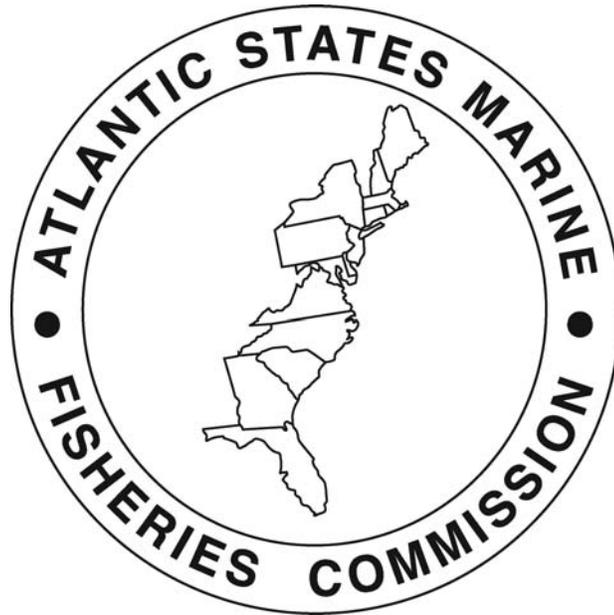


# *Atlantic States Marine Fisheries Commission*

## **ADDENDUM III TO THE FISHERY MANAGEMENT PLAN FOR AMERICAN EEL**



*ASMFC Vision Statement:*

*Healthy, self-sustaining populations for all Atlantic coast fish species or successful restoration well in progress by the year 2015.*

**Approved August 2013**

## EXECUTIVE SUMMARY

The Commission's American Eel Management Board initiated the development of Addendum III with the goal of reducing mortality and increasing conservation of American eel stocks across all life stages, in response to the 2012 Benchmark Stock Assessment which found that the American eel population in U.S. waters is depleted. The assessment concluded that 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.

It is important to emphasize that the 2012 American Eel Stock Assessment was a benchmark or baseline assessment that synthesized all available fishery-dependent and independent data yet 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. 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. For all coastal regions, peak catches of yellow eels in this period were followed by declining catches in the 1990s and 2000s, with some regions now at historic low levels of harvest. 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. Given that high catches in the past could have contributed to the current depleted status it is prudent to reduce mortality on all life stages 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.

This Addendum establishes new management measures for both the commercial (glass, yellow, and silver) and recreational eel fisheries, as well as implements fishery independent and fishery dependent monitoring requirements. As approved, this Addendum reduces overall mortality of American eel. Given the wide range of public input received during the development of this Addendum, some of the proposed management options originally considered in the public comment draft of Addendum III were transferred to Draft Addendum IV for further development. Draft Addendum IV primarily focuses on management measures for the glass eel fishery and will be considered in Spring 2014.

### Management Measures

- *Commercial Glass Eel Fisheries* - Pigmented Eel Tolerance
- *Commercial Yellow Eel Fisheries* – Increase Minimum Size Limit and Gear Restrictions
- *Commercial Silver Eel Fisheries Measures* - Seasonal Closure
- *Recreational Fisheries Measures* – Reduction in Bag Limit with Party/Charter Boat Exemption

## TABLE OF CONTENTS

1.	INTRODUCTION .....	1
1.1.	STATEMENT OF THE PROBLEM .....	1
1.2.	BACKGROUND.....	1
1.3.	STATUS OF THE STOCK.....	2
1.4.	STATUS OF THE FISHERY .....	3
2.	HABITAT RECOMMENDATIONS .....	4
3.	MONITORING PROGRAM .....	5
3.1.	FISHERIES INDEPENDENT SURVEYS.....	5
3.1.1.	Annual Young-of-Year Abundance Survey.....	5
3.1.2.	Annual Yellow Eel Survey .....	5
3.1.3.	Annual Silver Eel Survey.....	8
3.1.4.	Multiple Life Stages Survey .....	8
3.2.	FISHERIES DEPENDANT SURVEYS .....	8
4.	MANAGEMENT MEASURES .....	9
4.1.	COMMERCIAL FISHERY MANAGEMENT MEASURES .....	9
4.1.1.	Glass Eel Fisheries.....	9
4.1.2.	Yellow Eel Fisheries .....	10
4.1.3.	Silver Eel Fisheries .....	10
4.2.	RECREATIONAL FISHERY MANAGEMENT MEASURES .....	11
5.	IMPLEMENTATION SCHEDULE.....	11

Appendix I – Current State Fish Passage Considerations

Appendix II - Fish Passage Recommendations for American eel

# 1. INTRODUCTION

The Atlantic States Marine Fisheries Commission (ASMFC) 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.

## 1.1. STATEMENT OF THE PROBLEM

The 2012 American Eel Benchmark Stock Assessment found that the coastwide stock has declined in recent decades and the stock was declared depleted. Additionally, the prevalence of significant downward trends in multiple surveys across the coast is a cause for concern. In response the American Eel Management Board (Board) initiated the development of Addendum III with the goal of furthering eel conservation and reducing mortality throughout all life stages. As approved, this addendum reduces overall mortality of American eel. Further conservation measures will be considered in Draft Addendum IV.

## 1.2. BACKGROUND

American eel 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 by ocean currents to the coasts of North America and the upper portions of South America. After ocean drift, metamorphosis transforms leptocephali into glass eel. 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 eel grow in fresh, brackish, and marine waters, becoming yellow eel. Eel reach the silver eel life stage upon nearing sexual maturity. Silver eel migrate to the Sargasso Sea, completing sexual maturation en route, where they spawn and die.

Yellow eel can metamorphose into a silver eel (termed *silvering*) from three years old and up to twenty-four years old, with the mean age of silvering becoming greater with increasing latitude. Environmental factors (e.g., food availability and temperature) may play a role in the triggering of silvering. Additionally, 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). Actual metamorphosis is a gradual process occurring in the summer and fall; a drop in temperature appears to trigger the final events of metamorphosis, which lead to migratory movements under the appropriate environmental conditions.

Juvenile eel and silver eel 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.

American eel occupy a significant and unique niche in the Atlantic coastal reaches and tributaries. Historically, American eel 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. More recently, fishermen, resource managers, and scientists postulated a further decline in abundance based on harvest information and limited assessment data. This resulted in the development of the American Eel FMP.

The goals of the FMP are:

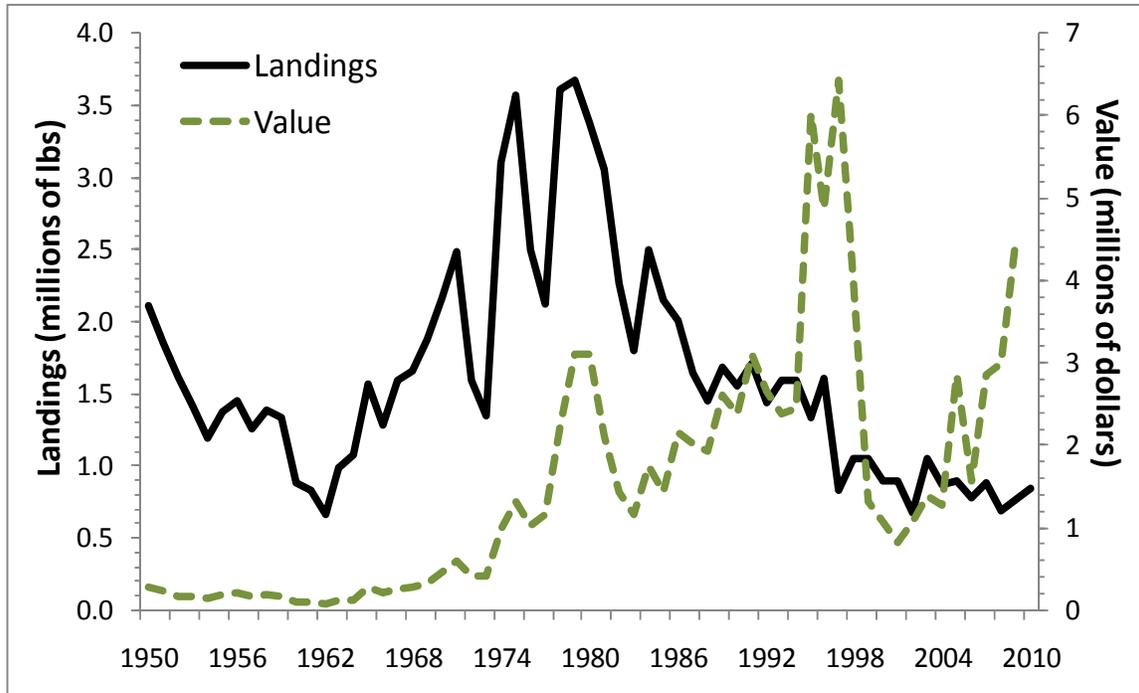
- Protect and enhance the abundance of American eel in inland and territorial waters of the Atlantic states and jurisdictions, and contribute to the viability of the American eel spawning population; and
- Provide for sustainable commercial, subsistence, and recreational fisheries by preventing over-harvest of any eel life stage.

In support of this goal, the following objectives were included in the FMP:

- Improve knowledge of eel utilization at all life stages through mandatory reporting of harvest and effort by commercial fishers and dealers, and enhanced recreational fisheries monitoring.
- Increase understanding of factors affecting eel population dynamics and life history through increased research and monitoring.
- Protect and enhance American eel abundance in all watersheds where eel now occur.
- Where practical, restore American eel to those waters where they had historical abundance but may now be absent by providing access to inland waters for glass eel, elvers, and yellow eel and adequate escapement to the ocean for pre-spawning adult eel.
- Investigate the abundance level of eel at the various life stages necessary to provide adequate forage for natural predators and support ecosystem health and food chain structure.

### **1.3. STATUS OF THE STOCK**

The Benchmark American Eel 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. The stock is considered depleted, however no overfishing determination can be made at this time based solely on the trend analyses performed. 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



**Figure 1.** Total commercial landings of American eels and value in 2010 dollars along the U.S. Atlantic Coast, 1950–2010.

detrimental to the stock, especially if other sources of mortality (e.g., turbine mortality, changing oceanographic conditions) cannot be readily controlled.

#### 1.4. 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. 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 glass eel and elver harvest. Harvest has increased the last few years as the market price has risen to over \$2,000 per pound. Although yellow eels were harvested for food historically, today’s fishery sells yellow eels primarily as bait for recreational fisheries. Glass eels are exported to Asia to serve as seed stock for aquaculture facilities.

From 1950 to 2010, U.S. Atlantic coast landings ranged from approximately 664,000 pounds in 1962 to 3.67 million pounds in 1979 (Figure 1). After an initial decline in the 1950s, landings increased to a peak in the 1970s and 1980s in response to higher demand from European food markets. In most regions, landings declined sharply in the 1990s and 2000s following a few years of peak landings. The value of U.S. commercial American 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 (Figure 1). Total landings value increased through the 1980s and 1990s, dropped in the late 1990s, and increased again in the 2000s.

## 2. HABITAT RECOMMENDATIONS

To meet the goal of reducing mortality on all life stages ASMFC should focus efforts on understanding habitat requirements for American eels, engaging the relevant regulatory agencies to increase or improve upstream /downstream eel passage, and encouraging habitat restoration. Specifically the following items are recommended for completion:

1. Development of quantifiable eel habitat enhancement goals through the creation of a coastwide eel habitat GIS database. The goal of the database would be the generation of coastwide, regional, state, and watershed maps that would quantify the amount of available habitat relative to historical habitat and identify major barriers to eel migration. This information would allow the ASMFC to prioritize eel habitat enhancement programs at coastwide, regional, and state scales. Efforts should be coordinated with existing GIS efforts already underway in Canada (see: <http://www.dfo-mpo.gc.ca/Library/345546.pdf>). Potential funding and coordination with the Atlantic Fish Habitat Partnership should be considered. This project is considered a high priority item and should be completed either prior to the start of the next benchmark stock assessment or in conjunction with the stock assessment.
2. The TC should work with other appropriate ASMFC committees to develop materials to support states or jurisdictions interested in making recommendations to the Federal Energy Regulatory Commission (FERC) for upstream and downstream fish passage provisions for American eels in the hydropower licensing and relicensing process. A list of FERC requirements in coordinating with the states in the hydropower licensing and relicensing process is included in Appendix I.
3. Work with states and jurisdictions to develop a list of non-FERC licensed dams and other impoundments which impact eel movements and migration. The Nature Conservancy recently completed an online, interactive inventory of dams from Maine to Virginia (see: The Northeast Aquatic Connectivity and Assessment of Dams) which could be adapted to meet this goal. An evaluation should be conducted on each general type of impoundment to assess the potential for eel passage without assistance (i.e. no eel passage constructed) or determine what type of eel passage for each type of impoundment would be most beneficial for all, or specific, life stages. The recommendations from the workshop proceedings (in preparation) from the ASMFC American Eel Passage Workshop held in Gloucester, MA, (March 2011) should be a useful document to assist in the completion of this task. Additional recommendations on eel passage are found in Appendix II.
4. Based on #1 – 3, all states and jurisdictions should develop a timeline and target for 1) the amount of habitat to open up through creation of fish passage or dam removal, where feasible and/or 2) the amount of habitat to enhance to increase survival for all, or specific, life stages.
5. The TC should assess and provide recommendations related to other potential impacts caused by water supply and withdrawal operations, water diversions, and agricultural water use.

6. The TC and SAS should increase coordination with the ASMFC Fish Passage, Habitat, and FERC Guidance Committees. The state marine fisheries agencies should also encourage increased communication and collaboration with their inland fisheries agencies counterparts where applicable. The Commission should also continue the development of a Memorandum of Understanding between the Great Lakes Fisheries Commission, U.S. Fish and Wildlife Service, and NOAA Fisheries in order to reduce mortality on eels throughout their range, as well as improving access to suitable habitat.

### **3. MONITORING PROGRAM**

Monitoring programs should be implemented to maximize the collection of the most useful data for monitoring the annual health of the stock, as well as to provide both statistically valid and scientifically rigorous information for stock assessment analysis. Additionally, the design of a new program will need to take into consideration the priorities of state monitoring programs as well as available funding and personnel.

#### **3.1. FISHERIES INDEPENDENT SURVEYS**

The 2012 American Eel Benchmark Stock Assessment made the following recommendations with regard to coastwide fisheries independent sampling:

1. Recommend states collect biological information by life stage including length, weight, age, and sex of eels caught in fishery-independent sampling programs; at a minimum, length samples should be routinely collected from fishery-independent or fisheries-dependant surveys.
2. Encourage states to implement surveys that directly target and measure abundance of yellow- and silver-stage American eels, especially in states where few targeted eel surveys are conducted.
3. A coast-wide sampling program for yellow and silver American eels should be developed using standardized and statistically robust methodologies.
4. Continue the ASMFC-mandated young-of-the-year surveys; these surveys could be particularly valuable as an early warning signal of recruitment failure.

##### *3.1.1. Annual Young-of-Year Abundance Survey*

The requirements of the annual young-of-the-year survey will remain as specified under Section 3.1.1 of the FMP.

##### *3.1.2. Annual Yellow Eel Survey*

States and jurisdictions currently conducting yellow eel surveys, as specified in Table 1, will be required to maintain these surveys. For those surveys that are targeting another species (either as required by separate ASMFC FMP or at the discretion of the state) and collects information on bycaught American eels, if the state discontinues the survey it is recommended that a similar survey be implemented, as possible, to continue data collection. Under this Addendum collection of data on bycaught eels is not a compliance requirement. As funds and/or personnel become available it is recommended that states/jurisdictions consider implementing additional yellow eel monitoring programs.

**Table 1.** Fisheries Independent Monitoring for American Eel

State	System	Monitoring Program	Targeted Life Stage				Information Collected
			G	E	Y	S	
Maine	West Harbor Pond	Irish Elver Ramp <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Sebasticook River (Benton Falls)	Irish Elver Ramp <sup>^A</sup>		X	X		length, weight, count, EV
New Hampshire	Lamprey River	Irish Elver Ramp <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Squamscott, Oyster, and Winnicut	Fyke net <sup>*^</sup>			X		length, weight, count, EV
Massachusetts	Acushnet, Parker, and Jones Rivers	Sheldon/Irish Elver Trap <sup>*^</sup>	X				count, length, weight, pigment stage, EV
	6 Coastal Rivers	Bycatch survey <sup>*^</sup>			X		length, weight, count, EV
Rhode Island	Gilbert Stuart	Irish Elver Ramp <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Annaquatucket River	Irish Elver Ramp <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Narragansett Bay	Trawl Survey <sup>^</sup>			X		length, weight, count, EV
	Narragansett Bay	Seine Survey <sup>^</sup>			X		length, weight, count, EV
Connecticut	Ingham Hill	Irish Elver Ramp <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Farmill River	Electrofishing survey <sup>^A</sup>			X		length, weight, count, EV
New York	Carmans River	Fyke net <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Hudson River	Striped Bass Survey <sup>*^A</sup>		X	X		length, weight, count, EV
	Hudson River	Alosine Survey <sup>*^A</sup>		X	X		length, weight, count, EV
	Western Long Island	Seine Survey <sup>*^</sup>		X	X		length, count, EV
New Jersey	Patcong Creek	Fyke net <sup>^</sup>	X				count, length, weight, pigment stage, EV
	tributary of Delaware River/Bay	River Herring electrofishing survey <sup>*</sup>			X		length, weight, count, EV
	Delaware River	Striped Bass Seine Survey <sup>*^A</sup>			X		length, weight, count, EV
Pennsylvania	non-tidal DE River	Small mouth bass survey <sup>^</sup>		X	X		count
Delaware	Millsboro	Fyke net <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Delaware River	Trawl survey <sup>^A</sup>		X	X		length, weight, count, EV

Table 1. Fisheries Independent Monitoring for American Eel (continued)

State	System	Monitoring Program	Targeted Life Stage				Information Collected
			G	E	Y	S	
Maryland	Turville Creek	Irish Elver Ramp <sup>^A</sup>	X				count, length, weight, pigment stage, EV
	Bishopville	Irish Elver Ramp	X				count, length, weight, pigment stage, EV
	Sassafrass River	Pot Survey <sup>^A</sup>			X		length, weight, count, EV
	Chesapeake Bay	Juvenile Striped Bass Survey <sup>*^A</sup>			X		length, weight, count, EV
	Corsica River	Trap Survey <sup>^A</sup>				X	length, weight, count, EV
PRFC	Clarks Millpond (Coan R.)	Irish Elver Ramp <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Gardys Millpond (Yeocomico R.)	Irish Elver Ramp <sup>^</sup>	X				count, length, weight, pigment stage, EV
DC	Potomac River	Electrofishing survey <sup>^</sup>			X		length, weight, count, EV
	Potomac River	Pot Survey <sup>^</sup>			X		length, weight, count, EV
Virginia	James	Irish Elver Ramp <sup>^</sup>	X				count, length, weight, pigment stage, EV
	York	Irish Elver Ramp <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Rappahannock	Irish Elver Ramp <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Inland Waters	Electrofishing survey <sup>**^A</sup>			X		length, weight, count, EV
North Carolina	Beaufort Bridge	Net Survey <sup>^**</sup>	X				count, length, weight, pigment stage, EV
	Estuarine Trawl Survey	Trawl Survey <sup>^A</sup>			X		length, count, EV
South Carolina	Goose Creek	Fyke net <sup>^</sup>	X				count, length, weight, pigment stage, EV
	Lower Edisto, Combahee, Ashley, Cooper Rivers and Upper Winyah Bay	Red Drum electrofishing survey <sup>*^A</sup>			X		length, weight, count, EV
	PeeDee, Edisto, Savannah Rives	Juvenile Am. Shad electrofishing survey <sup>*^</sup>			X	X	length, weight, count, EV
Georgia	Altamaha	Pot Survey			X		length, weight, count, EV
Florida	Guana River Dam	Dip Net Survey <sup>^</sup>	X				count, length, weight, pigment stage, EV

\*Survey is primarily targeting another species and collects information on American eels caught as bycatch. The survey is conducted either as required by separate ASMFC FMP or at the discretion of the state. Under this addendum collection of data on bycaught eels is not a compliance requirement. However, if the state discontinues the survey it is recommended that a similar survey be implemented, as possible, to continue data collection.

\*\* Survey is currently conducted by the inland or freshwater division in the state. G = Glass Eel E = Elver Eel Y = Yellow Eel S = Silver Eel

<sup>^</sup> Survey currently conducted. A = Survey used in 2012 American Eel Stock Assessment. EV = Environmental Variables, as specified under Section 3.1.1 of the FMP

### 3.1.3. Annual Silver Eel Survey

States and jurisdictions currently conducting silver eel surveys, as specified in Table 1, will be required to maintain these surveys. For those surveys that are targeting another species (either as required by separate ASMFC FMP or at the discretion of the state) and collects information on bycaught American eels, if the state discontinues the survey it is recommended that a similar survey be implemented, as possible, to continue data collection. Under this addendum collection of data on bycaught eels is not a compliance requirement. As funds and/or personnel become available it is recommended that states/jurisdictions consider implementing additional silver eel monitoring programs.

### 3.1.4. Multiple Life Stages Survey

Where possible, the TC recommends the identification of areas where multiple life stage surveys can be conducted. Ideally the survey would target glass eel immigration and silver/yellow eel emigration in the same system in order to track recruitment, age, growth, survival, and mortality.

## 3.2. FISHERY DEPENDENT SURVEYS

To increase accuracy of reporting, states and jurisdictions with a commercial yellow eel fishery will be required to implement a trip level reporting system for both dealer and harvester reporting. Dealer and harvester landing catches must submit reports to the state of landing monthly or more frequently, if possible. This includes reporting on directed commercial harvest, by trip, (pounds landed by life stage, gear type, and catch per unit effort (CPUE)). Cross referencing between dealer and fishery trip level reporting should be conducted to ensure accuracy. States with more conservative reporting requirements in place will be required to maintain them.

Additionally, states must continue collect biological data, per Section 3.4.1 of the FMP, from a representative sub-sample of the commercial catch, if available, to evaluate sex and age structure (for yellow/silver eels), length and weight. States must also continue report on the estimated percent of harvest going to food versus bait.

States and jurisdictions may continue to petition the Board for *de minimis* status (met if commercial landings are less than 1% of the coastwide total), which exempts them from additional fishery dependent monitoring requirements, per Section 4.4.2 of the FMP.

The ASMFC American Eel Plan Development Team (PDT) and TC have discussed the need to improve harvest data for eel caught under commercial permits and kept for personal use and not sold. There is concern this practice may be underreported especially in New England where some commercial permit holders save eels as bait for the commercial striped bass fishery. Under this Addendum states and jurisdictions are recommended to implement strategies within their reporting system to recover data on eels harvested for personal use. This could be accomplished by updating current reporting criteria or implementing a special-use permit. A related reporting gap likely exists for recreational eel potting, however the coast-wide magnitude is expected to be lower. Where feasible, states and jurisdiction are

encourage to also investigate strategies for improving recreational harvest data on eels kept for personal use.

Additionally, this Addendum recommends that the state marine agencies work with their state inland counterparts, where applicable, to standardize reporting of trip-level landings and effort data that occur in inland waters on diadromous populations of eels.

## **4. MANAGEMENT PROGRAM**

This Addendum establishes new management measures for both the commercial (glass, yellow, and silver) and recreational eel fisheries. Given the wide range of proposed management measures and public input received during the development of this Addendum, some of the proposed management options originally considered in the public comment draft of Addendum III were transferred to Draft Addendum IV in order to be further developed. Draft Addendum IV primarily focuses on management measures for the glass eel fishery and will be considered in Spring 2014.

### **4.1. COMMERCIAL FISHERY MANAGEMENT MEASURES**

These regulations replace Section 4.2.1 of the FMP. States/jurisdictions shall maintain existing or more conservative American eel commercial fishery regulations, unless otherwise approved by the American Eel Management Board. The implemented provisions will be considered a compliance requirement and are effective as specified under Section 5.0. Management measures also include all mandatory monitoring and annual reporting requirements as described in Section 3.0 of this addendum.

#### *4.1.1. Glass Eel Fisheries*

The following measures apply to the glass eel fisheries that currently operate 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 to control the development glass eel fisheries. The development of any future glass eel fisheries would be subject to the following measures, unless otherwise specified by the Board.

### **PIGMENTED EEL RESTRICTIONS**

An increase in harvest of pigmented eels has been observed in recent years during the glass eel fishery. Glass eels generally become pigmented as the season progresses and water temperatures increase, although there may be other factors that affect this pigmentation process (Haro and Krueger 1988). The pigmentation provides disruptive coloration and countershading for the eels, which presumably reduces predation and increases survivorship. While the glass eel fishery is a traditional fishery, the pigmented eel fishery represents the development of a new fishery. It has been observed that catches are predominately either glass eels or pigmented eels (i.e. the catch is not a mixture of both pigmented and glass eels).

Therefore, under this Addendum, for states with a commercial glass eel fishery, only a small tolerance (maximum of 25 pigmented eels per pound of glass eel catch) of pigmented eels will be allowed. In order to meet this requirement, it is recommended that states implement the use of a 1/8 inch non-stretchable mesh to grade all catch immediately upon harvesting.

States may propose alternative restrictions to meet the goal of minimizing the development of a pigmented eel fishery, which would require review by the TC and approval by the Board. It is also recommended that all catch be graded on the boat or streamside and that any bycatch is immediately returned to the waters where the fish were harvested.

#### *4.1.2. Yellow Eel Fisheries*

Yellow eel fisheries currently operate in all states with the exception of Pennsylvania and the District of Columbia. The following measures apply to all current yellow eel fisheries. The development of any future yellow eel fisheries would be subject to the following measures, unless otherwise specified by the Board.

#### **MINIMUM SIZE AND MESH REQUIREMENTS**

It is generally accepted that American eel in the northern portion of the species' range are larger than eel in the southern end of the range. However, there is not enough information at this time to develop regional or state specific maximum sizes for the coast. Nonetheless, there is growing concern about the development of fisheries on small yellow eels and an increase in the minimum size is a means to prevent this fishery from developing further. The benefit of effective gear restrictions is smaller eels are not landed, thus eliminating the need for harvesters to handle these fish or enforcement having to measure fish. No gear requirements are sought to exclude larger eels from pots at this time because only a low number of silver eels are caught in pot fisheries. Gear restrictions that are instituted should be monitored for effectiveness.

States and jurisdictions are required to adopt a nine (9) inch minimum size limit for all yellow eel fisheries. Harvesters are required to sort their catch and discard eels smaller than the size limit.

States and jurisdictions are required to implement a ½ by ½ minimum on the mesh size used in commercial yellow eel pots.

States may allow, for up to three years starting January 1, 2014, the use of a 4 by 4 inch escape panel constructed of a mesh size of at least ½ by ½ inch mesh in order to reduce the financial burden of gear changes on the fishery.

#### *4.1.3. Silver Eel Fisheries*

#### **SEASONAL CLOSURE RESTRICTIONS**

States and jurisdictions are required to implement no take of eels from September 1<sup>st</sup> through December 31<sup>st</sup> 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 Delaware River and its tributaries within New York are exempt from this requirement. This exemption will sunset one year from the date of implementation (implementation date is January 1, 2014). If alternative management measures are not implemented by January 1,

2015, then the requirements under this section will apply. Alternative management measures for the Delaware River and its tributaries within New York will be considered under Draft Addendum IV.

#### **4.2 RECREATIONAL FISHERY MANAGEMENT MEASURES**

These regulations replace Section 4.1 of the FMP. The implemented provisions will be considered a compliance requirement and are effective as specified under Section 5.0.

##### **RECREATIONAL MINIMUM SIZE**

In order to minimize the chance of excessive recreational harvest, as well as circumvention of commercial eel regulations, the ASMFC member states/jurisdictions shall establish uniform possession limits for recreational fisheries. States and jurisdictions are required to adopt a nine (9) inch minimum size limit for all recreational fisheries.

##### **RECREATIONAL BAG LIMIT**

Given the interest to have all fishery sectors contribute to conservation measures under Addendum III all states and jurisdictions are required to implement a daily recreational bag limit of 25 fish per day per angler.

##### **PARTY/CHARTER (FOR-HIRE) EXEMPTION**

Crew and captain involved in party/charter (for-hire) employment on party/charter (for-hire) activities are exempt from recreational bag limit reduction. Crew members involved in for-hire employment are allowed to maintain the current 50 fish per day bag limit for bait purposes during fishing, as specified under the American Eel FMP.

## **5. IMPLEMENTATION SCHEDULE**

The measures contained in Section 4.0 will be effective on January 1, 2014.

## 6. LITERATURE CITED

Goodwin, K.R., and P.L. Angermeier. 2003. Demographic characteristics of American eel in the Potomac River drainage, Virginia. *Transactions of the American Fisheries Society* 132(3):524–535.

Haro, A.J., and W.H. Krueger. 1988. Pigmentation, size, and migration of elvers (*Anguilla rostrata* (Lesueur)) in a coastal Rhode Island stream. *Canadian Journal of Zoology* 66(11):2528–2533.

Hutchinson, 1997. Evaluation under commercial fishing conditions the effectiveness of the mandated eel pot grading panel on the North Carolina American eel. North Carolina Department of Environment, Health, and Natural Resources, Division of Marine Fisheries Grant Program. Grant No. FRG-95-105. Contract No. M-6028.

## **Appendix IV. Current State Fish Passage Considerations**

### **FERC Guidelines**

Under section 401(a)(1) of the Clean Water Act (CWA), the FERC may not issue a license for a hydroelectric project unless the State water quality certifying agency has issued water quality certification for the project or has waived certification. Certification (or waiver) is required in connection with any application for a Federal license or permit to conduct an activity which may result in a discharge into U.S. waters. Any conditions of the certification become conditions of the license.

Section 18 of the Federal Power Act states that the Commission shall require construction, maintenance, and operation by a licensee of such fishways as the Secretaries of Commerce or the Interior may prescribe. The Commission's policy is to reserve such authority in a license upon the request of either designated Secretary.

Pursuant to section 10(j)(1) of the FPA, the Commission, when issuing a license, includes conditions based on the recommendations of Federal and State fish and wildlife agencies submitted pursuant to the Fish and Wildlife Coordination Act, for the protection and enhancement of fish and wildlife and their habitat affected by the project.

The Commission makes a preliminary determination of whether the recommendations are consistent with the FPA or other applicable law. If there is a preliminary inconsistency determination, the agency in question is invited to meet with the Commission staff to try to resolve the matter prior to action on the license application

For example:

On August 31, 1999, Northeast Generation Services Company (NGS)<sup>1</sup> filed an application for a single new license, pursuant to sections 4(e) and 15 of the Federal Power Act (FPA),<sup>2</sup> for the continued operation and maintenance of the existing 105.9-megawatt (MW) Housatonic Project. The Housatonic River flows southward 149 miles through western Massachusetts and Connecticut before reaching Long Island Sound. The watershed drains some 2,000 square miles consisting of rugged terrain in the north, and rolling hills and flat stretches of marshland in the south.

FWS made 28 recommendations in this proceeding, of which the Commission staff preliminarily determined that five were not consistent with the FPA or other applicable law. Based on comments filed by Interior and others on the Draft EIS, and additional staff analysis, it was determined that three of the five recommendations are not within the scope of section 10(j), and the Final EIS recommends that they be included in the license. The two remaining inconsistencies are Interior's recommendations to operate the Falls Village and Bulls Bridge developments in a run-of-river mode year-round. The EIS found that year-round run-of-river operation would disadvantage recreational users and businesses associated with whitewater boating, and would cost NGS about \$108,000 in lost generation. The EIS recommended that these developments be operated in run-of-river mode during the spring, and in peaking mode from July through March to benefit the whitewater-

boating community and reduce economic impacts to NGS. This issue was however mooted by Connecticut DEP's water quality certification, which requires run-of-river operation at these developments year round.

The Licensee shall, in a manner approved by the U.S. Fish and Wildlife Service (Service) and the Department, design, construct, operate, maintain and monitor the effectiveness of upstream and downstream American eel passage facilities. The Licensee shall implement the American eel passage effectiveness monitoring plan when the facilities are placed in operation. The Licensee shall, in a manner approved by the Service and the Department, design, construct, operate, maintain and monitor the effectiveness of upstream and downstream anadromous fish passage facilities that are capable of excluding the passage of sea lamprey. The Licensee shall implement the anadromous fish passage effectiveness-monitoring plan when the facilities are placed in operation.

The Licensee shall, in a manner approved by the Service and the Department, develop a plan to assess the impact on the littoral-zone community due to impoundment fluctuations associated with normal operations (excluding emergency or maintenance draw downs). The assessment will analyze impacts on aquatic resources such as fish, mussels, wetlands and wildlife that inhabit the littoral-zone of Lake Lillinonah. The results of the assessment will be presented in a report and submitted to the Department and the Service. If the Department and the Service determine that significant adverse impacts occur during normal operations, the Licensee will implement corrective actions to mitigate the impacts.

## **Maine**

*Permitting Agency:* Maine Dept of Environmental Protection

<http://www.mainelegislature.org/legis/statutes/38/title38ch5sec0.html>

*Initial Approval:* ([38 §636. Approval criteria](#))

The department shall make a written finding of fact with respect to the nature and magnitude of the impact of the project on each of the considerations under this subsection, and a written explanation of their use of these findings in reaching their decision.

B. Whether the project will result in significant benefit or harm to fish and wildlife resources. In making its determination, the department shall consider other existing uses of the watershed and fisheries management plans adopted by the Department of Inland Fisheries and Wildlife and the Department of Marine Resources

D. Whether the project will result in significant benefit or harm to the public rights of access to and use of the surface waters of the State for navigation, fishing, fowling, recreation and other lawful public uses

*Minimum Flow Requirements if Hearing is Sought:* ([38 §840. Establishment of water levels](#))

4. Evidence. At the hearing, the commissioner shall solicit and receive testimony, as provided by Title 5, section 9057, for the purpose of establishing a water level regime and, if applicable, minimum flow requirements for the body of water. The testimony is limited to:

- A. The water levels necessary to maintain the public rights of access to and use of the water for navigation, fishing, fowling, recreation and other lawful public uses;
- C. The water levels and minimum flow requirements necessary for the maintenance of fish and wildlife habitat and water quality

## **New Hampshire**

*Permitting Agency:* NH Dept of Env. Services

[http://des.nh.gov/organization/divisions/water/dam/permit\\_dam.htm](http://des.nh.gov/organization/divisions/water/dam/permit_dam.htm)

No guidelines for fish passageways: See

<http://www.gencourt.state.nh.us/rsa/html/NHTOC/NHTOC-L-482.htm>

Statute regarding inspection and erection of dams: See

<http://www.gencourt.state.nh.us/rsa/html/L/482/482-9.htm>

## **Massachusetts**

### ***Massachusetts***

*Permitting Agency:* Massachusetts Division of Marine Fisheries

Authorization and management of fish passage for sea-run fish: M.G.L Chapter 130, Sections 1 and 19.

*Fishway Construction Permit:* 322 CMR Sections 7.01 (4(f)) and (14(m)).

## **Rhode Island**

*Permitting Agency:* Dept. of Env. Management

<http://www.dem.ri.gov/>

*Impact Minimization:* Rhode Island's Freshwater Wetlands Act (R.I. Gen. Laws Section 2-1-18 et seq.) and Water Pollution Act (R.I. Gen. Laws Section 46-12-1 et seq.) require the Director to protect freshwater wetland values and water quality, respectively. It is important for the dam owner to recognize the Director's responsibilities under these laws and to plan his/her repair projects to minimize any negative impacts to freshwater wetlands and water quality values. In particular, the dam owner must:

(A) Minimize the impacts from lowering the water elevation in a reservoir during a repair project, such as by installing a temporary cofferdam. This is necessary to reduce detrimental impacts to fish and wildlife associated with the wetland environment and to reduce loss of aquatic vegetation that serves as wildlife habitat. In the event that a dam owner is unable to install controls to maintain water in the reservoir to assist in protecting fish and wildlife habitat, the dam owner must specifically inform the Director of this situation and document in writing why water is not proposed to be maintained upstream of the dam during the repair activity. Efforts must be made to avoid drawdowns between April 15 to July 1, and to avoid significant drawdowns between October 15 and March 15.

<http://www.dem.ri.gov/pubs/regs/regs//compinsp/dams07.pdf>

## **Connecticut**

*Permitting Agency:* Dept. of Energy and Env. Protection

[www.ct.gov/deep](http://www.ct.gov/deep)

*Permits for Construction:* (b) The commissioner or his representative, engineer or consultant shall determine the impact of the construction work on the environment, on the safety of persons and property and on the inland wetlands and watercourses of the state in accordance with the provisions of sections 22a-36 to 22a-45, inclusive, and shall further determine the need for a fishway in accordance with the provisions of section 26-136, and shall examine the documents and inspect the site, and, upon approval thereof, the commissioner shall issue

a permit authorizing the proposed construction work under such conditions as the commissioner may direct.

## **New York**

*Permitting Agency:* Dept of Env. Conservation

[www.dec.ny.gov/](http://www.dec.ny.gov/)

*§608.8 Standards*

The basis for the issuance or modification of a permit will be a determination that the proposal is in the public interest, in that:

(c) the proposal will not cause unreasonable, uncontrolled or unnecessary damage to the natural resources of the state, including soil, forests, water, fish, shellfish, crustaceans and aquatic and land-related environment. (<http://www.dec.ny.gov/regs/4438.html>)

*For existing dams, when they are inspected:* Conditions causing or requiring temporary or permanent adjustment of the pool level include: Requirements for recreation, hydropower, or water fowl and fish management (p. 27,

[http://www.dec.ny.gov/docs/water\\_pdf/damguideman.pdf](http://www.dec.ny.gov/docs/water_pdf/damguideman.pdf))

## **Pennsylvania**

*Permitting Agency:* Dept. of Env. Protection, Bureau of Waterways and Engineering

[http://www.portal.state.pa.us/portal/server.pt/community/waterways\\_engineering/10499](http://www.portal.state.pa.us/portal/server.pt/community/waterways_engineering/10499)

*Requirements for Permit:* (d) An application for a permit shall be accompanied by information, maps, plans, specifications, design analyses, test reports and other data specifically required under this chapter and additional information as required by the Department to determine compliance with this chapter.

(x) *Impacts analysis.* A detailed analysis of the potential impacts, to the extent applicable, of the proposed project on water quality, stream flow, fish and wildlife, aquatic habitat, Federal and State forests, parks, recreation, instream and downstream water uses, prime farmlands, areas or structures of historic significance, streams which are identified candidates for or are included within the Federal or State wild and scenic river systems and other relevant significant environmental factors. If a project will affect wetlands the project description shall also include:

(<http://www.pacode.com/secure/data/025/chapter105/chap105toc.html>)

*Reviewing Permit:* (b) In reviewing a permit application under this chapter, the Department will use the following factors to make a determination of impact:

(4) The effect of the dam, water obstruction or encroachment on regimen and ecology of the watercourse or other body of water, water quality, stream flow, fish and wildlife, aquatic habitat, instream and downstream uses and other significant environmental factors.

(5) The impacts of the dam, water obstruction or encroachment on nearby natural areas, wildlife sanctuaries, public water supplies, other geographical or physical features including cultural, archaeological and historical landmarks, National wildlife refuges, National natural landmarks, National, State or local parks or recreation areas or National, State or local historical sites

*§ 105.121. Fishways.*

Upon the request of the Fish and Boat Commission, the permittee shall install and maintain chutes, slopes, fishways, gates or other devices that the Fish and Boat Commission may require under 30 Pa.C.S. § § 3501—3505.

*§ 105.244. Protection of fish life.*

A low flow channel and habitat improvement device will be required when, in the opinion of the Fish Commission, it is necessary to provide satisfactory channel for maintenance of fish.

### **New Jersey**

*Permitting Agency:* Dept. of Env. Protection

<http://www.state.nj.us/dep/>

*For new dams:* (d) No person may construct a dam in any waterway of this state which is a runway for migratory fish, without installing a fish ladder or other approved structure to permit

the fish to pass the dam in either direction (see N.J.S.A. 23:5-29.1).

1. This provision is applicable to dams of any size.

2. The Department will determine whether a stream is currently a runway for migratory fish, during the review of the dam permit application. Applicants should consult the Division of Fish and Wildlife in this matter prior to finalizing the application.

(<http://www.nj.gov/dep/damsafety/docs/standard.pdf>)

### **Delaware**

*Permitting Agency:* Dept. of Natural Resources and Environmental Control

<http://www.dnrec.delaware.gov>

No guidelines for new dams or fish passageways

### **Maryland**

*Permitting Agency:* Dept of the Environment

<http://www.mde.state.md.us>

*For existing dams:* 5. Pool levels are sometimes adjusted for recreation, hydropower, or waterfowl and fish management. (p. 47,

<http://www.mde.state.md.us/programs/Water/DamSafety/GuidelinesandPolicies/Documents/www.mde.state.md.us/assets/document/damsafety/MD%20Dam%20Safety%20Manual%201996.pdf>)

*Dam in a Recreational Park:* The Lake Waterford Dam was repaired in 1993. A new principal pipe spillway along with a concrete ogee spillway were installed to safely pass the 100-year storm. In addition a cement bentonite slurry wall was installed and a fish passage was constructed to access the upstream spawning areas.

No guidelines for new dams or fish passageways

### **Virginia**

*Permitting Agency:* Dept. of Conservation and Recreation, Virginia Soil and Water Conservation Board

[http://www.dcr.virginia.gov/stormwater\\_management/index.shtml](http://www.dcr.virginia.gov/stormwater_management/index.shtml)

No guidelines for new dams or fish passageways: See

[http://www.dcr.virginia.gov/dam\\_safety\\_and\\_floodplains/documents/dsregs.pdf](http://www.dcr.virginia.gov/dam_safety_and_floodplains/documents/dsregs.pdf)

**North Carolina**

*Permitting Agency:* Dept. of Env. and Natural Resources

<http://portal.ncdenr.org>

*For existing dams:* 5. Pool levels are sometimes adjusted for recreation, hydropower, or waterfowl and fish management.

([http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=6968a202-c971-40ef-9efb-40883a9f9bd8&groupId=38334](http://portal.ncdenr.org/c/document_library/get_file?uuid=6968a202-c971-40ef-9efb-40883a9f9bd8&groupId=38334))

No other guidelines for new dams or specifically concerning fish passageway.

**South Carolina**

*Permitting Agency:* Dept. of Health and Env. Control, <http://www.scdhec.gov/>

No guidelines for new dams or fish passageways.

**Georgia**

*Permitting Agency:* Dept of Natural Resources, <http://www.gadnr.org/>

No guidelines for new dams or fish passageways.

**Florida**

*Permitting Agency:* Dept. of Env. Protection -

<http://www.dep.state.fl.us/water/mines/damsafe.htm>

No guidelines for new dams or fish passageways.

## **Appendix II – Fish Passage Recommendations for American eel**

The fragmentation of habitat and blockage of upstream and downstream migrations is a major area of concern for American eels. Traditional fish passage is not effective for upstream migration of juvenile American eels, presumably due to velocity barriers. While low-head weir and pool fishways may allow juvenile eel passage, it is likely that most Denil and Alaskan Steeppass ladders are not passable. Eel Passage structures often vary in design via substrate type, slope and length. However, eel passage is relatively new practice in the US, and additional investigation is needed on standard design criteria and quantitative metrics of passage success. Eel passage structures should only be deployed after evaluating the potential for eels to pass the present impediment and the possibility of removing the impediment. If an eel passageway is necessary, the design should initially focus on the size range of eels below the impediment and the specific location where an eel pass can suitably attract eels. With this information, designs can progress towards selecting water supply for the eel pass, the choice of having a monitoring tank, and structural dimensions for the eel pass and associated hardware. Recently some strides have been made in upstream eel passage structures (see ASMFC 2011 American Eel Passage Workshop Proceedings, in prep.). With these considerations, the PDT recommends that each jurisdiction actively seeks opportunities to improve upstream eel passage through obstruction removal and deployment of eel passage structures.

Downstream passage of out migrating eels is seen as more difficult than upstream migrations issues, as the results of passage through a hydroelectric project can often be mortality of mature, fecund individuals. Downstream mortality rate is often highly variable and is depended on dam configuration, turbine type, and operational conditions. Generally turbine strikes positively relate to eel length, putting larger female silver eels at particular high risk. Light barriers, louver screens, high flow bypass and generation shut downs during predicted migration windows have all shown promise but there are few quantitative studies showing the level of effectiveness. Important gains in eel survival and recruitment could be realized through widespread reductions in downstream passage mortality of silver eels. The PDT recommends that each jurisdiction identify opportunities to work within the FERC review process and with non-FERC dam owners to improve downstream eel passage.