

Atlantic States Marine Fisheries Commission

DRAFT ADDENDUM III TO THE FISHERY MANAGEMENT PLAN FOR AMERICAN EEL FOR PUBLIC COMMENT



ASMFC Vision Statement:

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

March 2013

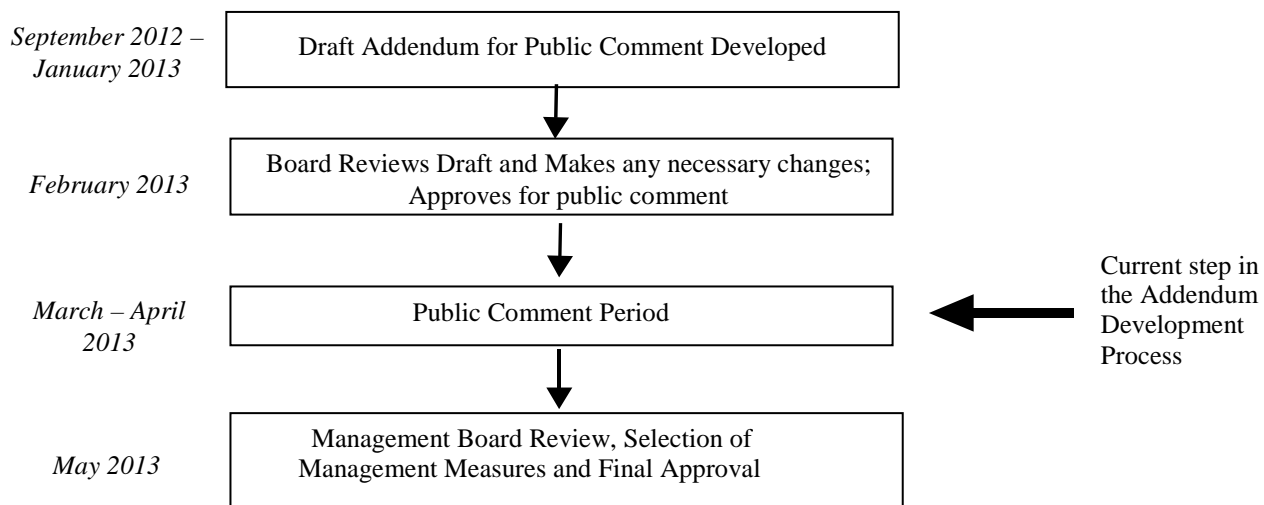
PUBLIC COMMENT PROCESS AND TIME LINE

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 May 2, 2013. 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 III 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:

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EXECUTIVE SUMMARY

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

This Draft Addendum includes a range of options suggested by the American Eel Plan Development Team, including possible moratoria or quota allocation on glass, yellow, and silver eel harvest; reductions in eel catch and effort for all life stages; seasonal closures; habitat recommendations; and future monitoring requirements.

Specifically, the management options under consideration are:

Commercial Glass Eel Fisheries

- Option 1 – Status Quo
- Option 2 – Closure of Glass Eel fisheries
- Option 3 – Glass Eel Quota
- Option 4 – Reporting Requirements
- Option 5 – Pigmented Eel Tolerance

Commercial Yellow Eel Fisheries

- Option 1 – Status Quo
- Option 2 – Increase Minimum Size Limit
- Option 3 – Gear Restrictions
- Option 4 – Coastwide Quota
- Option 5 – Reporting Requirements
- Option 6 – Two Week Fall Closure

Commercial Silver Eel Fisheries Measures

- Option 1 – Status Quo
- Option 2 – Seasonal Closure

Recreational Fisheries Measures

- Option 1 – Status Quo
- Option 2 – Reduce Bag Limit (25 fish/day bag limit)
- Option 3 – Party/Charter Boat Exemption

For more detailed information on the proposed management options, please refer to the full draft Addendum. The public is encouraged to submit comments regarding this document at any time during the public comment period, which closes 11:59 P.M. (EST) on May 2, 2013.

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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 initiated the development of Draft Addendum III with the goal of furthering eel conservation and reducing mortality throughout all life stages.

1.1. BACKGROUND

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 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 ASMFC Interstate Fishery Management Plan (FMP) for American Eel.

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.

1.2. 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 and Stock Assessment Subcommittee 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.

1.3. 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 (see Appendix 1 for

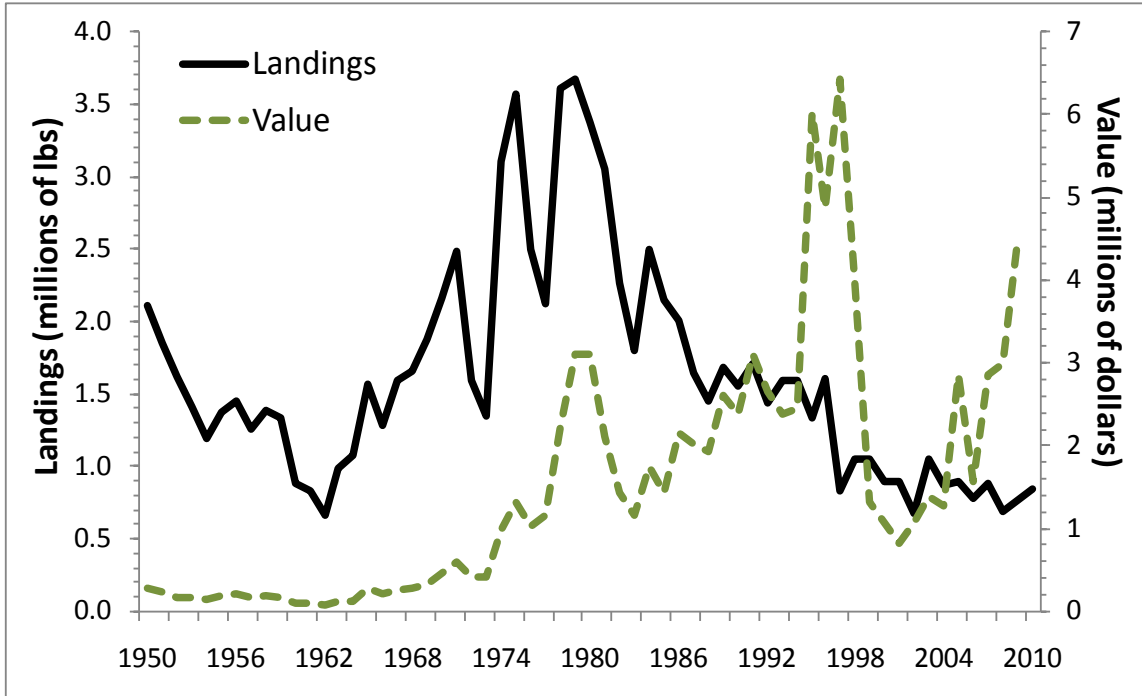


Figure 1. Total commercial landings of American eels and value in 2010 dollars along the U.S. Atlantic Coast, 1950–2010.

current regulations for all American eel fisheries). 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. For current commercial and recreational regulations for American eel by state, please see Appendix I.

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 Technical Committee and Plan Development Team have recommended the following items 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 American Eel Technical Committee 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 IV.
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 III.
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 Technical Committee 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 American Eel Technical Committee and Stock Assessment Sub-committee 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

3.1 CURRENT MONITORING REQUIREMENTS

3.1.1 Fisheries Independent Data Collection

Annual fishery-independent surveys for young-of-year American eel were mandated by ASMFC in 2001. Each participating jurisdiction shall deploy appropriate gear to capture young of the year over an eight-week period. A variety of gear types are available for use, and states should use the gear most suitable to the habitat and geography within their jurisdiction. The timing and placement of the young-of-year sampling gear will coincide with those periods of peak onshore migration of young-of-year. The locations selected will be those previously shown to catch young-of-year American eel and should provide as wide a geographic distribution as possible. Standard stations and procedures will remain fixed. At a minimum, the gear will be set so that they are operational during periods of rising or flood tides occurring at nighttime hours. The entire catch of young-of-year will be counted, with weekly sub-sampling of 60 eels for length and weight.

3.1.2 Fisheries Dependent Data Collection

Under the FMP states must report on directed commercial harvest, by month, including pounds landed by life stage, gear type, and catch per unit effort (CPUE). Additionally, states must collect biological data 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 report on the estimated percent of harvest going to food versus bait.

3.2 PROPOSED 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.

3.2.1 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.

3.2.1.1 Annual Young-of-Year Abundance Survey

States and jurisdictions currently conducting young-of-the-year surveys, as specified in Table 1, will be required to maintain these surveys. The requirements of the annual young-of-the-year survey will remain as specified under Section 3.1.1 of the FMP. As funds and/or personnel become available it is recommended that states/jurisdictions consider implementing young-of-the-year monitoring programs as specified in Table 1.

3.2.1.2 Annual Yellow Eel Survey

States and jurisdictions currently conducting yellow eel surveys, as specified in Table 1, will be required to maintain these surveys. As funds and/or personnel become available it is recommended that states/jurisdictions consider implementing the yellow eel monitoring programs as specified in Table 1.

3.2.1.3 Annual Silver Eel Survey

States and jurisdictions currently conducting silver eel surveys, as specified in Table 1, will be required to maintain these surveys. As funds and/or personnel become available it is recommended that states/jurisdictions consider implementing the silver eel monitoring programs as specified in Table 1.

3.2.1.4 Multiple Life Stages Survey

Where possible, the American Eel Technical Committee 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.

3.2.2 Fisheries Dependant Surveys

States and jurisdictions are required to continue commercial monitoring programs, including mandatory monitoring (harvester or dealer) of catch and effort, applicable only to the commercial sector of the eel fishery. To increase accuracy of reporting, dealer and/or harvester landing catches must report to the state of landing monthly or more frequently, if possible. States with more conservative reporting requirements in place will be required to maintain them. States and jurisdictions may continue to petition the Management 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 American Eel Plan Development Team and Technical Committee 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 draft 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.

Table 1. Proposed 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 [^]	X				count, length, weight, pigment stage, EV
	Sebasticook River (Benton Falls)	Irish Elver Ramp ^{^A}		X	X		length, weight, count, EV
New Hampshire	Lamprey River	Irish Elver Ramp [^]	X				count, length, weight, pigment stage, EV
	Squamscott, Oyster, and Winnicut	Fyke net			X		length, weight, count, EV
Massachusetts	Acushnet, Parker, and Jones Rivers	Sheldon/Irish Elver Trap ^{*^}	X				count, length, weight, pigment stage, EV
	6 Coastal Rivers	Bycatch survey ^{*^}			X		length, weight, count, EV
Rhode Island	Gilbert Stuart	Irish Elver Ramp [^]	X				count, length, weight, pigment stage, EV
	Annaquatucket River	Irish Elver Ramp [^]	X				count, length, weight, pigment stage, EV
	Narragansett Bay	Trawl Survey [^]			X		length, weight, count, EV
	Narragansett Bay	Seine Survey [^]			X		length, weight, count, EV
Connecticut	Ingham Hill	Irish Elver Ramp [^]	X				count, length, weight, pigment stage, EV
	Farmill River	Electrofishing survey ^{^A}			X		length, weight, count, EV
New York	Carmans River	Fyke net [^]	X				count, length, weight, pigment stage, EV
	Hudson River	Striped Bass Survey ^{*^A}		X	X		length, weight, count, EV
	Hudson River	Alosine Survey ^{*^A}		X	X		length, weight, count, EV
	Western Long Island	Seine Survey ^{*^}		X	X		length, count, EV
New Jersey	Patcong Creek	Fyke net [^]	X				count, length, weight, pigment stage, EV
	tributary of Delaware River/Bay	River Herring electrofishing survey [*]			X		length, weight, count, EV
	Delaware River	Striped Bass Seine Survey ^{*^A}			X		length, weight, count, EV
Pennsylvania	non-tidal DE River	Small mouth bass survey [^]		X	X		count
Delaware	Millsboro	Fyke net [^]	X				count, length, weight, pigment stage, EV
	Delaware River	Trawl survey ^{^A}		X	X		length, weight, count, EV

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

[^] 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

4. MANAGEMENT OPTIONS

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. The development of sustainable population and fishery thresholds will be an essential goal 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 1). 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 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.

4.1 COMMERCIAL FISHERY MANAGEMENT OPTIONS

The American Eel Stock Assessment recommended that mortality should be reduced on all life stages. Therefore the management options proposed below are not exclusive of one another and, in order to maximize the conservation benefit to American eel stocks, may be implemented in combination. If new regulations are implemented by the Management Board, these regulations will 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 either upon adoption of the Addendum or as specified by the ASMFC. Management measures also include all mandatory monitoring and annual reporting requirements as described in Section 3. For current commercial regulations by state refer to Appendix I.

4.1.1 Glass Eel Fisheries

The following options apply to the glass eel fisheries that currently operate in Maine and South Carolina (Table 2). 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 restrict the development of glass eel fisheries in the remaining states and jurisdictions. The following options are not mutually exclusive and can be implemented in combination.

Option 1 – Status Quo

Under this option the current regulations for glass eel fisheries will remain in place.

Option 2 – Closure of glass eel fisheries

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

Sub-Option 2a – Immediate closure

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

Sub-Option 2b – 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.

Table 2. Harvest (in pounds) and value of the glass eel fishery in Maine and South Carolina from 2007 - 2012. **South Carolina landings are confidential.* ^ *2012 data is preliminary.*

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^	20,755	\$38,574,146	<1,000	<\$2,000,000

Option 3 – Glass eel quota

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.

Sub-option 3a – Historical Average (1998 – 2012)

Under this sub-option, glass eel landings will be managed through a quota system, with allocation based on the average landings from 1998 – 2012. This period was chosen as it includes reliable harvest from recent years. However, the American eel Plan Development Team (PDT) expressed concern about using 2012 harvest data as the landings were not representative of the historic operation of the fishery given the recent spike in demand for glass eels.

Under this sub-option, the annual quota would be set at 6,567 pounds, with 97% (6,373 pounds) allocated to Maine and 3% (194 pounds) allocated to South Carolina (Tables 3 and 4; Figures 2 and 3). If a jurisdiction exceeds its allocation, the amount in excess of its annual quota will be deducted from the jurisdiction’s allowable quota in the following year.

Sub-Option 3b – Harvest Reductions

Under this option the annual quota for all states and jurisdictions would be reduced between 25% and 50%, or another percentage specified by the Management Board

but the Plan Development Team does not recommend a reduction over 50%. The baseline used for determining the quota reduction would be the 1998 – 2012 harvest average. Under the 25% option, Maine would be allocated 4,780 pounds and South Carolina would be allocated 145.5 pounds. Under the 50% option Maine would be allocated 3,187 pounds and South Carolina would be allocated 97 pounds (Tables 3 and 4; Figure 2 and 3).

Table 3. Estimated value for Maine under quota management based on the historical average (Sub-Option 3a) and a 25% and 50% harvest reduction (Sub-Option 3b). Estimated value based on 1) \$100 per pound, 2) \$1,000 per pound and 3) \$2,500 per pound price for glass eels. *Difference refers to the difference between allocation and the average harvest from 2010 – 2012 (10,284 pounds).

	Allocation	Difference*	Estimated Value		
			\$100/pound	\$1000/pound	\$2500/pound
Sub-Option 3a - Quota	6,373	-38%	\$637,300	\$6,373,000	\$15,932,500
Sub-Option 3b - 25%	4,780	-53%	\$477,975	\$4,779,750	\$11,949,375
Sub-Option 3b - 50%	3,187	-69%	\$318,650	\$3,186,500	\$7,966,250

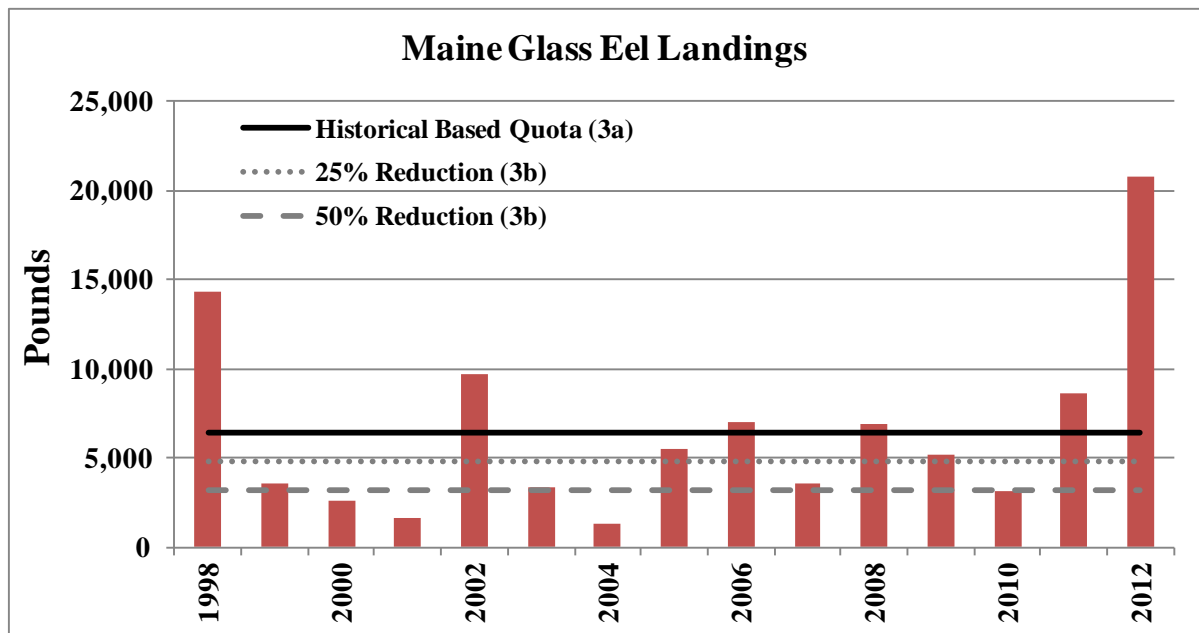


Figure 2. Maine glass eel landings and quota alternatives, in pounds.

Table 4. Estimated value for South Carolina under quota management based on the historical average (Sub-Option 3a) and a 25% and 50% harvest reduction (Sub-Option 3b). Estimated value based on 1) \$100 per pound, 2) \$1,000 per pound and 3) \$2,500 per pound price for glass eels. **South Carolina glass eel landings are confidential.*

	Allocation	Difference*	Est. Value		
			\$100/pound	\$1000/pound	\$2500/pound
Sub-Option 3a - Quota	194	-	\$19,400	\$194,000	\$485,000
Sub-Option 3b - 25%	145.5	-	\$14,550	\$145,500	\$363,750
Sub-Option 3b - 50%	97	-	\$9,700	\$97,000	\$242,500

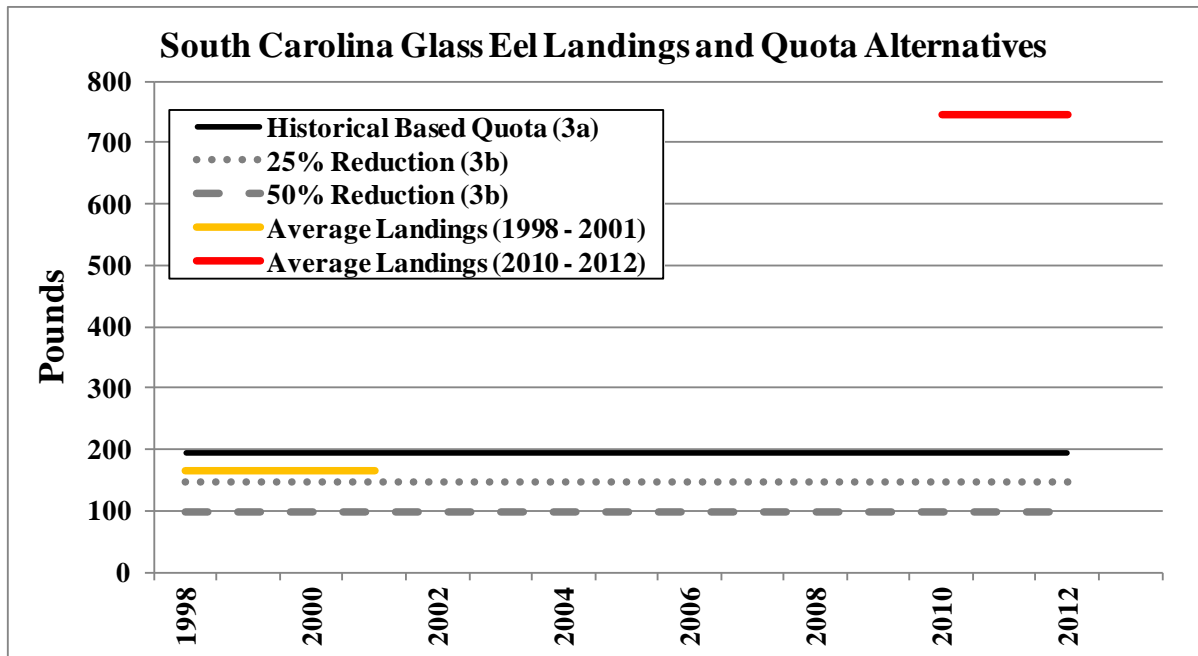


Figure 3. South Carolina glass eel landings (1998 – 2001 and 2010 – 2012 averages) and quota alternatives, in pounds.

Option 4 – Dealer Requirements

Under this option states with a glass eel fishery would be required to implement a trip level ticket system for harvesters and dealers in order to ensure accurate reporting of glass eel harvest. The American Eel Plan Development Team believed this system would be essential for quota monitoring accuracy given the sharp increase in market value and rise in illegal harvest. A cap or reduction in the number of glass eel dealers, or alternatively increased dealers license requirements, would also help address the underreporting problem by preventing people without a long-term interest in the fishery from entering.

Option 5 – Pigmented eel tolerance

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. Under the FMP, states must maintain current or more conservative fishing regulations. While the glass eel fishery is a traditional fishery, the pigmented eel fishery represents the development of a new fishery.

Therefore, under this option, 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 would be allowed. States would have the option to propose other restrictions (e.g. mesh size requirements) to meet the goal of minimizing the development of a pigmented eel fishery, which would require review by the Technical Committee and approval by the Board. 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). States may choose to. It is also recommended that all catch be graded on the boat or streamside and that any bycatch is returned to the waters where the fish were harvested.

4.1.2 Yellow Eel Fisheries

Currently commercial yellow eel fisheries operate in all states with the exception of Pennsylvania and the District of Columbia. The following options are not mutually exclusive and can be implemented in combination.

Option 1 – Status Quo

Under this option the current regulations for yellow eel fisheries will remain in place.

Option 2 – Increase Minimum Size

Under this option states and jurisdictions would be required to adopt a new minimum size limit for all yellow eel fisheries. Size limits are difficult to enforce prior to harvest, unless the gear selects for a certain size. Harvesters would be required to sort their catch and discard eels smaller than the size limit.

The American Eel Stock Assessment Subcommittee (SASC) has used the Sequential Life-table and Yield-per-recruit Model for the American Eel, known as *SLYME*, to describe the effects of growth and mortality on the American eel population by age class from the time that glass eel arrive at the coast to the time that adult eel spawn. Originally developed by David Cairns (Canada DFO) for the August 2000 meeting of the International Council for Exploration of the Seas (ICES) Working Group on Eels, the SASC has applied this model to evaluate the relative impact of varying fishing mortalities on egg production (eggs per recruit, EPR) and the relative increases in egg production as a result of changing the minimum size limit and implementing a maximum size limit for harvest (See *Silver Eel Management Options*). 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, the SASC has determined that there is not enough information to develop regional or state specific maximum sizes for the coast.

The American Eel Plan Development Team (PDT) recognizes that the potential Eggs-Per-Recruit increase is not substantial for the size options given (< 1%, Table 5). However the PDT is concerned about the development of fisheries on small yellow eels and sees the inclusion of options to increase the minimum size as a means to prevent this fishery from further developing. The glass eel fisheries have long targeted the newly recruited young-of-the-year eel to sell to the Asian market for eel culture. In 2011-2012 the ASMFC Eel Technical Committee received reports of new dealers offering to buy pigmented eels of larger size (age-1+) than glass eels. New fisheries that target pigmented juvenile eels in Maine and South Carolina and presently legal sizes (>6 inches) in other states could create significant enforcement challenges and undermine regional conservations efforts. This option would also meet the overall goal of reducing mortality on all life stages and has potential to increase future yield in commercial fisheries. The PDT recommends 10 to 11 inch minimum size limit. Additionally, the PDT requests that the Law Enforcement Committee comment on the need for consistent size regulations between the commercial and recreational fisheries.

Table 5. Expected increase in Eggs-Per-Recruit with the associated change in minimum size for yellow eels.

Minimum Size (inches)	% Change Eggs Per Recruit
8	0
9	0.0113
10	0.0113
11	0.262
12	0.262

Table 6. Percent of the fishery (by number) for New Jersey, Delaware, Maryland, and Florida that would be illegal under the proposed increases in minimum size.

Size Limit	NJ	DE	MD	NC	FL
8"		0%	0%	0%	
9"	0%	2%	1%	0%	
10"	1%	9%	3%	1%	
11"	3%	24%	14%	7%	0%
12"	6%	44%	34%	36%	0%

Option 3 – Gear Restrictions

Under this option states and jurisdictions would need to implement gear restrictions in their commercial yellow eel fisheries. The benefit of effective gear restrictions is that smaller eels

are not landed, thus eliminating the need for harvesters to handle these fish or enforcement having to measure fish. It is likely that the gear restrictions will not protect out-migrating silver eel because silver eels don't actively pot. 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. Also since there is size overlap between yellow and silver eels the smaller silver eels would not likely be protected by gear restrictions (males are commonly shorter than females). Another consideration in requiring gear modifications is the cost to the fishermen to modify existing gear. Any gear restrictions that are instituted should be monitored for effectiveness.

The size of eels that are retained in pots depends on a number of variables but the principal one is the size of the mesh. Requiring the use of escape panels of the appropriate mesh size for a targeted minimum length (correlated to girth) could control the size of eels retained in eel pots. Maine, Maryland, Potomac River Fisheries Commission, and South Carolina have a mesh size requirement of ½ x ½ inch mesh or an escape panel constructed of ½ x ½ inch mesh. Florida and New York (marine) currently require mesh of 1 x ½ inches. North Carolina and Virginia require escape panels. Their escape panels are constructed of 1 x ½ inch wire mesh and must be at least 4 x 6 inches (North Carolina) and 4 x 4 inches (Virginia). Georgia requires pots to be constructed of 1 ½ x ½ inch mesh.

Sub-option 3a – Status Quo

Under this sub-option states would be required to maintain their current mesh size restrictions.

Sub-option 3b – ¾ by ½ inch minimum mesh size

Under this sub-option states would be required to implement a restriction on the mesh size used in eel pots. States would have to require, at a minimum, the use of a 4 by 4 inch escape panel constructed out of mesh size of at least ¾ by ½ inch mesh. The implementation of this sub-option should allow for smaller eels to escape. However, there is no information on harvest reductions of smaller yellow eels this sub-option would achieve.

Sub-option 3c – 1 by ½ inch minimum mesh size

Under this sub-option states would be required to implement a restriction on the mesh size used in eel pots. States would have to require at a minimum the use of a 4 by 4 inch escape panel constructed of a mesh size of at least 1 by ½ inch mesh.

In North Carolina, Hutchinson (1997) demonstrated a reduction in the percentage of small yellow eels harvested using escape panels (1 x ½ inch, Table 7). Escape panels (1 x ½ inch) reduced the percentage of yellow eels less than 9 and 10 inches in total length harvested from eel pots by 31% and 43%, respectively, when compared to eel pots constructed of ½ x ½ inch mesh (no escape panel). Escape panels (1 x ½ inch) reduced the percentage of yellow eels less than 11 and 12 inches in total length harvested from eel pots by 45% and 37%, respectively, when compared to eel pots constructed of ½ x ½ inch mesh (no escape panel).

Implementing an escape panel (1 x ½ inch) requirement would reduce the number of small yellow eels (less than 10 inches) harvested coast wide. Refer to Table 6 for the percent of catch, for states with available data, by size.

Table 7. Reduction in the percentage of small yellow eels harvested using escape panels (1 x ½ inch, n = 3,957) and no escape panels (n=8,105) (Hutchinson 1997).

Inches	% of catch no escape panel	% of catch with escape panel	Reduction in eels harvested at the given sizes
Less than 8	-	0.03%	
Less than 9	0.16%	0.11%	31%
Less than 10	1.25%	0.71%	43%
Less than 11	13%	7%	45%
Less than 12	58%	36%	37%
12 to 31	42%	64%	-

Option 4 – Coastwide Quota

Under this option yellow eel harvest for states and jurisdictions with a yellow eel fishery will be regulated annually through a quota system. Examples for quota management are described in the following sub-options.

Sub-option 3a – Historical Average (1980-2011)

Under this sub-option, yellow eel landings will be managed through a quota system, with allocation based on the average landings from 1980-2011. This period was chosen as it includes a range of years that captures a more productive time in the fishery as well as years for which reliable data is available.

Under this sub-option, the annual quota would be set at 1,481,529 pounds, with allocation and change from current landings specified in Table 8. If a jurisdiction exceeds its allocation, the amount in excess of its annual quota will be deducted from the jurisdiction’s allowable quota in the following year. The states of New Hampshire and South Carolina have minimal reported landings during this time period. The PDT recommends a minimum quota set at 2,000 for these two states to provide a small quota that would be sufficient to cover any directed or bycaught landings. Quota transfers between states may be considered.

Sub-option 3b – Historical Average (1990-2011)

Under this sub-option, yellow eel landings will be managed through a quota system, with allocation based on the average landings from 1990-2011. This period was chosen as it includes the most current years for which reliable data is available.

Under this sub-option, the annual quota would be set at 1,117,734 pounds, with allocation and change from current landings specified in Table 9. If a jurisdiction exceeds its allocation, the amount in excess of its annual quota will be deducted from

the jurisdiction's allowable quota in the following year. The minimum allocated quota was fixed at 2,000 pounds; if a state's proposed quota under any of the sub-options was less than this amount it was automatically set at 2,000 pounds. This provides those states a quota that would be sufficient to cover any directed or bycaught landings without creating an administrative burden. Quota transfers between states may be considered.

Sub-option 3c – Current Average (2002-2011)

Under this sub-option, yellow eel landings will be managed through a quota system, with allocation based on the average landings from 2002-2011. This period was chosen because it is based on landings which more accurately reflect the current distribution of the fishery.

Under this sub-option, the annual quota would be set at 859,309 pounds, with allocation as specified in Table 10. If a jurisdiction exceeds its allocation, the amount in excess of its annual quota will be deducted from the jurisdiction's allowable quota in the following year. The minimum allocated quota was fixed at 2,000 pounds; if a state's proposed quota under any of the sub-options was less than this amount it was automatically set at 2,000 pounds. This provides those states a quota that would be sufficient to cover any directed or bycaught landings without creating an administrative burden. Quota transfers between states may be considered.

Sub-Option 3d – Harvest Reductions

Under this option states and jurisdictions the annual quota would be reduced by 20, 30, 40, and 50%. The baseline used for determining the quota reduction could be one of the following:

1. 1980 – 2011 harvest average
2. 1990 – 2011 harvest average
3. 2002 – 2011 harvest average

Under this sub-option, the annual quota could be set between 432,654 and 1,186,023 pounds, with allocation as specified in Tables 8, 9, and 10. If a jurisdiction exceeds its allocation, the amount in excess of its annual quota will be deducted from the jurisdiction's allowable quota in the following year. The minimum allocated quota was fixed at 2,000 pounds; if a state's proposed quota under any of the sub-options was less than this amount it was automatically set at 2,000 pounds. This provides those states a quota that would be sufficient to cover any directed or bycaught landings without creating an administrative burden. Quota transfers between states may be considered.

Option 5 – Reporting Requirements

Under this option states and jurisdictions with a commercial yellow eel fishery will be required to implement a trip level ticket system for dealer and harvester reporting. The PDT believed this system will be essential for quota monitoring. Cross referencing between dealer and fishery trip level reporting should be conducted to ensure accuracy.

Table 8. Proposed quota allocations, in pounds, by state under Sub-Options 3a and 3d. The proposed quota listed under Sub-Option 3a is based on that states average harvest from 1980 to 2011. The proposed quotas listed under Sub-Option 3d show the 20%, 30%, 40%, and 50% reductions from the Sub-Option 3a quota. Also shown is the recent harvest by state (average landings from 2009 – 2011) for comparison. The fishery is not currently managed by a quota. Note: The minimum allocated quota was fixed at 2,000 pounds; if a state’s proposed quota under any of the sub-options was less than this amount it was automatically set at 2,000 pounds.

	Sub-Option 3a and 3d Proposed Quota Allocations					Recent Harvest (Average 2009-2011)
	3a	3d - 20% reduction	3d - 30% reduction	3d - 40% reduction	3d - 50% reduction	
Maine	28,519	22,816	19,964	17,112	14,260	6,755
New Hampshire	2,000	2,000	2,000	2,000	2,000	99
Massachusetts	10,257	8,206	7,180	6,154	5,129	621
Rhode Island	6,485	5,188	4,539	3,891	3,242	3,673
Connecticut	9,790	7,832	6,853	5,874	4,895	221
New York	57,034	45,627	39,924	34,220	28,517	15,761
New Jersey	169,512	135,610	118,659	101,707	84,756	119,447
Delaware	130,274	104,219	91,192	78,164	65,137	72,972
Maryland	282,622	226,098	197,835	169,573	141,311	484,138
PRFC	208,982	167,186	146,287	125,389	104,491	48,543
Virginia	365,664	292,531	255,965	219,398	182,832	92,945
North Carolina	178,643	142,914	125,050	107,186	89,322	82,270
South Carolina	2,000	2,000	2,000	2,000	2,000	18
Georgia	8,743	6,994	6,120	5,246	4,372	103
Florida	21,010	16,808	14,707	12,606	10,505	14,571
Total	1,481,529	1,186,023	1,038,270	890,517	742,765	48,543

Table 9. Proposed quota allocations, in pounds, by state under Sub-Options 3b and 3d. The proposed quota listed under Sub-Option 3a is based on that states average harvest from 1990 to 2011. The proposed quotas listed under Sub-Options 3d show the 20%, 30%, 40%, and 50% reductions from the Sub-Option 3b quota. Also shown is the recent harvest by state (average landings from 2009 – 2011) for comparison. The fishery is not currently managed by a quota. Note: The minimum allocated quota was fixed at 2,000 pounds; if a state’s proposed quota under any of the sub-options was less than this amount it was automatically set at 2,000 pounds.

	Sub-Option 3b and 3d Proposed Quota Allocations					Recent Harvest (Average landings from 2009-2011)
	3b	3d - 20% reduction*	3d - 30% reduction	3d - 40% reduction	3d - 50% reduction	
Maine	24,576	19,660	17,203	14,745	12,288	6,755
New Hampshire	2,000	2,000	2,000	2,000	2,000	99
Massachusetts	6,632	5,306	4,642	3,979	3,316	621
Rhode Island	8,569	6,855	5,999	5,142	4,285	3,673
Connecticut	5,942	4,753	4,159	3,565	2,971	221
New York	12,527	10,021	8,769	7,516	6,263	15,761
New Jersey	133,591	106,873	93,514	80,154	66,795	119,447
Delaware	132,100	105,680	92,470	79,260	66,050	72,972
Maryland	314,432	251,546	220,102	188,659	157,216	484,138
PRFC	155,912	124,729	109,138	93,547	77,956	48,543
Virginia	221,539	177,231	155,077	132,923	110,770	92,945
North Carolina	83,357	66,686	58,350	50,014	41,679	82,270
South Carolina	2,000	2,000	2,000	2,000	2,000	18
Georgia	2,000	2,000	2,000	2,000	2,000	103
Florida	13,756	11,005	9,630	8,254	6,878	14,571
Total	1,117,734	894,987	783,614	672,240	560,867	48,543

Table 10. Proposed quota allocations, in pounds, by state under Sub-Options 3c and 3d. The proposed quota listed under Sub-Option 3c is based on that states average harvest from 2002 to 2011. The proposed quotas listed under Sub-Options 3d show the 20%, 30%, 40%, and 50% reductions from the Sub-Option 3c quota. Also shown is the recent harvest by state (average landings from 2009 – 2011) for comparison. The fishery is not currently managed by a quota. Note: The minimum allocated quota was fixed at 2,000 pounds; if a state’s proposed quota under any of the sub-options was less than this amount it was automatically set at 2,000 pounds.

	Sub-Option 3c and 3d Proposed Quota Allocations					Recent Harvest (Average 2009-2011)
	3c	3d - 20% reduction	3d - 30% reduction	3d - 40% reduction	3d - 50% reduction	
Maine	14,358	11,486	10,051	8,615	7,179	6,755
New Hampshire	2,000	2,000	2,000	2,000	2,000	99
Massachusetts	3,073	2,458	2,151	2,000	2,000	621
Rhode Island	2,360	2,000	2,000	2,000	2,000	3,673
Connecticut	2,000	2,000	2,000	2,000	2,000	221
New York	7,001	5,601	4,901	4,201	3,501	15,761
New Jersey	125,607	100,485	87,925	75,364	62,803	119,447
Delaware	104,854	83,883	73,398	62,912	52,427	72,972
Maryland	335,105	268,084	234,574	201,063	167,553	484,138
PRFC	87,010	69,608	60,907	52,206	43,505	48,543
Virginia	87,627	70,102	61,339	52,576	43,814	92,945
North Carolina	74,969	59,975	52,479	44,982	37,485	82,270
South Carolina	2,000	2,000	2,000	2,000	2,000	18
Georgia	2,000	2,000	2,000	2,000	2,000	103
Florida	9,528	7,622	6,670	5,717	4,764	14,571
Total	859,309	688,647	603,316	517,985	432,654	48,543

Option 6 – Two Week Fall Closure

Under this option, states and jurisdictions would be required to close their directed yellow eel pot/trap fishery for two consecutive weeks between September 1st and October 31st. The state or jurisdiction may specify when the closure occurs, however it must occur after the estimated start of each state’s silver eel migration. All eel pots/traps, as defined by the state, must be removed from the water during this two week closure. A limited fall closure will result in a reduction in yellow eel landings as most American eels are landed in the fall. Refer to Table 11 for estimates of average monthly harvest by state. Although silver eels have a low susceptibility to eel pots, the dominant eel fishing gear, a limited fall closure will also allow more silver eels to escape to spawn. Time of out migration for silver eels is given in Table 12.

Table 11. Percentage of commercial yellow eel harvest, by state, for the months of September, October, and November that was caught in pots or traps. All percentage calculations are based on the average harvest from all gears from 2009 – 2011.

	September	October	November	Average Harvest from 2009 – 2011 for All Gears
Maine	5%	0%	0%	6,755
New Hampshire	10%	0%	0%	99
Massachusetts	4%	3%	0%	621
Rhode Island	19%	21%	2%	3,573
Connecticut	24%	17%	0%	221
New York	10%	17%	3%	15,761
New Jersey	23%	27%	6%	119,447
Delaware	21%	30%	8%	72,972
Maryland	9%	19%	8%	484,138
Virginia	21%	30%	12%	92,945
North Carolina	13%	38%	24%	82,270
South Carolina	0%	0%	0%	18
Georgia	0%	0%	0%	103
Florida	0%	0%	11%	14,571
Total				893,491

4.1.3 Silver Eel Fisheries

Option 1 – Status Quo

Under this option the current regulations will remain in place.

Option 2 – Seasonal Closure Restrictions

Under this option states and jurisdictions would be required to implement no take of eels during the fall from any gear type other than baited traps/pots (e.g. fyke nets, pound nets and

weirs). These gears may still be fished, however no retention of eels is allowed. These gears specified have the highest rate of capture of silver eels. It is believed that most silver eels do not respond to baited traps/pots. Time of out migration for silver eels is given in Table 12. The goal of this option is to reduce or phase out the harvest of silver eels as well as reduce pressure on yellow eels. Refer to Table 13 for the average commercial harvest by month and state. If the outmigration period cannot be determined then prohibition on landing eels from the gears specified above will occur from from September 1st through December 31st. If adopted, the PDT recommends that all states implement a closure from September 1st to December 31st in order to provide the greatest conservation benefit.

Table 12. Expected or known periods of silver eel out-migration by state and jurisdiction. Black shading indicates periods of silver eel out-migration.

State	Sep	Oct	Nov	Dec
ME				
NH				
MA				
RI				
CT				
NY				
NJ				
PA	UNKNOWN			
DE				
MD				
DC				
PRFC				
VA				
NC	UNKNOWN			
SC	UNKNOWN			
GA	UNKNOWN			
FL	UNKNOWN			

Table 13. Percentage of commercial yellow eel harvest, by state, for the months of September, October, November, and December that was caught in gears other than pots or traps. All calculations based on the average harvest from 2009 – 2011.

	September	October	November	December	Average Harvest from 2009 – 2011 for All Gears
Maine	0.00%	0.00%	0.00%	0.00%	6,755
New Hampshire	0.00%	0.00%	0.00%	0.00%	99
Massachusetts	0.00%	0.00%	7.73%	0.00%	621
Rhode Island	0.00%	0.07%	14.47%	0.00%	3,573
Connecticut	0.00%	0.00%	0.00%	0.00%	221
New York	1.33%	0.83%	3.66%	0.17%	15,761
New Jersey	0.12%	0.65%	0.27%	0.05%	119,447
Delaware	0.00%	0.00%	0.00%	0.00%	72,972
Maryland	0.00%	0.01%	0.17%	0.00%	484,138
Virginia	0.07%	0.28%	0.10%	0.16%	92,945
North Carolina	0.00%	0.02%	0.00%	0.00%	82,270
South Carolina	0.00%	0.00%	0.00%	0.00%	18
Georgia	0.00%	0.00%	0.00%	0.00%	103
Florida	0.00%	0.00%	0.00%	0.00%	14,571
Total					893,491

4.2 RECREATIONAL FISHERIES

Although recreational harvest of eel is believed to be low compared to commercial harvest, reductions in all sectors are warranted given the depleted nature of the stock. The following options are not mutually exclusive and can be implemented in combination. Additionally, if the commercial minimum size limit changes under Option 2 of Section 4.2.1, the American Eel Plan Development Team requests that the ASMFC Law Enforcement Committee comment on the need for consistent size regulations between the commercial and recreational fisheries.

Option 1 - Status Quo

There is currently a 50 fish per day per angler creel limit in place under the FMP. Two jurisdictions (Maryland and D.C.) have a lower creel limit in place. Two states (Georgia and Florida) do not have any possession limits in place due to the fact that no recreational fishery is known to occur. While recreational harvest of American eels has been anecdotal in South Carolina with most fish released, the state recently passed legislation enacting a 50 eel per day per angler creel limit with a six inch size minimum restriction.

Option 2 - Reduce recreational bag limit

Given the interest to have all fishery sectors contribute to conservation measures under Addendum III, and the expectation that a recreational daily bag limit of 50 eels is excessive, this option proposes to required all states and jurisdictions to reduce the daily recreational bag limit to 25 fish per day per angler creel. This measure would also apply to crew members involved in party/charter (for-hire) employment, for bait purposes during fishing. The current size limit as specified under the FMP in six inches. Most eels caught recreationally are for use as bait, especially for striped bass. Harvest from the recreational fishery is believed to be low.

Option 3 – Party/Charter (For-Hire) Exemption

Under this option, party/charter (for-hire) activities would be exempt from the 25 fish per day bag limit. Crew members involved in for-hire employment would still be subject to the current 50 fish per day bag limit and six inch size minimum for bait purposes during fishing, as specified under the American Eel FMP.

5. IMPLEMENTATION SCHEDULE

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.

6. LITERATURE CITED

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Appendix I. Commercial American Eel Regulations by state or jurisdiction

State	Size Limit	License/ Permit	Reporting	Seasonal/ Time Closure	Gear Restrictions	Area Restriction	Other
ME	6"	Specific license	At end of season. Harvester reporting. Pounds/month, pots fished, and days fished.	Coastal and inland yellow eel fishery - None. Inland weir fishery - July 15 - Nov 15	Coastal yellow eel fishery limited to pot or hoop nets. An eel pot is a cylindrical or rectangular trap with funnels that is baited. It is 50 cubic ft or less in volume and made of wire or slatting no smaller than ½ inch square measure. A hoop net is a stationary cylindrical net fitted with mesh measuring ½ inch or greater stretch measure, has a max diameter of 6 ft, and is 18 ft or less in length from the cod end to the hoop that forms the mouth; it may have wings/leads attached to the mouth.		
	6"	Specific license	End of season. Harvester reporting. Pounds/month, pots fished, and days fished.		Inland Yellow Eel fishery limited to pots only. An eel pot is a cylindrical or rectangular trap with funnels that is baited. It is 50 cubic ft or less in volume and made of wire or slatting no smaller than ½ inch square measure (same as for coastal waters).		
	6"	Specific license	At end of season. Harvester reporting. Pounds/month, days fished, and pounds/weir/day.		Inland silver eel fishery Limited to eel weir, a structure placed in a river, stream or brook, designed to entrap migrating fish, that exceeds more than 1/3 of the wetted width of the channel. If constructed of netting, the min mesh shall not be larger than 3/8-bar mesh (3/4 in stretch mesh); if constructed of metal/wood, the slat or vertical bars shall have a min, unobstructed opening of not less than ½ in.		
	None	Specific license	At end of season. Total pounds/month, pounds/net by month. Dealer reporting.	Open season - noon March 22 through noon May 31; closed periods - Tues noon to Wed noon and Sat noon to Sun noon	It is unlawful for a person to fish for or take elvers by any method other than by dip net, elver fyke net or Sheldon eel trap. License holders are issued for one or two pieces of gear.	Middle 1/3 of waterway cannot be blocked	Lottery system for elver licenses not renewed or revoked in the previous year. License capped.
NH	6"	General commercial saltwater license and wholesaler license.	Monthly reporting with daily information. Pounds landed, hours or days fished. Harvester reporting.	None		downstream portions of fishways are closed October 2 - June 14	50/day for bait. Gear restrictions in freshwater.
MA	6"	General commercial license. Specific endorsement for eels. Registration for dealers with purchase record requirement	Trip level harvester reporting (pounds/pot/night) submitted monthly.		No person shall take or attempt to take eels by any contrivance other than by nets, pots, spears, or angling.		Nets, pots, spears, and angling only. No nets or traps in coastal rivers from February 15th through June 15th with mesh openings < 1/8 inch. Each of 52 coastal towns has its own regulations.

State	Size Limit	License/ Permit	Reporting	Seasonal/ Time Closure	Gear Restrictions	Area Restriction	Other
RI	6"	Commercial fishing license.					
CT	6"	Commercial license.	Harvest recorded daily, reported monthly to DEP, including catch and effort data. Dealer reporting.	From April 1st to June 15th (inclusive), fyke, trap and pound nets shall not be used in the main body of the Connecticut River.	Fish pots or fish traps shall be not more than 72 inches in length, width, or height. Scap nets or scoop nets may have a mesh of any size, except that for the taking of American shad such nets shall have a mesh size of not less than five inches when stretched.		In the marine district a commercial fishing license is not required to take, for personal use only, eels by the use of: (1) cast nets; (2) minnow traps not more than 20 inches long and 15 inches in diameter; (3) scoop or scap nets not more than 36 inches in diameter; (4) umbrella nets not more than 4 feet in length by 4 feet in width; (5) seines not more than 30 feet in length; and (6) not more than 2 eel pots.
NY	6"	Commercial harvester license and dealer license.	Trip records, harvester and dealer, reported at end of season		It shall be unlawful to use eel traps or pots in the waters of the marine and coastal district for commercial purposes with mesh sizes smaller than 1 inch by 1/2inch unless such pots contain an escape panel that is at least 4 inches square with a mesh size of 1 inch by 1/2 inch located so that the panel is on a side, but not at the bottom of the trap or pot. Eel pots shall not be more than 6 feet long, nor more than 12 inches in diameter if round, nor more than 12 inches square if in square form. The aperture or mouth of any eel pot shall be not more than 2 inches in its greatest diameter. Fixtures or wings of any kind attached to or used in connection with eel pots is prohibited. An eel weir shall consist of not to exceed two wings or leaders fastened to an eel trap; no eel trap shall have attached thereto more than one weir; the length of each weir shall be determined by the department; and the use of weirs of a greater length than specified in the license is prohibited. Eel weirs and eel pots shall not be constructed, set or used in any manner so as to unduly obstruct the natural flow of water or interfere with the free passage of boats. The use of eel weirs, the lengths of which are less than three eighths of an inch apart, is prohibited. All fish, except eels, taken in an eel weir or an eel pot, shall be immediately returned to the water.	The taking, possessing, sale or exposure for sale of eel from the Harlem R., East R., Hudson R., and its tributary waters upstream from the river to the first falls or barrier impassable by fish, from the Federal dam at Troy south to the Battery, NY City, Lake Ontario and the St. Lawrence R. and their tributaries upstream to the first barrier impassable by fish is prohibited, except that eels may be possessed only less than 14 inches in length and greater than 6 inches in length, for use or sale as bait.	
NJ	6"	License required.	Mandatory daily trip level and dealer transaction reporting. Miniature fyke net (eel pot) license holders required to report monthly.		Pot diameter not to exceed 16 inches if cylindrical or 201 square inches in cross section if any other configuration. Mesh no smaller than 3/16 inch bar inside measurement.	Commercial eel fishing is restricted to tidal waters.	Use of two pots is permitted for taking killifish or eels for bait, without a license, provided they are not sold or used for barter

State	Size Limit	License/ Permit	Reporting	Seasonal/ Time Closure	Gear Restrictions	Area Restriction	Other
PA	NO COMMERCIAL FISHERY						
DE	6"	A commercial eel fishing license is required to take and sell 25 or more eels per day or to fish more than two eel pots per day.	Harvesters report monthly on catch by area, effort and weight		"Commercial eel fishing gear" shall include the following items: (1) A fyke net or hoop net of a diameter not exceeding 30 inches when more than 1 such net is being fished by a person; (2) Eel pots when more than 2 such pots are being fished by a person; (3) Any seine net with a mesh size of less than 1 inch and greater than 100 feet in total length; and (4) A minnow trap when more than 2 such traps are being fished by any person. It shall be unlawful for any person to fish, set, place, use or tend any fish pot in the tidal waters of this state unless said fish pot has two escape vents placed in the parlor portion of said pot which complies with one of the following minimum sizes: 1.375 inches by 5.75 inches; or a circular vent 2.5 inches in diameter; or a square vent with sides of 2 inches, inside measure. Pots constructed of wooden lathes must have spacing of at least 1.375 inches between one set of lathes.	It shall be unlawful to fish for eels for the purpose of initially selling such eels in nontidal waters within the State unless authorized to do so by the Department.	(h) "Noncommercial eel fishing gear" shall include the following items: (1) A fyke net or hoop net of a diameter not exceeding 30 inches when only 1 is in use by a person; (2) Eel pots when 2 or less pots are being fished by a person; (3) A seine net less than or equal to 100 feet in length; (4) A cast net; (5) A lift net or umbrella net less than or equal to 5 feet in diameter; (6) A dip net less than or equal to 3 feet in diameter; (7) Spear, arrow or gigs; (8) A minnow trap when less than 2 are being fished by a person; (9) Hooks and lines when an individual places, sets or tends 3 or less separate lines with any 1 line having no more than 3 hooks attached (double and treble hooks counted as 1 hook).
MD	6"	Licensed required.	Monthly reporting with daily information (lbs. landed, gear type, and amount by area)		An eel pot shall be constructed of wire having a mesh size not less than ½ inch square when the wire mesh is unstretched. 7. An eel pot constructed with mesh smaller than ½ inch by ½ inch shall have an escape panel installed in an exterior wall of the retention chamber made of ½ inch by ½ inch mesh measuring at least 16 square inches.	Commercial fishing is prohibited in non-tidal waters.	Limited entry exists for new commercial fisherman.
DC	NO COMMERCIAL FISHERY						
PRFC	6"	License required.	Each commercial fisherman is required to file daily harvest reports for each gear type used.		No eel pot shall exceed ten (10) feet in length or have a mesh size less than ½ inch by ½ inch.		

State	Size Limit	License/ Permit	Reporting	Seasonal/ Time Closure	Gear Restrictions	Area Restriction	Other
VA	6"	A license is required to harvest finfish for commercial purposes by fish or eel pots, and there are several license categories, each with a fee depending on the number of pots fished.	All registered commercial fishermen and holders of seafood landing licenses are required to report daily harvest to VMRC monthly.		The minimum mesh size allowed in eel pots is ½-inch by ½-inch. Rectangular, square, or cylindrical eel pots must contain at least one unrestricted 4-inch by 4-inch escape panel consisting of ½-inch by 1-inch mesh.	The use of any type of fixed fishing device, fish pot, or eel pot in an area extending 250 yards from either span of the Chesapeake Bay Bridge Tunnel is unlawful.	Bait limit of 50 eels/day.
NC	6"	Standard Commercial Fishing License for all commercial fishing		Seasonal closures.	Mesh size restrictions on eel pots.		Bait limit of 50 eels/day.
SC	None	License for commercial fishing and sale. Permits by gear and area fished.	Monthly reporting, regardless whether fish were caught or not	Fyke nets shall be set only between sunset and sunrise, and all such nets shall be removed from such waters between sunrise and sunset	Dip net or fyke net only. Any permitted dip net can only be operated by the permittee without any mechanical assistance. Maximum of 10 fyke nets may be set per license holder. Fyke nets with wings not exceeding ten (10') feet in length and fourteen (14') feet in depth; with the distance from throat to cod end not to exceed twenty (20') feet. Maximum bar mesh for any portion of the nets shall not exceed one-eighth (1/8 ") inch square; and all fyke nets must be set with the cod end upstream from the wings.	Nets may not be set within 200 feet of another net	Limited entry in glass eel fishery. Capped at 5 licenses.
	6"			Pots and baskets not to exceed two (2') feet in diameter and four (4') feet in length with bar mesh of not less than one-half (1/2 ") inch square and throat opening not to exceed two (2") inches in any direction. Each such pot or basket shall be tagged and marked in accordance with Section 50-5-110, Section 50-19-2910, and Section 50-19-2920, with the cost of each tag being one (\$1.00) dollar.			
GA	6"	Personal commercial fishing license and commercial fishing boat license. Harvester/dealer reporting.					Gear restrictions on traps and pots. Area restrictions.
FL		Permits and licenses.	Trip level submitted monthly				Gear restrictions.

* For specifics on licenses, gear restrictions, and area restrictions, please contact the individual state.

Appendix II. Recreational regulations for American eel.

State	Size Limit	Possession Limit	Other
ME	6"	50 eels/person/day	Gear restrictions. License requirement and seasonal closures (inland waters only).
NH	6"	50 eels/person/day	Coastal harvest permit needed if taking eels other than by angling. Gear restrictions in freshwater.
MA	6"	50 eels/person/day	Nets, pots, spears, and angling only; mesh restrictions. Some of the 52 coastal towns have local regulations.
RI	6"	50 eels/person/day	
CT	6"	50 eels/person/day	
NY	6"	50/eels/person/day	Additional length restrictions in specific inland waters.
NJ	6"	50 eels/person/day	
PA	6"	50 eels/person/day	Gear restrictions.
DE	6"	50 eels/person/day	Two pot limit/person.
MD	6"	25/person/day limit	Gear restrictions.
DC	6"	10 eels/person/day	Five trap limit.
PRFC	6"	50 eels/person/day	
VA	6"	50 eels/person/day	Recreational license. Two pot limit. Mandatory annual catch report. Mesh size restrictions on eel pots.
NC	6"	50 eels/person/day	Gear restrictions. Non-commercial special device license. Two eel pots allowed under Recreational Commercial Gear license.
SC	None	None	Gear restrictions and gear license fees.
GA	None	None	
FL	None	None	Gear restrictions.

** For specifics on licenses, gear restrictions, and area restrictions, please contact the individual state.

Appendix III – 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.

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)¹ filed an application for a single new license, pursuant to sections 4(e) and 15 of the Federal Power Act (FPA),² 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

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

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/

6.1.1 §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)

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

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

No guidelines for new dams or fish passageways: See

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)

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 IV – 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.*).

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.