for the upcoming fishing season. Transfer and Aquaculture Plans must be submitted by June 1<sup>st</sup> of the preceding fishing year and approval will be determined by the Board by September 1<sup>st</sup>. Plans will initially be valid for only one year. After the first year of implementation the TC will evaluate the program and provide recommendations to the Board on the overall impact of and adherence to the plan. If the

proposed regulatory changes, habitat improvements, or harvest impact cannot be assessed one year post-implementation, then a secondary review must occur within three to five years post-implementation.

If states use habitat improvements and changes to that habitat occurs in subsequent years, the Commission must be notified through the annual compliance report and a review of the Plan may be initiated. The PDT recommends that the Board set a date after which states or jurisdictions may apply conservation measures for mortality offset purposes in Fishing Mortality Based Plans. Any requests that include a stocking provision would have to ensure stocked eels were certified disease free according to standards developed by the TC and approved by the Board.

#### **4. LAW ENFORCEMENT RECOMMENDATIONS**

The ASMFC Law Enforcement Committee has previously weighted in on the enforceability of proposed American eel management options based on the *Guidelines for Resource Managers on the Enforceability of Fishery Management Measures (July 2009)*. These Guidelines rated management strategies using standard terms as follows, from least to most enforceable: Impossible, Impractical, Difficult and Reasonable.

The LEC concluded that status quo measures for all eel fisheries is impractical for enforcement, specifically for the glass eel fishery given the enforcement challenges associated with the prosecution of the glass eel fishery in those states currently closed to harvest of glass eels. A significant amount of illegal harvest of glass eels continues outside the two states where harvest is currently allowed, and illegally harvested eels are being possessed and shipped via those two states. State and federal enforcement agencies are tasked to thwart the illegal harvest and export with reduced staff and resources. Given the monetary value of glass eels and the ability to move illegally harvested eels via legal shipments, enforcement agencies do not have, and are unlikely to obtain the resources necessary to effectively monitor and control a limited glass eel harvest.

The LEC finds that a quota system would be difficult to enforce because of the variety of management strategies associated with quota implementation, enforceability depends largely on how quota systems are managed. Increased complexity of quota systems will generally reduce enforceability. The enforcement of time/area closures for the silver eel fishery is considered reasonable.

The LEC reports continuing illegal harvest of glass eels or elvers in the two states where some legal harvest is permitted, and in a number of states where any harvest of eels below a minimum size is prohibited. This is not unexpected given the high dollar value associated with the fishery. Enforcement agencies are dedicating resources to monitor and enforce regulations through stepped up patrols, coordination with local enforcement authorities, and by communicating the importance of glass eel cases to judiciary officials. Specific changes to regulations or statutes that would enhance field enforcement and/or penalties are encouraged, and those that have been implemented (in Maine, for example) have improved the outcome of arrests and convictions. Because of the cross-state nature of illegal glass eel harvest,

strengthening of extradition or bail provisions for criminal violations would enhance the deterrent effect of enforcement actions.

## **5. COMPLIANCE**

States must implement the provisions of this Addendum not later than the following dates:

XX-XX-XXXX: States must submit detailed plans to implement this Addendum for approval by the American Eel Technical Committee (TC).

XX-XX-XXXX: The Technical Committee presents their findings regarding the implementation plans to the Management Board.

XX-XX-XXXX: States with approved management programs shall begin implementing Addendum.

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