# Atlantic States Marine Fisheries Commission

## American Eel Management Board

*February 20, 2013*
*1:00 – 2:30 p.m.*
*Alexandria, Virginia*

## Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1. Welcome/Call to Order (*T. Stockwell)* 1:00 p.m.

2. Board Consent 1:00 p.m.
   - Approval of Agenda
   - Approval of Proceedings of October 23, 2012 Board meeting

3. Public Comment 1:05 p.m.

4. Consider Draft Addendum III for Public Comment **Action** 1:15 p.m.
   - Review of Draft Addendum III (*K. Taylor*)
   - Advisory Panel Report (*K. Taylor*)
   - Technical Committee Report (*B. Chase*)
   - Law Enforcement Committee Report (*M. Robson*)

5. Review and Populate Advisory Panel Membership *(K. Taylor)* **Actions** 2:25 p.m.

6. Other Business/Adjourn 2:30 p.m.

The meeting will be held at the Crowne Plaza Hotel 901 North Fairfax Street, Alexandria, Virginia 1 (703) 683 – 6000

# *Atlantic States Marine Fisheries Commission*

## MEETING OVERVIEW

### American Eel Management Board Meeting

February 20, 2013
1:00 – 2:30 p.m.
Alexandria, Virginia

| | | |
|---|---|---|
| Chair: Terry Stockwell<br>Assumed Chairmanship: 5/12 | Technical Committee Chair:<br>Brad Chase (MA) | Law Enforcement Committee Representative:<br>Fessenden/Marston/Hurd |
| Vice Chair:<br>Tom O'Connell | Advisory Panel Chair:<br>Vacant | Previous Board Meeting:<br>October 23, 2012 |

**Voting Members:** **ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, VA, NC, SC, GA, FL, D.C., PRFC, USFWS, NMFS (19 votes)**

**2. Board Consent:**

- Approval of Agenda
- Approval of Proceedings from May 1, 2012 Meeting

**3. Public Comment:**

At the beginning of the meeting, public comment will be taken on items not on the Agenda. Individuals that wish to speak at this time must sign-up at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Board Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

**4. Consider Draft Addendum III for Public Comment 1:115 – 2:25 p.m. Action**

**Background**

- The Board accepted the 2012 American Eel Stock Assessment for management use in May 2012. The stock assessment report found that American eel stocks were depleted. The Board tasked the Technical Committee with the development of potential management actions based on the recommendations of the stock assessment and peer review reports.
- In August the Board received the Technical Committee report. Based on the Technical Committee report the Board initiated the development of Draft Addendum III with the goal of reducing mortality on all life stages of American eel.
- The Plan Development Team met via conference call to develop management, monitoring, habitat, and law enforcement recommendations. (**Briefing CD)**

**Presentation**

- Review of Draft Addendum III by K. Taylor
- Advisory Panel Report by K. Taylor
- Technical Committee Report by B. Chase
- Law Enforcement Committee Report by M. Robson

**Board actions for consideration**

- Consider Draft Addendum III for Public Comment

| **5. Review and Populate Advisory Panel Membership 2:25 p.m. Action** |
| --- |
| **Background**<br>• Sam Veach, a New Jersey commercial fisherman, and Sam Livingston, a South Carolina commercial fishermen, have been nominated to the American Eel Advisory Panel. **(Briefing CD)** |
| **Presentation**<br>• Advisory Panel Nomination |

## 6. Other Business/ Adjourn

# *Atlantic States Marine Fisheries Commission*

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

**This draft document was developed for Management Board review and discussion. This document is not intended to solicit public comment as part of the Commission/State formal public input process. However, comments on this draft document may be given at the appropriate time on the agenda during the scheduled meeting. Also, if approved, a public comment period will be established to solicit input on the issues contained in the document.**

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

**October 2012**

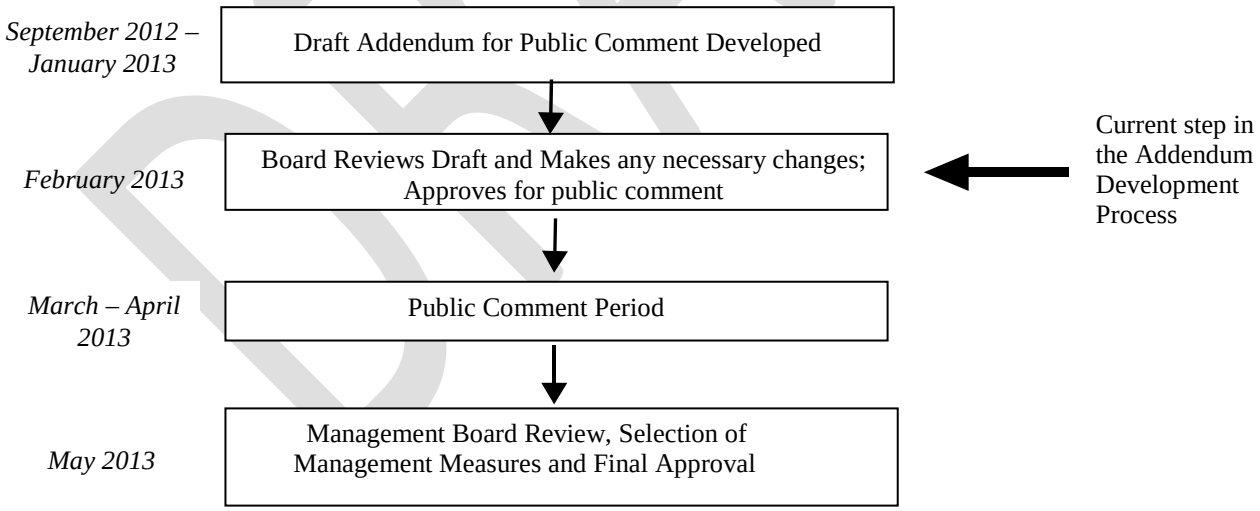
# PUBLIC COMMENT PROCESS AND TIME LINE

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 X:XX xm on XX-XX-XXXX. 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 Addendum II to the American Eel Fishery Management Plan.

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

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

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



## 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 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.

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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 American 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 metamorphosis 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; van den Thillart *et al*. 2005). 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

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

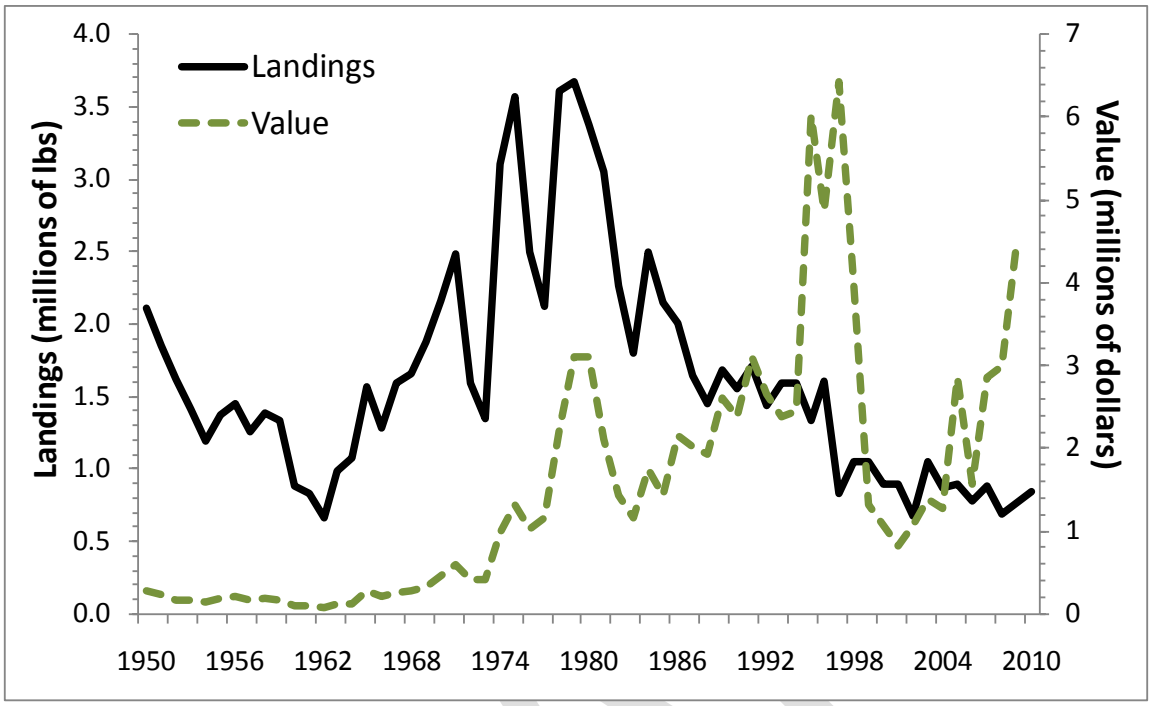


**Figure 1.** Total commercial landings of American eels and value in 2010 dollars along the U.S. Atlantic Coast, 1950–2010.

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 Service 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 Technical Committee should work with other appropriate ASMFC committees to develop materials to support states or jurisdictions interested in petitioning 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 licensed hydropower dams in Atlantic Coast rivers and FERC requirements in coordinating with the states in the hydropower licensing and relicensing process is included in Appendix III.
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 IV.
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 other potential impacts caused by water supply and withdrawal operations, water diversions, and agricultural water use.
6. The American Eel TC and SAS committees 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.

# 3. MONITORING PROGRAM

## 3.1 CURRENT MONITORING REQUIREMENTS

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

The glass eel and elver (young-of-year, YOY) life stages provide unique opportunity to assess the annual recruitment of each year's cohort since young-of-year result from the previous winter's spawning activity, and hence are all the same age. Known age is an attractive feature of the young-of-year life stage, as aging with all older life stages has shown to be problematic.

Measurement of young-of-year abundance is cost effective since the gear required is inexpensive to purchase or manufacture, requires no additional expense for bait, and may be operated by few staff. Also, since the young-of-year life stage and period of recruitment to the Atlantic coast is short in duration, each annual assessment of young-of-year abundance would not amount to a long commitment of staff time. The young-of-year abundance survey could provide a broad-scale indicator of recruitment failure or improvements. As the time series progresses, young-of-year indices may also provide a basis of inference for the future abundance of each year's cohort, similar to abundance indices validated for other fish species. Future analyses will also need to consider environmental factors which affect spawning, larval survival, transport, metamorphosis, and subsequent recruitment of young-of-year to the Atlantic coast.

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 Catch and Effort Reporting*

Under Addendum I, states and jurisdictions must issue permits for allowing commercial harvest with mandatory reporting requirements of eel catch and effort, applicable only to the commercial sector of the eel fishery or alternatively, require a dealer permit with a mandatory purchase-reporting requirement. The eel permit and reporting program is to be implemented in all areas, freshwater and saltwater, where eel are harvested to provide a complete picture of catch and effort for the commercial fishery and useful data for stock assessments. Permits are to be issued with a requirement to report eel catch and effort on a trip-level basis. Completion of reporting is to be a condition of permit renewal. Reports should include soak time, number of units of gear fished, and pounds landed by life stage.

## 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 YOY 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 YOY surveys, as specified in Table 1, will be required to maintain these surveys. The requirements of the annual YOY 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 YOY 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 Current Fisheries Dependant Data Collection Surveys*

Fishery-dependent reporting requirements include pounds landed, harvest method, gear, season, effort, and life stage as specified in Section 3.4.1 of the FMP. Under Addendum II to the FMP states and jurisdictions are required to implement either:

1) A permit allowing commercial harvest with mandatory reporting of eel catch and effort, applicable only to the commercial sector of the eel fishery or
2) A dealer permit with a mandatory purchase-reporting requirement in all areas, freshwater and saltwater, where eel are harvested to provide catch and effort for the commercial fishery and useful data for stock assessments. Permits are to be issued with a requirement to report eel catch and effort on a trip-level basis. Completion of reporting is to be a condition of permit renewal. Reports should include soak time, number of units of gear fished, and pounds landed by life stage. Efforts to collect catch and effort data should be consistent with the ACCSP standards.

### *3.2.3 Proposed Fisheries Dependant Surveys*

States will be required to implement mandatory reporting of catch and effort, applicable only to the commercial sector of the eel fishery. States and jurisdictions may continue to petition the Management Board for *de minimis* status, which exempts them from fishery dependent monitoring requirements, per Section 4.4.2 of the FMP.

The PDT and American Eel 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 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^ | | 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 | **Three Rivers** | Sheldon/Irish Elver Trap*^ | X | | | | count, length, weight, pigment stage, EV |
| | **Up to 8 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^ | | | X | | length, weight, count, EV |
| New York | Carmans River | Fyke net^ | X | | | | count, length, weight, pigment stage, EV |
| | Hudson River | Striped Bass Survey*^ | | X | X | | length, weight, count, EV |
| | Hudson River | Alosine Survey*^ | | X | X | | length, weight, count, EV |
| | West Long Island Sound | 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*^ | | | 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^ | | 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^ | X | | | | count, length, weight, pigment stage, EV |
| | Bishopville | Irish Elver Ramp | X | | | | count, length, weight, pigment stage, EV |
| | Sassafrass River | Pot Survey^ | | | X | | length, weight, count, EV |
| | **???** | Juvenile Striped Bass Survey*^ | | | X | | length, weight, count, EV |
| | Corsica River | Trap Survey^ | | | | 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**^ | | | X | | length, weight, count, EV |
| North Carolina | Beaufort Bridge | Net Survey^** | X | | | | count, length, weight, pigment stage, EV |
| | Estuarine Trawl Survey | Trawl Survey^ | | | 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*^ | | | X | | length, weight, count, EV |
| | PeeDee, Edisto, Savannah Rives | Juvenile Am. Shad electrofishing suvery*^ | | | 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 a compliance requirement until either the non-eel FMP monitoring requirement is changed or the state discontinues the survey. A substitute survey may be required to be implemented if this occurs.
** Survey is currently conducted by the inland or freshwater division in the state.
^ Survey currently conducted.
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 provisions listed within this section are 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.

### *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, a six inch minimum size limit was implemented in 1999 through the American Eel FMP. This size limit restricted the development of glass eel fisheries in the remaining states and jurisdictions. This size limit will continue to be enforced, unless otherwise changed through this addendum. The following options are not mutually exclusive and can be implemented in combination.

It is 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. Under the glass eel harvest options, a small tolerance (maximum 5% of the catch by number or volume) of harvest of pigmented eels should be considered along with a maximum size.

**Option 1 – Status Quo**

Draft document for Management Board. This document is not intended to solicit public comment.

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.*

| | Maine | | South Carolina | |
|---|---|---|---|---|
| **Year** | **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 | 18,856 | $37,717,191 | <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 – 2011)
Under this sub-option, glass eel landings will be managed through a quota system, with allocation based on the average landings from 1998 – 2011. This period was chosen as it includes reliable harvest from recent years.

Under this sub-option, the annual quota would be set at 5,563 pounds, with 98% (5,463 pounds) allocated to Maine and 2% (100 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. The PDT has concerns over the influence of the high price of glass eels and the marked increase in poaching on glass eels in 2011-2012.

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 PDT does not recommend a reduction over 50%. The baseline used for determining the quota reduction would be the 1998 – 2011 harvest average. Under the 25% option, Maine would be allocated 4,098 pounds and South Carolina would be allocated 75 pounds. Under the 50% option Maine would be allocated 2,732 pounds and South Carolina would be allocated 50 pounds (Tables 3 and 4; Figure 2).

**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 | 5463 | -46% | 546,300 | 5,463,000 | 13,657,500 |
| Sub-Option 3b - 25% | 4098 | -60% | 409,800 | 4,098,000 | 10,245,000 |
| Sub-Option 3b - 50% | 2732 | -73% | 273,200 | 2,732,000 | 6,830,000 |

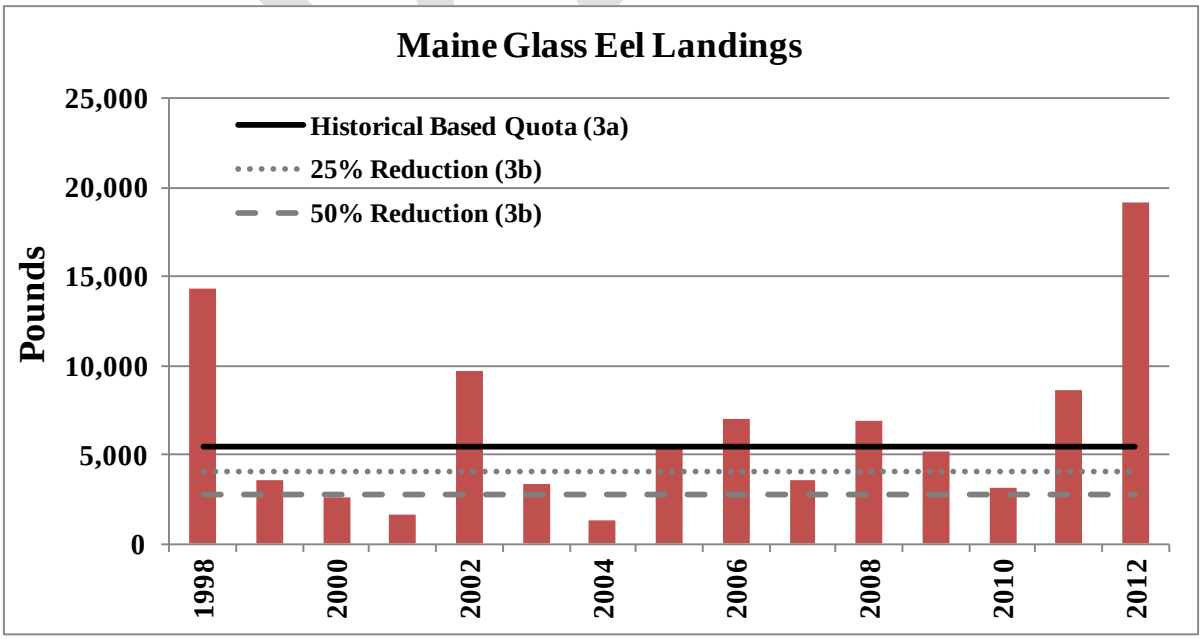


**Figure 2.** Maine glass eel landings and quota alternatives.

**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 | 100 | - | 10,000 | 100,000 | 250,000 |
| Sub-Option 3b - 25% | 75 | - | 7,500 | 75,000 | 187,500 |
| Sub-Option 3b - 50% | 50 | - | 5,000 | 50,000 | 125,000 |

**Option 4 – Dealer Requirements**

Requiring a trip level hail ticket system for dealers would help ensure accurate reporting of glass eel harvest. The PDT believed this system will 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 would also help address the underreporting problem by preventing people without a long-term interest in the fishery from entering.

*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. States and jurisdictions with a commercial fishery are required through Addendum I to the FMP to either require a harvester permit with mandatory reporting of commercial catch and effort or a dealer permit with a mandatory purchase reporting requirement. 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 sates 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 eel larger 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.

**Table 5.** Expected increase in EPR 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 |

The PDT recognizes that the potential EPR 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 TC 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.

**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 4inches (Virginia). Georgia requires pots to be constructed of 1 ½ x 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 8 and 9 inches in total length harvested from eel pots by 50.0% and 40.04%, 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 46.39% and 43.62%, 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. Escape panel requirements should allow for eels less than 10 inches to escape but a small tolerance (less than 5% by number) of eels less than 10 inches harvested should be expected. In conjunction with the gear restrictions the PDT recommends possession of eels less than 6 inches be prohibited, eels less than 6 inches are not frequently encountered in the yellow eel pot fisheries (Table 6.).

Implementation of gear restrictions should be done along with the appropriate minimum size regulation. A small tolerance (less than 5% by number) of undersized eels between 6 and 10 inches, with no possession under 6 inches, in the yellow eel fishery should be considered.

**Table 7**. Reduction in the percentage of small yellow eels harvested using escape panels (1 x ½ inch, Hutchinson 1997)

| | No escape panel (½ x ½ inch) | | | Escape panel (1 x ½ inch) | | | | |
|---|---|---|---|---|---|---|---|---|
| Inches | N | Percent | Cumulative percent | N | Percent | Cumulative percent | | Percent difference |
| 7 | 0 | 0 | | 1 | 0.03 | 0.03 | | |
| 8 | 13 | 0.16 | 0.16 | 3 | 0.08 | 0.1 | | 50.00 |
| 9 | 87 | 1.09 | 1.25 | 24 | 0.61 | 0.71 | | 44.04 |
| 10 | 923 | 11.52 | 12.76 | 250 | 6.32 | 7.03 | | 45.14 |
| 11 | 3,626 | 45.24 | 58 | 1,158 | 29.26 | 36.29 | | 35.32 |
| | | | | | | | Average | 43.62 |

**Option 4 – Coastwide Quota**
Under this option yellow eel harvest for states and jurisdictions with a yellow eel fishery will be regulated annual 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 1,344,707 pounds, with allocation as specified in Tables 8 and 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.

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 chose as it includes the most current years for which reliable data is available.

Under this sub-option, the annual quota would be set at 1,056,374 pounds, with allocation as specified in Tables 8 and 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 state of South Carolina has no reported landings during this time period, but the state does issue yellow eel permits for a pot fishery. The PDT recommends a minimum quota set at 2,000.

Sub-Option 3c – 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

Under this sub-option, the annual quota could be set between 680,811 and 1,344,707 pounds, with allocation as specified in Tables 8 and 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 PDT recommends a minimum quota set at 2,000 pounds.

**Table 8.** Quota allocations (in pounds) by state under Sub-Options 3a, 3b, and 3c. Note: quota allocation for New Hampshire (all options), South Carolina (all options) and Georgia (1990-2011 options) fell below 2,000 pounds and therefore have been set at this minimum allocation level.

| | 1980 - 2011 | | | | | 1990 - 2011 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Average** | **20%** | **30%** | **40%** | **50%** | **Average** | **20%** | **30%** | **40%** | **50%** |
| Maine | 29,754 | 23,803 | 20,828 | 17,852 | 14,877 | 25,848 | 20,678 | 18,093 | 15,509 | 12,924 |
| New Hampshire | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 |
| Massachusetts | 34,556 | 27,645 | 24,189 | 20,733 | 17,278 | 7,951 | 6,361 | 5,566 | 4,771 | 3,975 |
| Rhode Island | 55,563 | 44,451 | 38,894 | 33,338 | 27,782 | 55,563 | 44,451 | 38,894 | 33,338 | 27,782 |
| Connecticut | 9,791 | 7,833 | 6,854 | 5,875 | 4,896 | 5,944 | 4,755 | 4,161 | 3,566 | 2,972 |
| New York | 57,078 | 45,663 | 39,955 | 34,247 | 28,539 | 12,546 | 10,037 | 8,782 | 7,527 | 6,273 |
| New Jersey | 169,512 | 135,609 | 118,658 | 101,707 | 84,756 | 133,590 | 106,872 | 93,513 | 80,154 | 66,795 |
| Delaware | 130,274 | 104,219 | 91,192 | 78,164 | 65,137 | 132,100 | 105,680 | 92,470 | 79,260 | 66,050 |
| Maryland | 275,161 | 220,128 | 192,612 | 165,096 | 137,580 | 303,579 | 242,863 | 212,505 | 182,147 | 151,790 |
| PRFC | 208,982 | 167,186 | 146,287 | 125,389 | 104,491 | 155,912 | 124,729 | 109,138 | 93,547 | 77,956 |
| Virginia | 279,452 | 223,562 | 195,616 | 167,671 | 139,726 | 206,553 | 165,242 | 144,587 | 123,932 | 103,276 |
| North Carolina | 178,796 | 143,037 | 125,157 | 107,277 | 89,398 | 83,579 | 66,863 | 58,506 | 50,148 | 41,790 |
| South Carolina | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 |
| Georgia | 8,743 | 6,994 | 6,120 | 5,246 | 4,372 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 |
| Florida | 25,348 | 20,278 | 17,744 | 15,209 | 12,674 | 13,926 | 11,141 | 9,749 | 8,356 | 6,963 |
| Total | 1,467,009 | 1,174,408 | 1,028,107 | 881,806 | 735,505 | 1,056,374 | 915,673 | 801,964 | 688,255 | 574,546 |

**Table 9.** The percent reduction in fishery harvest associated with the quota alternatives from the average harvest from 2009-2011.

| | 1980 - 2011 | | | | | 1990 - 2011 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Average** | **20%** | **30%** | **40%** | **50%** | **Average** | **20%** | **30%** | **40%** | **50%** |
| Maine | 217% | 153% | 122% | 90% | 58% | 175% | 120% | 93% | 65% | 38% |
| New Hampshire | 1427% | 1427% | 1427% | 1427% | 1427% | 1427% | 1427% | 1427% | 1427% | 1427% |
| Massachusetts | 9367% | 7474% | 6527% | 5580% | 4634% | 2078% | 1643% | 1425% | 1207% | 989% |
| Rhode Island | 2626% | 2081% | 1808% | 1536% | 1263% | 2626% | 2081% | 1808% | 1536% | 1263% |
| Connecticut | 12139% | 9691% | 8467% | 7243% | 6019% | 7330% | 5844% | 5101% | 4358% | 3615% |
| New York | 69% | 35% | 18% | 2% | -15% | -63% | -70% | -74% | -78% | -81% |
| New Jersey | 31% | 5% | -8% | -21% | -34% | 4% | -17% | -28% | -38% | -48% |
| Delaware | 44% | 15% | 1% | -14% | -28% | 46% | 17% | 2% | -13% | -27% |
| Maryland | -62% | -70% | -74% | -77% | -81% | -59% | -67% | -71% | -75% | -79% |
| PRFC | 620% | 476% | 404% | 332% | 260% | 437% | 330% | 276% | 222% | 169% |
| Virginia | 175% | 120% | 92% | 65% | 37% | 103% | 63% | 42% | 22% | 2% |
| North Carolina | 191% | 133% | 104% | 74% | 45% | 36% | 9% | -5% | -18% | -32% |
| South Carolina | 484% | 484% | 484% | 484% | 484% | 484% | 484% | 484% | 484% | 484% |
| Gerogia | 8388% | 6691% | 5842% | 4993% | 4144% | 1842% | 1842% | 1842% | 1842% | 1842% |
| Florida | 635% | 488% | 415% | 341% | 268% | 304% | 223% | 183% | 142% | 102% |

**Option 4 – Dealer Reporting Requirements**
Under this option states and jurisdictions with a commercial yellow eel fishery will be required to implement dealer reporting requirements. Cross referencing between dealer and fishery trip level reporting should be conducted to ensure accuracy.

### *4.1.3 Silver Eel Fisheries*

The following options are not mutually exclusive and can be implemented in combination.

**Option 1 – Status Quo**
Under this option the current regulations for silver eel fisheries will remain in place.

**Option 3 – Gear Restrictions**
Under this option states and jurisdictions would be required to implement no take of eels during the fall from the following gears: fyke nets, pound nets and weirs. Time of out migration for silver eels is given in Table 10. The goal of this option is to reduce or phase out the harvest of silver eels.

Under this option states or jurisdictions will be required to evaluate when the majority of outmigration of American eels occurs. During the outmigration period there will be a prohibition on landing eels from the gears specified above. If the outmigration period cannot be determined then prohibition on landing eels from the gears specified above will occur from from September 1$^{st}$ through December 31$^{st}$. The gears specified have the highest rate of capture of silver eels. These gears may still be fished, however no retention of eels is allowed.

**Table 10.** Average length, age, and timing reported for migrating silver-phase American eels in various locations, by sex. Length and age ranges are in parentheses.

| Location | Migration Timing | Female | | Male | | Reference |
|---|---|---|---|---|---|---|
| | | Length (mm) | Age (yrs) | Length (mm) | Age (yrs) | |
| St. Lawrence R. (Upper) | Jun–Oct | 915 to 1,000 (890–1,123) | 20, 21 | | | Casselman 2003; McGrath et al. 2003a; Tremblay 2009; McGrath et al. 2009 |
| St. Lawrence R. | Aug–Nov | 853 (475–1,000) | 13, 14 | | | Hurley 1972; Dutil et al. 1987; Fournier and Caron 2001; Verreault et al. 2003; Tremblay 2009 |
| St . Lawrence (estuarine) | Aug–Nov | 650 to 1,043 (526–1,219) | 20 to 23 | | | Dutil et al. 1987; Couillard et al. 1997; Verreault 2002; McGrath et al. 2003a; Verreault et al. 2003; Tremblay 2009 |
| Newfoundland | Aug–Sept | 590 to 778 (431–931) | 6 to 19 (3–32) | 340 (329–361) | (4–15) | Gray and Andrews 1970, 1971; Bouillon and Haedrich 1985; Jessop et al. 2009 |
| New Brunswick | July–Oct | 417 to 565 (284–733) | | 317, 326 | | Smith and Saunders 1955; Ingraham 1999 |
| Nova Scotia | Aug–Nov | 491 to 610 (394–945) | 19 (8–43) | 392 (346–473) | 12.7 (6–18) | Jessop 1987; Carr and Whoriskey 2008 |
| Maine | Aug–Oct | (502–538) | 15 to 16 (6–18) | (344–359) | 12 to 13 | Oliveira and McCleave 2000; Haro et al. 2003 |
| SE of Cape Cod | Nov | 642 | | 373 | | Wenner 1973 |
| Rhode Island | Sept–Dec | 475 to 537 (410–867) | 12.8 (6–20) | (323–335) (228–400) | 10.9 (4–15) | Winn et al. 1975; Bianchini et al. 1983, cited by Helfman et al. 1987; Krueger and Oliveira 1997; Oliveira 1999 |
| Connecticut River | Sept–Oct | 707 | | | | Brown et al. 2009 |
| Indian River, DE | Aug–Nov | 571 (367–774) | 12 (7–20) | 330 (264–412) | 7.4 (4–16) | Barber 2004 |
| E of Assateague Is., MD | Dec | 636 (609–658) | | | | Wenner 1973 |
| Ches. Bay, MD | Oct | | | 306 (275–360) | 5.1 (3–10) | Foster and Brody 1982 |
| Ches. Bay, VA | Nov | (366–452) | | (395–438) | | Wenner 1973 |
| SE of Ches. Bay | Dec | 551 (512–579) | | | | Wenner 1973 |

| Location | Migration Timing | Female | | Male | | Reference |
|---|---|---|---|---|---|---|
| | | Length (mm) | Age (yrs) | Length (mm) | Age (yrs) | |
| Cape Charles, VA | Nov | 633 (418–845) | | 372 (339–438) | | Wenner and Musick 1974 |
| Potomac R., VA | | (600–800) | (5–11) | 350 | | Goodwin and Angermeier 2003 |
| Shenandoah R., WV | Sep–Dec | 869, 872 (560–1,118) | (10–19) | | | Euston et al. 1998; Goodwin and Angermeier 2003 |
| Cooper R., SC | | 543, 646 (369–834) | 6, 7.6 | 257, 318 (214–322) | 3 | Harrell and Loyacano 1982 |
| Charleston Harbor, SC | | 550 | 5.8 | 317 | 2.7 | Michener and Eversole 1983 |
| Altamaha R., GA | Oct–Mar | 584, 587 (413–682) | 5, 8.6 (4–13) | 329 (282–411) | 4.1, 5.5 (3–10) | Helfman et al. 1984b; Facey and Helfman 1985 |

### *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.

**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. Most eels caught recreationally are for use as bait, especially for striped bass. Harvest from the recreational fishery is believed to be low.

## 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. |

## 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 reporitng. 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 reporitng. Pounds/month, days fished, and pounds/weir/day. | | **Inalnd 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 seaon - 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 | Harvester reporting. Pounds/pot / night. Submitted annually. | | 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 trip records, reporting at end of season. Dealer license. | | | 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 eights 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 with 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 vessels landing seafood for commercial purposes must possess a Seafood Landing License, unless the vessel owner is a registered Virginia commercial fisherman. 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 wether 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. | | |

| State | Size Limit | License/ Permit | Reporting | Seasonal/ Time Closure | Gear Restrictions | Area Restriction | Other |
|---|---|---|---|---|---|---|---|
| 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. | | | | | Gear restrictions. |
| * For specifics on licenses, gear restrictions, and area restrictions, please contact the individual state. | | | | | | | |

**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. Each of 52 coastal towns has its own 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" | No possession limit in tidal areas; 25/person/day limit in non-tidal areas | 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 II. Considered, but Rejected, Management Options Discussed by the PDT

### Glass Eel Commercial Management Options

### Option 3 – Glass Eel Quota

Sub-option 3c – 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 1996 – 2012. This period was chose as it includes the most current years for which reliable data is available. 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. 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.

*Reasoning*: The PDT did not believe it was appropriate to use a time series with 2012 included.

Sub-Option 3d – Current landings
Under this sub-option, the total allowable glass eel landing will be set at the 2012 harvest level. The annual quota would be set at 20,560 pounds, with 93% (19,108 pounds) allocated to Maine and 7% (1,452) allocated to South Carolina. 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.

*Reasoning*: The PDT felt this was not a time period reflective of normal fisheries operations and should not be used to base future management on

### Option 5 – Gear Restrictions

Effort reductions have the potential to lower mortality on glass eels and prevent future expansion of the fishery. Under this option states and jurisdiction with a glass eel fishery will need to implement gear restrictions. Examples for gear restrictions are described in the following sub-options.

Sub-Option 5a – Time Closures
Under this option, states and jurisdictions would be required to implement time closures during the commercial elver season in order to reduce effort.

*Reasoning:* Maine and South Carolina already implemnt closures to the fishery.

Table X.X Current Season/Time Restrictions for Maine and South Carolina, proposed season/time restrictions, and associated estimated impact to fishery.

| | Current Season Restrictions | Proposed Reduction | Estimated Impact |
|---|---|---|---|
| **Maine** | Open season - Noon March 22 through noon May 31. Closed periods - Tuesday noon to Wednesday noon and Saturday noon to Sunday noon. | X | X |
| **South Carolina** | Open season - 5 November through the following 15 May. Closure restriction - Fyke nets shall be set only between sunset and sunrise, and all such nets shall be removed from such waters between sunrise and sunset | X | X |

Sub-Option 5b – Gear Distance Requirements

*Reasoning*: Both states currently have requirements in place.

Sub-Option 5c – Gear Reductions
Under this option, the amount of total allowable gear that can be fished will be reduced by X-XX%. [Note: The PDT did not develop a reduction range.]

*Reasoning*: The PDT was concerned that gear reduction would not have same effect as quota reductions, especially with illegal harvest. While the option would require a reduction in gear, this might not necessarily translate into a reduction in the pounds of eels harvested. The PDT felt this was least likely to be effective at controlling the fishery.

**TABLE X.X** Amount of gear currently allowed by glass eel fishermen in Maine and South Carolina and the amount that would be allowed under a X-X% reduction in gear.

| | Current gear restrictions | Example: 50% Reduction |
|---|---|---|
| **Maine** | 1 or 2 pieces of gear; specified by license | No more than one piece of gear per license holder |
| **South Carolina** | Up to 10 pieces of gear per license holder | No more than 5 pieces of gear per license holder |

**Option 6 – Harvest License Cap**
Under this option states and jurisdictions with a commercial elver fishery are required to implement a glass eel harvest license cap set at X.

*Reasoning:* Maine and South Carolina currently have license caps in place. States do not have control over tribal licenses. However, the PDT notes that there should be some consideration for reductions as future commercial fishermen leave the fishery.

**Yellow Eel Commercial Fishery Management Measures**

**Option 3 – Coastwide Quota**
Sub-Option 3d – Current landings
Under this sub-option, the total allowable glass eel landing will be set at the 2012 harvest level. The annual quota would be set at X pounds, with allocation s XXX. 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.

*Reasoning:* 2012 was not a representative year on which to base the quota and allocation. Additionally the PDT did not advocate for the quota to be based on any one specific year, but rather a range of years should be used given the fluxuation in fisheries landings.

**Option 5 - Harvest License Cap**
Under this option, states and jurisdictions with a commercial yellow eel fishery will be required to implement a harvest license cap.

*Reasoning:* Most currentl states implement a license cap.

**Silver Eel Commercial Fishery Management Measures**

**Option 2 – Maximum Size Limit**

Under this option, states and jurisdictions would implement a minimum size restriction in order to protect outmigrating silver eels.

*Reasoning:* It is likely that the maximum size limit will not protect all out-migrating silver eel, as males are commonly shorter than females. As there is no size that is all-inclusive of silver eel and exclusive of yellow eel, smaller silver eel are not likely to be protected by size restrictions. 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 eel larger than the size limit. Additionally, 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.

| Percent Eels Emigrated | Length (in) | % Change Eggs Per Recruit |
|---|---|---|
| 0.25 | 19.1 | 65.4 |
| 0.5 | 21.3 | 22.5 |
| 0.75 | 23.5 | 0.923 |

**Table 12.** Expected change in eggs per recruit with the associated increase in the percent of eels that are allowed to emigrate.

**Appendix III. Current State Fish Passage Considerations.**

**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**
*Permitting Agency*: Dept. of Conservation and Resources
http://www.mass.gov/dcr/

No guidelines for new dams or fish passageways: See
http://www.malegislature.gov/Laws/GeneralLaws/PartIII/TitleIV/Chapter253

**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/

*5.1.1 §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 a satisfactory channel for maintenance of fish life.

**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: See
http://delcode.delaware.gov/title7/c042/index.shtml

**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 currently on file 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.

**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 place 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.

**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.

# Atlantic States Marine Fisheries Commission

1050 N. Highland Street • Suite 200A-N • Arlington, VA 22201
703.842.0740 • 703.842.0741 (fax) • www.asmfc.org


# MEMORANDUM

**January 28, 2013**

**To:** **American Eel Management Board**

**From:** **Law Enforcement Committee**

**Subject:** **Draft Addendum III Enforcement Considerations**

At the October 2012 meeting of the Atlantic States Marine Fisheries Commission, the Law Enforcement Committee (LEC) reviewed and discussed possible management strategies for reducing harvest of American eel as outlined in Draft Addendum III. We offer the following comments on management strategies for various life stages and welcome the opportunity for additional input to this addendum.

**Glass Eel Harvest**

The LEC supports including all of the options in the document for public comment. The LEC has discussed some of the harvest and enforcement issues related to glass eels during its last two meetings. A significant amount of illegal harvest of glass eels continues outside the two states where harvest is currently allowed, and illegally harvested eels are being possessed and shipped via those two states. State and federal enforcement agencies are tasked to thwart the illegal harvest and export with reduced staff and resources. Given the monetary value of glass eels and the ability to move illegally harvested eels via legal shipments, enforcement agencies do not have, and are unlikely to obtain the resources necessary to effectively monitor and control a limited glass eel harvest. LEC members are sensitive to the economic value associated with the current glass eel fishery in Maine and South Carolina where harvest is allowed. However we are convinced that the circumstances of this fishery do not permit adequate enforcement control.

**Yellow/Silver Eel Harvest**

The LEC cautions that minimum or maximum size requirements for live-harvested yellow eels are cumbersome for fishermen and enforcement officers to apply in the field. However despite the difficulty, these regulations are enforceable and minimum-size regulations are already well established for this fishery. The substitution of girth measurement as a replacement or proxy for length is not recommended. The use of gear specifications relating to eel pot mesh size to control harvest of undersized animals is acceptable, but should be applied in concert with minimum size requirements. This would allow officers in the field to monitor and ensure compliance with minimum size standards through all phases of the fishery.

The LEC appreciates the opportunity to provide advice regarding future management options for the American eel fishery.

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# MEMORANDUM

January 28, 2013

TO: American Eel Management Board

FROM: Tina Berger, Public Affairs Specialist

SUBJECT: **Non-traditional Stakeholder Nomination**

Please find attached for your consideration two outstanding AP nominations for Sam Veach, a New Jersey commercial fisherman, and Sam Livingston, a South Carolina commercial fishermen to the American Eel Advisory Panel. Their nomination formations are attachment.

Also for your consideration is an application to fill a non-traditional stakeholder seat currently available on the American Eel Advisory Panel. Jake Kritzer, with Environmental Defense, stepped down from the panel last year. The two other non-traditional stakeholders on the panel are Tim Brush, representing the hydropower industry, and Eric Helm Buehl, an environmental advocate with the Delaware Inland Bays Program. While we did not send out a formal solicitation to fill Mr. Kritzer's seat, we received the attached nomination form from Mari-Beth DeLucia, a Senior Fisheries/Aquatic Biologist with The Nature Conservancy in New York.

Enc.

M2013-06

# AMERICAN EEL ADVISORY PANEL

Bolded names await approval by the American Eel Management Board
Bolded and italicized name denotes Advisory Panel Chair January 30, 2013

**Maine**
David Allen (rec)
22 Allen Lane
Washington, ME 04574
Phone: (207)845-2704
Email: maineeagle@pivot.net
Appt Confirmed 11/10/04
Appt Reconfirmed 11/07

Patricia Bryant (glass eel harvester)
74 Duck Puddle Road
Nobleboro, ME 04555
Phone/FAX: (207)563-5611
Phone (eve): (207) 563-3365
Email: pbeelandurchins@yahoo.com
Appt. Confirmed 5/10/05
Appt Reconfirmed 5/10

**New Hampshire**
Vacancy (comm/trap)

**Massachusetts**
John Henry (dealer/fisherman)
9 Cedarwood Road
Gloucester, MA 01930
Phone: (978)281-3275
FAX: (508)282-7408
Appt. Confirmed: 5/21/97
Appt. Reconfirmed 10/1/01
Appt Reconfirmed 11/05
Appt Reconfirmed 5/10

**Connecticut**
Steve Lewis (rec/non-eel angler)
654 Cypress Road
Newington, CT 06111
Phone: (860)667-2515
Appt. Confirmed: 5/21/97
Appt. Reconfirmed 10/1/01
Appt Reconfirmed 10/05
Appt Reconfirmed 5/10

**New York**
***Vacancy (rec/pot for bait eels)***

**New Jersey**
**Sam Veach (comm.)**
**Route, 49**
**P.O. Box 536**
**Tuckahoe, NJ 08250-0536**
**Phone (day): (609) 425-0807**
**Phone (eve): (609) 628-4538**
**SBVeach@aol.com**

**Pennsylvania**
Mitchell Feigenbaum (buyer/exporter)
17 Weirwood Road
Radnor, PA 19087
Phone (day): (215)859-0428
Phone (eve): (610)964-8465
FAX: (610)277-4051
Email: feigen15@yahoo.com
Appt. Confirmed: 8/17/04
Appt Reconfirmed 8/07

**Delaware**
Robert Piascinski (comm/pot/adult)
253 Shaws Corner Road
Dover, DE 19904
Phone: (302)735-1668
Appt. Confirmed: 5/21/97
Appt. Reconfirmed 10/1/01
Appt Reconfirmed 10/05
Appt Reconfirmed 5/10

**Maryland**
Robert H. Evans (comm./pot)
5527 Muddy Creek Road
Churchton, MD 20733
Phone(Day): 443/336-3000
Phone(eve): 410/956-3327
Appt. Confirmed 5/10/05
Appt Reconfirmed 5/10

William R. Legg (comm./pot)
110 Rebel Road
Grasonville, MD 21638
Phone (eve): (410)310-4072
Phone (eve): (410) 820-5841
Appt. Confirmed 8/17/05

# AMERICAN EEL ADVISORY PANEL

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Appt Reconfirmed 5/10

**Virginia**
Warren M. Cosby Jr. (comm/fyke & gillnet/aquaculture)
9321 Turkey Hill Lane
New Kent, VA 23124
Phone: (804)932-4735
Appt. Confirmed: 5/21/97
Appt. Reconfirmed 10/1/01
Appt Reconfirmed 10/05
Appt Reconfirmed 5/10

Vacancy (comm/pot, fyke & gillnet)

**North Carolina**
Robert Hutchinson (comm/pot/intl exp.)
2692 Whichards Beach Road
Chocowinity, NC 27817
Phone: (919)946-2514
Appt. Confirmed: 5/21/97
Appt. Reconfirmed 10/1/01
Appt. Reconfirmed 3/22/06
Appt Reconfirmed 5/10

***Vacancy - dealer***

**South Carolina**
**Jimmy Livingston (comm/fyke net)**
**670 Anderson Lane**
**Cordesville, SC 29434**
**Phone (day): (843) 761-1407**
**Email: Livingtees1@homesc.com**

**Florida**
Vacancy (dealer/aquaculture/ intl exp.)

**PRFC**
James I. Trossbach (comm/pot)
46377 Drayden Road
Drayden, MD 20630
Phone (day): (301)481-8906
Phone (eve): (301)994-3577

Appt Confirmed 11/10/04
Appt Reconfirmed 11/07

**At-Large Seats**
Tim Brush (hydropower)
Normandeau Associates
917 Route 12, #1
Westmoreland, NH 03467
603-355-2333
603-355-2332 fax
tbrush@normandeau.com
Appt. Confirmed: 10/21/97
Appt. Reconfirmed 10/1/01
Appt. Confirmed 8/05

Eric Helm Buehl (environmental)
16529 Coastal Highway
Lewes, DE 19958
Phone (day): (302)645-7325
Phone (eve): (410)364-5553
FAX: (302)645-5765
Email: habitat@inlandbays.org
Appt. Confirmed 8/17/05

**Mari-Beth DeLucia (environmental)**
**The Nature Conservancy**
**22 patterson Street**
**Port Jervis, NY 112771**
**Phone: (914)714-4669**
**Email: mdelucia@tnc.org**