Atlantic States Marine Fisheries Commission

American Eel Management Board

October 30, 2013
9:30 a.m. – 12:00 p.m. and 1:30 – 2:30 p.m.
St. Simons Island, Georgia

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)*	9:30 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings of August 2013 Board meeting	9:30 a.m.
3.	Public Comment	9:35 a.m.
4.	Update on the proposed Endangered Species Act Listing of American Eel	9:45 a.m.
5.	Consider 2013 FMP Review and State Compliance (*K. Taylor*) **Action**	9:50 a.m.
6.	Consider Harvest Permit Request in North Carolina *(L. Daniel)* **Action**	10:00 a.m.
7.	Consider Draft Addendum IV for Public Comment (*K. Taylor*) **Action**	10:20 a.m.

Break from 12:00 – 1:30 p.m. for Captain David H. Hart Award Luncheon

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

The meeting will be held at:
The King and Prince Beach & Golf Resort, 201 Arnold Street, St. Simons Island, GA (800) 342-0212

Atlantic States Marine Fisheries Commission

MEETING OVERVIEW

American Eel Management Board Meeting
October 30, 2013
9:30 a.m. – 12:00 p.m. and 1:30 - 2:30 p.m.
St. Simons Island, Georgia

Chair: Terry Stockwell Assumed Chairmanship: 5/12	Technical Committee Chair: Sheila Eyler (USFWS)	Law Enforcement Committee Representative: Fessenden/Marston/Hurd
Vice Chair: Tom O'Connell	Advisory Panel Chair: Martie Bouw	Previous Board Meeting: August 7, 2013

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 August 2013 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. Update on proposed Endangered Species Act Listing of American Eel (9:45 – 9:50 a.m.)

Background

- American eel were petitioned for listing as threatened under the Endangered Species Act (ESA) in April 2010. USFWS published a positive 90 day finding on the petition in September 2011, stating that the petition may be warranted and a status review will be conducted. The organization that initially petitioned to list American eel filed a lawsuit in August 2012 against USFWS for failure to comply with the statues of the ESA, which specifies a proposed rule based on the status review be published within one year of the receipt of the petition. A Settlement Agreement has been approved by the court. It requires USFWS to publish a 12-month finding by September 30, 2015.

Presentation

- Review of proposed listing by K. Taylor

5. Consider 2013 FMP Review and State Compliance (9:50 – 10:00 a.m.) Action

Background

- State Compliance Reports are due on September 1st **(Briefing CD)**
- The Plan Review Team reviewed each state report and compiled the annual PRT Report and FMP Review **(Supplemental Material)**.

Presentation

- Overview of FMP Review Report by K. Taylor

Board actions for consideration

- Approve 2012 FMP Review and State Compliance

6. Consider Harvest Permit Request from North Carolina (10:00 – 10:20 a.m.) Action

Background

- The state of North Carolina has submitted a request for a glass eel harvest permit for aquaculture purposes **(Supplemental Material)**.

Presentation

- Review of permit request by L. Daniel

Board actions for consideration

- Approve permit request for North Carolina

7. Draft Addendum IV for Public Comment (10:20 a.m. – 2:30 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 initiated the development of Draft Addendum III in August 2012 with the goal of reducing mortality on all life stages of American eel. At the May Board meeting the Board delayed final action on the addendum so that a Working Group comprised of Commissioners and the TC and AP Chairs could further develop management options for consideration by the Board.
- In August the Board approved Addendum III and initiated development of Draft Addendum IV. Given the scope of issues addressed in Draft Addendum III and the wide range of input received through public comment, the Board decided to divide the issues between the two addenda, with Draft Addendum IV primarily focusing on management measures for the glass eel fishery, the silver eel fishery in the Delaware River (NY), and any other measures as necessary **(Supplemental Material)**.

Presentation

- Overview of Draft Addendum IV for public comment by K. Taylor

Board actions for consideration

- Approve Draft Addendum IV for public comment.

8. Other Business/ Adjourn

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
ENVIRONMENT
Directorate E – Global and Regional Challenges, LIFE
ENV.E.2 – Global Sustainability, Trade & Multilateral Agreements
Head of Unit

10 OCT. 2013

Brussels,
ENV.E.2 Ares (2013)

U.S. Fish and Wildlife Service
Division of Management Authority
4401 N. Fairfax Drive
Room 212
ARLINGTON, VA 22203-3247
USA

Email:
managementauthority@fws.gov

Subject: **Implementation of CITES in the European Union – Import and export regime of European eel.**

Dear Colleagues,

I write to you in connection with the legislation designed to implement the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in the European Union (EU).

Since the entry into force of the listing of European eels (*Anguilla anguilla*) in CITES Appendix II in March 2009, the situation of the species has been closely monitored by the Scientific Review Group (SRG), which gathers all scientific authorities of the EU Member States. Information about European eels is essential for the SRG to assess whether export from and import into the EU of European eels and derived products can take place without having a harmful effect on the conservation status of the species. Such a common assessment is the basis of opinions delivered by national scientific authorities in the EU Member States on import and export applications, in line with Council Regulation (EC) No 338/97. The SRG found that, given the fact that one single stock is assessed, it is essential that a consistent approach is defined for export from and import into the European Union.

At a meeting in December 2010, the SRG concluded that, due to the biological situation of the species and the decline observed in the past years, it was not possible for the scientific authorities in the EU to deliver a "non detriment finding" for any export from or import into the EU of European eels. This opinion was confirmed by the SRG at its meetings in 2011 and 2012.

Commission européenne, B-1049 Bruxelles / Europese Commissie, B-1049 Brussel - Belgium. Telephone: (32-2) 299 11 11.
Office: BU9 5/175. Telephone: direct line (32-2) 296.26.14.

E-mail: Hugo-Maria.Schally@ec.europa.eu

At its meeting of 12 September 2013, the SRG reviewed again the situation of European eels and concluded once more that there was no new element demonstrating a recovery of the stock and that therefore it would not be possible for the scientific authorities in the EU to deliver a "non detriment finding" for any export from or import into the EU of European eels until the end of 2014.

On the basis of those elements and in accordance with Regulation (EC) No 338/97, EU Member States are not in a position to deliver permits allowing export or import of European eels until the end of 2014. The CITES Secretariat in its web page on export quota will indicate in due course that EU Member States decided on a "zero export quota" until the end of 2014 for European eels.

This regime affects the EU which has been a major exporter of European eels over the last decades. It also affects third countries wishing to export European eels into the EU or import eels from the EU.

In operational terms, the consequences of this situation are that export from and import into the EU of European eels will not be authorised until the end of 2014.

The only exemption to this prohibition concerns the re-import of European eels into the EU in the case where the specimens had initially been exported legally from the EU between 13 March 2009 and 3 December 2010. In such cases, a positive opinion could be given to the re-import of the specimens if the exporting country is able to demonstrate, via close tracking, monitoring and reporting, that the re-exported products are linked to export documents originally approved by the EU. Furthermore, it was decided that applications for re-import into the EU of such eels and eel products would not be accepted after 20 December 2013.

We are certainly available to provide further information to the CITES Authorities of United States, if needed.

Yours sincerely,

Hugo-Maria Schally

c.c.: CITES Scientific Authority in United States: scientificauthority@fws.gov
EU Delegation in United States
Nick Hanley (DG ENV.E.1)

2013 REVIEW OF THE ATLANTIC STATES MARINE FISHERIES COMMISSION FISHERY MANAGEMENT PLAN FOR **AMERICAN EEL** ***(Anguilla rostrata)***

2012 FISHING YEAR

Prepared by:

The American Eel Plan Review Team

2013 REVIEW OF THE ASMFC FISHERY MANAGEMENT PLAN FOR AMERICAN EEL
(Anguilla rostrata)

I. Status of the Fishery Management Plan

Date of FMP approval:	November 1999
Addenda:	Addendum I (February 2006) Addendum II (October 2008)
Management unit:	Migratory stocks of American Eel from Maine through Florida
States with a declared interest:	Maine through Florida, including the District of Columbia and the Potomac River Fisheries Commission
Active committees:	American Eel Management Board, Plan Review Team, Technical Committee, Stock Assessment Subcommittee, and Advisory Panel.

The ASMFC American Eel Management Board first convened in November 1995 and finalized the Fishery Management Plan (FMP) for American Eel in November 1999 (ASMFC 2000a). The major goal of the FMP is to conserve and protect the American eel resource to ensure ecological stability while providing for sustainable fisheries. In support of this goal, the following objectives are included:

The FMP requires that all states and jurisdictions implement an annual young-of-year (YOY) abundance survey by 2001 in order to monitor annual recruitment of each year's cohort. In addition, the FMP requires all states and jurisdictions to establish a minimum recreational size limit of six inches and a recreational possession limit of no more than 50 eels per person, including crew members involved in party or charter (for-hire) employment for bait purposes during fishing. Recreational fishermen are not allowed to sell eels without a state license. Commercial fisheries management measures stipulate that states and jurisdictions shall maintain existing or more conservative American eel commercial fishery regulations for all life stages. States with minimum size limits for commercial eel fisheries must retain those minimum size limits, unless otherwise approved by the American Eel Management Board. Each state is responsible for implementing management measures within its jurisdiction to ensure the sustainability of the American eel population that resides within state boundaries.

In August 2005, the American Eel Management Board directed the American Eel Plan Development Team (PDT) to initiate an addendum to establish a mandatory catch and effort monitoring program for American eel. The Board approved Addendum I at the February 2006 Board meeting.

In January 2007, the Management Board initiated the development of a draft Addendum with the goal of increasing the escapement of silver eels to the spawning grounds. In October 2008, the Management Board approved Addendum II to the American Eel FMP, with some modification. The Addendum places increased emphasis on improving the upstream and downstream passage of American eel and maintains the status quo on management measures. The Management Board chose to delay action on management measures in order to incorporate the results of the upcoming stock assessment.

In August 2012 the Management Board initiated the development of Draft Addendum III with the goal of reducing mortality on all life stages of American eel. The addendum was initiated in repose to the

findings of the 2012 Benchmark stock assessment which declared American eel stock along the US East Coast as depleted. The Management Board approved Addendum III in August 2013. The addendum required states to: implement a 9 inch minimum size restriction in the commercial and recreational yellow eel fisheries, require the use of ½ by ½ mesh in the commercial yellow eel pot fishery, decrease the recreational bag limit to 25 fish/angler/day, restricts the silver eel fishery, and restricts the development if pigmented eel fisheries. The addendum also set the minimum monitoring standards for states and requires increased reporting in the commercial fishery. The Board chose to delay action on the glass eel management measures and will address this fishery through Draft Addendum IV.

II. Status of the Stock

In 2009, the Management Board initiated the start of a new assessment. After reviewing over 100 surveys and studies that catch eel, the American Eel Stock Assessment Subcommittee selected 19 young-of-year surveys and 15 yellow eel surveys along the East Coast for use as indices of abundance in the assessment. Despite the large number of surveys and studies available for use in this assessment, the American eel stock is still considered data-poor because very few surveys target eels and collect information on length, age, and sex of the animals caught. Also, eels have an extremely complex life history that is difficult to describe using traditional stock assessment models. Therefore, several data-poor methods were used to assess the American eel resource. The first set of analyses (trend analyses) aimed at determining if there was a statistically significant trend in the fishery-independent survey data and whether or not there was evidence for significant trends at the regional and coast-wide scales. The second approach involved a model called Depletion-Based Stock Reduction Analysis (DB-SRA) which uses trends in historical catch to estimate biomass trends and maximum sustainable yield. Both trend analyses and DB-SRA results indicate 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. Therefore, the stock status for American eels is depleted. The Benchmark Stock Assessment was peer reviewed in March 2012. The assessment passed peer review and was approved for management use in May 2012.

In 2003, declarations from the International Eel Symposium (AFS 2003, Quebec City, Quebec, Canada) and the Great Lakes Fisheries Commission (GLFC) highlighted concerns regarding the health of eel stocks worldwide. In 2010, Canada Department of Fisheries and Oceans (DFO) conducted a stock assessment on American eels in Canadian waters and found that region-specific status indices show abundance relative to the 1980s is very low for Lake Ontario and upper St. Lawrence River stock, and either unchanged or increasing in the Atlantic Provinces. A joint stock assessment by both Canada DFO and the Commission was recommended by the American Eel Stock Assessment Subcommittee as an approach for the next assessment.

III. Status of the Fishery

American eel currently support commercial fisheries throughout their range in North America, with significant fisheries occurring in the US Mid-Atlantic region and Canada. These fisheries are executed in riverine, estuarine, and ocean waters. In the US, commercial fisheries for glass eel/elver exist in Maine and South Carolina, whereas yellow/silver eel fisheries exist in all states and jurisdictions with the exception of Pennsylvania and the District of Columbia.

Although eel have been continuously harvested, consistent data on harvest are often not available. Harvest data from the Atlantic coastal states (Maine to Florida) indicate that the harvest fluctuated widely between

1970 and 1980, but showed an increasing trend and peaked in 1979 at 3,951,936 pounds. Harvest has declined since then, with the lowest harvest occurring at 641,225 pounds in 2002. Because fishing effort data is unavailable for the entire time series, finding a correlation between population numbers and landings data is difficult.

Commercial

Commercial landings have decreased from the high of 3.95 million pounds in 1979 to a low of 641,000 pounds in 2002, and have only exceeded one million pounds twice since 2000[1]. State reported landings of yellow/silver eels in 2011 totaled 1,041,929 pounds[2] (Table 1), which represents an 8% decrease (~90,000) in landings from 2011 (1,131,575 pounds). Yellow eel landings increased in the New England (ME and CT) and Southern Mid-Atlantic (PRFC, VA, and NC) regions, but declined in the Northern Mi-Atlantic (NY, DE, and MD) region. In 2012, state reported landings from New Jersey, Maryland, and Virginia each totaled over 100,000 pounds of eel, and together accounted for 77% of the coastwide commercial total landings. Landings of glass eels were reported from Maine and South Carolina and totaled 22,215 pounds. Combined yellow and glass eel landings reported by NMFS totaled 1,072,727 pounds.

Table 1. 2012 Commercial Landings by state and Life Stage[1,2]

	State Reported		NMFS
	Glass	**Yellow**	
Maine	20,764	10,425	31,586*
New Hampshire		0	168
Massachusetts		462	463
Rhode Island		1,478	1,485
Connecticut		3,560	2,501
New York		Not Available	32,295
New Jersey		105,913	111,810
Pennsylvania		No Fishery	
Delaware		54,304	54,304
Maryland		556,093	642,538
D.C.		No Fishery	
PRFC		90,037	
Virginia		141,232	128,997
North Carolina		66,580	66,580
South Carolina	1,451	0	
Georgia^			
Florida		11,845	
Total	**9,128**	**1,041,929**	**1,072,727**

^Landings are confidential ** Glass and yellow eel landings not differentiated.*

[1] Personal communication, National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD

[2] Harvest data for 2012 comes from the 2013 State Compliance Reports. All landings are preliminary and some are incomplete.

Table 2. State commercial regulations for the 2012 fishing year.*

State	Size Limit	License/Permit	Other
ME		Harvester license. Dealer license and reporting.	Seasonal closures. Gear restrictions.
NH	6"	Commercial saltwater license and wholesaler license. Monthly reporting.	50/day for bait. Gear restrictions in freshwater.
MA	6"	Commercial permit with annual catch report requirement. Registration for dealers with purchase record requirement.	Nets, pots, spears, and angling only. Mesh restrictions. Each of 52 coastal towns has its own regulations.
RI	6"	Commercial fishing license.	
CT	6"	Commercial license. Dealer reporting.	Gear restrictions
NY	6"	Commercial harvester license and reporting. Dealer license.	Gear restrictions.
NJ	6"	License required.	Gear restrictions.
PA	NO COMMERCIAL FISHERY		
DE	6"	License required.	Commercial fishing in tidal waters only. Gear restrictions.
MD	6"	Licensed required with monthly reporting.	Prohibited in non-tidal waters. Gear restrictions.
DC	NO COMMERCIAL FISHERY		
PRFC	6"	Harvester license and reporting.	Gear restrictions.
VA	6"	Harvester license required. Monthly reporting.	Mesh size restrictions on eel pots. Bait limit of 50 eels/day. Seasonal closures.
NC	6"	Standard Commercial Fishing License for all commercial fishing	Mesh size restrictions on eel pots. Bait limit of 50 eels/day. Seasonal closures.
SC		License for commercial fishing and sale. Permits by gear and area fished. Monthly reporting.	Gear restrictions.
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

Available information indicates that few recreational anglers directly target eel. For the most part, hook-and-line fishermen catch eel incidentally when fishing for other species. The National Marine Fisheries Service (NMFS) Marine Recreational Information Program (MRIP, formerly the Marine Recreational Fisheries Statistics Survey) shows a declining trend in the catch of eel during the latter part of the 1990s.

As of 2009, recreational data are no longer provided for American eel. This is a result of the unreliable design of MRIP that focuses on active fishing sites along coastal and estuarine areas. In previous years the proportional standard error (PSE) has ranged from 0-100.1. Eel are often purchased by recreational fishermen for use as bait for larger gamefish such as striped bass, and some recreational fishermen may catch their own eels to utilize as bait.

Table 3. State recreational regulations for the 2012 fishing year.**

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	
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	6”	50 eels/person/day	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.

IV. Status of Research and Monitoring

The FMP requires states and jurisdictions with a declared interest in the species to conduct an annual young-of-the-year (YOY) survey for the purpose of monitoring annual recruitment of each year's cohort. In 2012, the states of Rhode Island and Florida had below average YOY survey counts. The state of New Hampshire, New York, Virginia, and Georgia had average YOY counts. The states of Maine, Connecticut, New Jersey, Delaware, and Maryland had above average YOY survey counts and all states had their highest YOY catch on record in 2012. In 2012 Florida had the lowest YOY catch of their time series.

The FMP does not require any other research initiatives in participating states and jurisdictions. Nonetheless, the American Eel Technical Committee has identified several research topics that could further understanding of the species' life history, behavior, and biology. Research needs for American eel include:

High Priority

- Accurately document the commercial eel fishery so that our understanding of participation in the fishery and the amount of directed effort could be known.
- Investigate, develop, and improve technologies for American eel passage upstream and downstream at various barriers for each life stage. In particular, investigate low-cost alternatives to traditional fishway designs for passage of eel.
- A coastwide sampling program for yellow and silver American eels should be formulated using standardized and statistically robust methodologies.
- Regular periodic stock assessments and establishment of sustainable reference points for eel are required to develop a sustainable harvest rate in addition to determining whether the population is stable, decreasing, or increasing.
- Research the effects of swim bladder parasite *Anguillacolla crassus* on the American eel's growth and maturation, migration to the Sargasso Sea, and the spawning potential.
- Evaluate the impact, both upstream and downstream, of barriers to eel movement with respect to population and distribution effects. Determine relative contribution of historic loss of habitat to potential eel population and reproductive capacity**.**

Medium Priority

- Investigate survival and mortality rates of different life stages (leptocephalus, glass eel, yellow eel, and silver eel) to assist in the assessment of annual recruitment. Continuing and initiating new tagging programs with individual states could aid such research.
- Tagging Programs: A number of issues could be addressed with a properly designed tagging program. These include:
    - Natural, fishing, and/or discard mortality; survival
    - Growth
    - Validation of aging method(s)
    - Reporting rates
    - Tag shedding or tag attrition rate
- Research contaminant effects on eel and the effects of bioaccumulation with respect to impacts on survival and growth (by age) and effect on maturation and reproductive success.
- Investigate: fecundity, length, and weight relationships for females throughout their range; growth rates for males and females throughout their range; predator-prey relationships; behavior

and movement of eel during their freshwater residency; oceanic-behavior, movement, and spawning location of adult mature eel; and all information on the leptocephalus stage of eel.
- Assess characteristics and distribution of eel habitat and value of habitat with respect to growth and sex determination.
- Identify triggering mechanism for metamorphosis to mature adult, silver eel life stage, with specific emphasis on the size and age of the onset of maturity, by sex. A maturity schedule (proportion mature by size or age) would be extremely useful in combination with migration rates.

Low Priority
- Perform economics studies to determine the value of the fishery and the impact of regulatory management.
- Review the historic participation level of subsistence fishers in wildlife management planning and relevant issues brought forth with respect to those subsistence fishers involved with American eel.
- Examine the mechanisms for exit from the Sargasso Sea and transport across the continental shelf.
- Research mechanisms of recognition of the spawning area by silver eel, mate location in the Sargasso Sea, spawning behavior, and gonadal development in maturation.
- Examine age at entry of glass eel into estuaries and fresh waters.
- Examine migratory routes and guidance mechanisms for silver eel in the ocean.
- Investigate the degree of dependence on the American eel resource by subsistence harvesters (e.g., Native American Tribes, Asian and European ethnic groups).
- Examine the mode of nutrition for leptocephalus in the ocean.
- Provide analysis of food habits of glass eel while at sea.

V. Status of Management Measures and Issues

The FMP required that all states and jurisdictions implement an annual young-of-the-year (YOY) abundance survey by 2001 in order to monitor annual recruitment of each year's cohort. In addition, the FMP required all states and jurisdictions to establish a minimum recreational size limit of six inches and a recreational possession limit of no more than 50 eels per person, including crew members involved in party or charter (for-hire) employment, for bait purposes during fishing. Under the FMP commercial fisheries management measures stipulate that states and jurisdictions shall maintain existing or more conservative American eel commercial fishery regulations for all life stages. Through Addendum III, as of January 1, 2014 states and jurisdictions must implement a 9 inch minimum size restriction in the commercial and recreational yellow eel fisheries, require the use of ½ by ½ mesh in the commercial yellow eel pot fishery, decrease the recreational bag limit to 25 fish/angler/day, restrict their silver eel fishery, and restrict the development of pigmented eel fisheries.

Proposed Endangered Species Act Listing of American Eel
American eel were petitioned for listing as threatened under the Endangered Species Act (ESA) in April 2010 by the Center for Environmental Science, Accuracy, and Reliability (CESAR, formally the Council for Endangered Species Act Reliability). USFWS published a positive 90 day finding on the petition in September 2011, stating that the petition may be warranted and a status review will be conducted. CESAR filed a lawsuit in August 2012 against USFWS for failure to comply with the statues of the ESA, which specifies a proposed rule based on the status review be published within one year of the receipt of the petition. A Settlement Agreement was approved by the court in April 2013. The settlement requires USFWS to publish a 12-month finding by September 30, 2015. The USFWS previously reviewed the

status of the American eel in 2007 and found that, at that time, protection under the Endangered Species Act was not warranted.

VI. Current State-by-State Implementation of FMP Compliance Requirements

The following monitoring program changes occurred in 2012:

- New Jersey – Due to a collapsing overpass, the site for mandated young of the year survey was not accessible in 2011, but monitoring resumed in 2012.
- Pennsylvania – A supplemental YOY electrofishing survey was initiated due to the lack of success in the Irish elver trap survey.
- District of Columbia - initiated a YOY/elver electrofishing survey due to the lack of success achieved with the Irish elver traps set in Rock Creek

The following regulatory changes for 2012 were documented in the compliance reports:

- None

The PRT reviewed the state compliance reports for 2012. The PRT finds that all states are currently implementing the required provisions of the American Eel Fishery Management Plan.

Section 4.4.2 of the FMP stipulates that states may apply for *de minimis* status for each life stage if (given the availability of data), for the preceding two years, their average commercial landings (by weight) of that life stage constitute less than 1% of the coastwide commercial landings for that life stage for the same two-year period. States meeting this criterion are exempted from having to adopt commercial and recreational fishery regulations for a particular life stage listed in Section 4 and any fishery dependent monitoring elements for that life-stage listed in Section 3.4.1.

In 2012, the states of Massachusetts, Pennsylvania, South Carolina, and Georgia requested *de minimis* status for their yellow eel fisheries. Qualification for *de minimis* was determined from state reported landings found in compliance reports. All states that applied for *de minimis* meet the *de minimis* standard.

VII. Recommendations/Findings of the Plan Review Team

1. The PRT recommends *de minimis* be granted to the states of Massachusetts, Pennsylvania, South Carolina, and Georgia.

2. The PRT requests that state personnel highlight notable trends in annual reports. The PRT also requests that state personnel describe any circumstances that prevented sampling from occurring as required in the FMP and Addendum I, or reasoning for sampling not occurring in a manner consistent with previous years.

3. The PDT requests that states collect biological data from landings.

4. The PDT requests that states work with the law enforcement agencies to include information on any confiscated poundage from illegal or undocumented fisheries.

5. The PDT requests that states that do not regulate their personal use fishery, be required, at a minimum, to permit participants in this fishery and collect harvest data in order to provide an estimate of effort and catch.

Plan Review Team Report

Prepared for the American Eel Management Board by the American Eel Plan Review Team
October 2013

Introduction

The Interstate Fishery Management Plan for American eel requires that states submit annual reports detailing each state's regulations, catch, harvest, bycatch, fishery-dependent and independent surveys, and characterization of other losses for American eel. These reports are utilized by the ASMFC Plan Review Team to determine compliance and must be submitted to the ASMFC by September 1 of each year.

2011 Compliance Review

The Plan Review Team (PRT) reviewed 2013 state annual compliance reports for the 2012 fishing year to determine compliance status. As described in Section 5.2 of the Fishery Management Plan, under Procedures for Determining Compliance, the PRT has summarized the compliance on a state-by-state basis below.

State-By-State Evaluation

MAINE

Comments or trends highlighted in state report:

- Dealers reported landings of 20,764 pounds of glass eels, valued at $38,760,490. Of the total, 5,753 pounds were taken with dipnets; 13,461 pounds were taken with fyke nets; and 1,549 pounds did not have an associated gear type.
- Harvesters make daily estimates of their catch. They reported landing 19,141 pounds of glass eels of which 6,568 pounds were taken with dip nets and 12,559 pounds were taken with fyke nets.
- The number of licenses issued continues to increase, but remains just below the level as required under the FMP.
- All glass eels were harvested for food. Elvers are exported very soon after purchase.
- A total of 10,425 pounds of yellow eels were taken by the coastal pot fishery, 485 pounds by the inland weir fishery; and 360 pounds were reported by the inland pot fishery. The majority of the catch from the coastal pot fishery was sold to dealers (8,805 pounds) with the remainder used as bait (1,170 pounds) or discarded (439 pounds).
- In the YOY survey a total of 156,472 YOY were caught in 2012 which represents the highest catch on record. This despite that the catch may have been poached on two nights, the attraction water tubing froze on the first three nights, the attraction water was off one night, and water level were high from 4/24 – 5/2. This was 17x higher than the catch in 2011 (which was the fourth smallest catch on record).
- Fines and penalties for violations in the elver fishery increased in 2013
- Legislation was passed in 2012 to exempt tribal members from having to hold state licenses to fish for elvers; each group was allowed to issue a specific number of tribal permits for the fishery.

Unreported information:

- Projects planned in next five years
- No information on the characterization of other losses. No studies are planned.
- Landings reported only by year, not by month, for glass eels.
- Estimate of exports by dealers not provided

Areas of concern:

- Dealer reported glass eel landings continue to be higher that harvest reported landings, although the difference between the two reporting methods has decreased.
- The Specialist who had done the YOY sampling prior to 2012 retired, and staff at the DMR Boothbay Harbor Laboratory are now collecting data. Height of water over or below the dam was not recorded in 2012. Some environmental data is no longer collected by the Boothbay Harbor Laboratory. The PDT recommends Boothbay Harbor staff work to maintain the continuity of the sampling methods as much as possible.
- No biological data were collected from the commercial fishery.
- No estimate of recreational harvest
- No information on characterization of other losses (impingement, bycatch, poaching, etc..)

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- The PDT recommends that any further changes to the management program be reviewed by the Technical Committee and Advisory Panel.

NEW HAMPSHIRE

Comments or trends highlighted in state report:

- No individual sold commercially in 2012.
- There were 34 individuals permitted to recreationally harvest American eels in state waters (which is a decrease from 49 in 2011). Out of these 34 individuals, 7 harvested a total of 166 pounds, of which almost all were used for bait (0.5 pounds was used for food).
- MRIP estimates that 15,644 eels were caught recreationally with 15,092 being harvested.
- 4,213 YOY caught in required fisheries independent sampling in the Lamprey River. This was the sixth highest on record since monitoring began in 2001 and the third consecutive year the total number of YOY increased.
- An additional pilot location run by a volunteer group was added to the YOY survey in 2012

Unreported information:

- Other losses (bycatch mortalities, confiscated from illegal or undocumented fisheries, mass mortalities)

Areas of concern:

- No biological data were collected from the recreational fishery although landings were reported.
- Concern over latent effort with licensing
- Given the proximity to Maine, the PDT believes that inclusion of any confiscated

poundage from illegal or undocumented fisheries, if known, should be a high priority as this information would be helpful and informative to have.

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

MASSACHUSETTS

Comments or trends highlighted in state report:

- Since 2009, the eel fishery has declined further to historic lows with 7 permits reporting landings of 462 pounds in 2012. In total 142 commercial eel permits were issued with 125 reporting that they did not fish for eels. 10 permit holders did not report.
- No recreational landings were reported in 2012.
- No inland harvests were reported by the Division of Fish and Wildlife.
- FI monitoring in the Jones River – the data series is showing a fairly flat trend that may be declining slightly. FI monitoring in the Parker River – catch was the highest in the data series in terms of geometric mean and the third highest in terms of total YOY numbers; appears to be small upward trend.
- Less than 130 silver eels were harvested as part of an ongoing research study conducted by UMass Dartmouth
- Since 2007, DMF has attempted to install at least one eel pass per year in cooperation with property owners and project partners. Two eel ramps were designed and partially constructed in 2012 but were not operational until the spring of 2013.

Unreported information:

- Harvest data CPUE.
- Estimate of harvest for food versus bait

Areas of concern:

- No biological data were collected from the commercial fishery. Commercial landings are not reported by life stage.
- It does appear likely that some fishermen are not reporting catches used personally for striped bass bait under the false interpretation that only eels sold must be reported.
- The sharp decline in landings during 2010-2012 appears to be most influenced by reduced fishing effort in response to low eel abundance.
- Given the proximity to Maine, the PDT believes that inclusion of any confiscated poundage from illegal or undocumented fisheries, if known, should be a high priority as this information would be helpful and informative to have.

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- The Commonwealth of Massachusetts requests *de minimis*. The total landings in Massachusetts are below 1% of the total 2012 coastwide landings, thus Massachusetts meets the requirements for *de minimis*.

RHODE ISLAND

Comments or trends highlighted in state report:

- 1,478 pounds of yellow eels were landed in 2011 in pots or traps.
- It is estimated that all eels are shipped/sold for food.
- No recreational landings were recorded.
- A total of 5,041 YOY American eel were observed in RI's 2011 recruitment survey, which was as 84% decrease from 2011 (which was the highest year on record).
- There was a decrease in the number of American eel observed in the RIDFW Marine Fisheries Section fishery-independent trawl and beach seine surveys in 2011.
- Rhode Island continues to place a high priority on fish passage. A new self regulating eel ramp was operated and maintained in 2012 on the Pawcatuck River. Seven new eel ramps are currently being developed and palnned for 2013 on the Blackstone, Saugatucket and Ten Mil River.

Unreported information:

- None

Areas of concern:

- Estimates of export, CPUE, and personal use data were not available. Some data may be confidential.
- No biological data were collected from the commercial fishery.
- No information on characterization of other losses (impingement, bycatch, poaching, etc..)

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

CONNECTICUT

Comments or trends highlighted in state report:

- State reported landings: 3,560 pounds valued at $2,136. This was an increase from 80 pounds reported in 2011. Anecdotal information from eel potters implies that the majority of harvest is going to bait
- A total of 30,253 YOY were captured. Eels were captured beginning March 6 which was the earliest date that YOY have been captured at the monitoring site.
- In other monitoring projects in the state – The eel pass at the Kinneytown Dam was removed for renovations and did not operate in 2012. The Mill River eel pass was renovated in 2011 and operated in 2012. The Lower Millpond Dam eel pass did not operate in 2012 due to a malfunctioning water supply system but a local non-profit held a "bucket brigade" to pass more than 35,000 glass eels over the dam. The Rainbow Dam fishway digital recording system observed 117 silver eels outmigrating from October 2nd – 22nd. The digital recording system in the Haakonsen fishway, installed for the first time ever, had to be removed less than ten days after installation due to Superstorm Sandy. An experimental eel pass was installed at the Bunnells Pond Dam in 2012.

Unreported information:

- No report of exports by season

Areas of concern:

- Two pots are allowed to be fished without a license for personal use. There are no

reporting requirements and therefore there are no estimates of catch and harvest. The PDT recommends CT be required to permit these pots in order to be able to provide an estimate of participation as well as require reporting to estimate catch.

- No biological data were collected from the commercial fishery.

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

NEW YORK

Comments or trends highlighted in state report:

- Reported commercial landings in 2012 were not available
- Recreational harvest estimate (MRFSS): 66 eels, all released alive during Wave 6
- 959 glass eels were caught in the YOY survey which was the fifth highest since the survey began and more than double from 2010.
- Fourth year of increasing glass YOY numbers, with the highest recorded total number of glass eels caught since 2002 and the second highest value since the survey began in 2000. Pigmented eel abundance has been declining since 2009.

Unreported information:

- Commercial landings data were not available for 2012.

Areas of concern:

- No biological data were collected from the commercial fishery.
- No information exists from commercial reporting mechanisms to provide information on CPUE, amount of personal use, or percent of harvest going for food vs. bait.
- Information on exports was for the entire US and not New York.

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

NEW JERSEY

Comments or trends highlighted in state report:

- State reported commercial landings: 105,913 pounds of yellow eels from pots. This was estimated to be the lowest harvest since 2003
- The majority of eels (84%) were commercially harvested as food, followed by bait (12%) and personal use (0.2%).
- Biological samples were collected from the commercial fishery (n= 140 yellow eels).
- CPUE was slightly lower than the time series average and overall has been declining since 2007.
- Sampling for glass eels is conducted in Patcong Creek in Linwood, New Jersey. Due to a collapsing overpass, the survey site was not accessible in 2011. Monitoring was resumed in 2012 and 292,980 glass eels were collected in the YOY survey. The highest GM CPUE in the time series (since 2000) was recorded in 2012, although decreased in 2013 to the lowest since 2004.

Unreported information:

- None

Areas of concern:

- No information on characterization of other losses due to bycatch or mass mortalities

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

PENNSYLVANIA

Comments or trends highlighted in state report:

- No eels were collected in the trap during the seven-week YOY sampling period. To supplement YOY sampling, six electrofishing surveys were conducted and captured 712 YOY.

Unreported information:

- None

Areas of concern:

- Recreational harvest data is not available.
- The compliance report does not characterize other losses to the eel population. The report does not identify the projects planned for the next five years.

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- Pennsylvania requests *de minimis*. There is no commercial fishery for eel in the State. American eels cannot be taken from the wild and sold, traded, exported, etc.

DELAWARE

Comments or trends highlighted in state report:

- Commercial eelers in Delaware landed 54,304 pounds of American eel, valued at $190,064 in 2012. This was a 41% decrease from the 92,181 pounds landed in 2011 and 50% less than mean annual landings during 1999 through 2012 (109,615 lbs.). 2012 landings were the lowest reported since logbook reporting was made mandatory in 1999
- American eels ranked fourth in pounds landed and third in value among all fish species landed commercially in Delaware during 2012.
- Delaware Bay and River ports, including ports on Delaware Bay and River tidal tributaries, accounted for 81% of 2012 landings and the Inland Bays ports accounted for the remaining 19% of landings.
- 62 licenses were issued in 2012 with only 13 licensees reported landing eels, 41 reported they did not fish for eels, and 8 did not submit any report. This was the seventh year in a row in which fewer than 70 eel licenses were issued.
- Effort, measured in eel pot days decreased by 30% between 2011 and 2012. Catch per pot day, measured in pounds caught per pot per day fished decreased 16% between 2011 and 2012
- Yellow eels harvested for food consumption comprised 44,406 pounds or 82% of

total reported landings, and bait eels comprised the remaining 9,898 pounds or 18% of the total

- A sub-sample of 115 commercially caught eels were weighed and measured. American eels aged 6, 7 and 8 constituted only 8% of the catch which suggested that eels older than 5 were not common among eels caught with commercial gear in Delaware tidal waters in 2012.
- MRIP reports a total of 24,976 eels were recreationally caught in 2012 (kept and released). The 2012 estimated recreational catch was 28% lower than the 2011 estimated catch.
- One fish kill involving American eel was reported at a freshwater impoundment during 2012. On July 18, 2012, approximately 30 eels were found dead at Silver Lake in Dover, Delaware, as a result of extremely low dissolved oxygen levels.
- YOY sampling captured 452,444 glass eels during 31 sampling days in2012. The 2012 glass eel catch was the highest annual catch for the time series, and was 462% higher than the 2011 glass eel catch. The geometric mean was 9,631 glass eels per sample day, nearly double the highest value in the twelve year time series.

Unreported information:

- None

Areas of concern:

- Delaware did not require dealers to report the final destination of commercially caught eels
- Personal use harvest not available.

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

MARYLAND

Comments or trends highlighted in state report:

- State reported commercial landings: 556,093 pounds. This was the second highest annual total since 1983 when a commercial license was first required to harvest eels. Landings have exceeded the time series mean for eight consecutive years. Since 1992, both American eel landings and CPUE have shown an overall positive trend.
- Harvest of eels for trotline bait in 2010 and 2011 increased 500% and 300% respectively.
- A total of 422 commercially harvested American eels were sampled from the Choptank River and a total of 574 commercially harvested American eels were sampled from the eel pot fishery in the Chester River.
- Licensed commercial crabbers harvested 36,964 pounds of American eel for use as trotline bait (personal use). These landings are not reported to NMFS.
- A total of 283,708 glass eels and elvers were captured over the sampling period with a CPUE of 450.9 elvers/hour, nearly double the previous highest annual CPUE of 247.5 in 2010.
- In addition to Maryland's primary YOY site, a site located at Bishopville prong, a coastal bay tributary to the St. Martin River was sampled in 2011. A total of 390,768

glass eels and elvers were captured over the entire sampling period.

- Prevalence rate of swimbladder parasite *Anquillicolla crassus* for combined sexes 63% in a silver eel survey on the Corsica River, down from 92% in 2011. Sampling methodology at this site will need to be modified as a result of the removal of the dam planned for 2014.

Unreported information:

- None

Areas of concern:

- Estimated percent going to food v. bait was not reported.
- Dealers are not required to report export of eels.
- The PDT recommends that all eel harvest data (even from crabbers) be reported to NMFS and ACCSP.
- Recreational harvest data is not available.
- No information on characterization of other losses (impingement, bycatch, poaching, etc..)

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

DISTRICT OF COLUMBIA

Comments or trends highlighted in state report:

- FI elver monitoring caught no eels.
- Due to the lack of success achieved with the Irish elver traps set in Rock Creek, an electrofishing survey was initiated. FI backpack electrofishing caught 955 eels (6 YOY and 892 elvers).
- In 2012 an assessment of adult American eels in the Potomac and Anacostia Rivers was conducted. Sampling for adult eels on the main rivers started on May 4, 2012 and ended September 28, 2012 alternating each month for a total of twelve weeks. A total of 62 eels were caught.

Unreported information:

- None

Areas of concern:

- The PDT requests that rends be highlighted in the report

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

POTOMAC RIVERS FISHERY COMMISSION

Comments or trends highlighted in state report:

- Reported commercial harvest: 90,037 pounds (a 200% increase from 2011 which was the lowest value since reports began in 1964).

- Based on data supplied by the harvesters, about 50% of the harvest went to live markets (food) and 50% were sold or used as bait.
- Results for 2012 indicated above average recruitment of glass eels occurred at Gardy's Millpond and the highest ever recruitment index was observed at Clark's Millpond. The Potomac River sites are the furthest inland elver/young of-year survey sampling sites on the East Coast

Unreported information:

- None

Areas of concern:

- No estimates of export are available.
- No biological data are collected from the commercial harvest.
- All eels caught with commercial gear, either sold or kept for personal use, must be reported on forms supplied by PRFC and the data included in the reported harvest. The PDT requests that this outcome be included in future reports submitted by the fishermen and the information included in the compliance report.
- No information on characterization of impingement, scientific losses, or mass mortalities

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

VIRGINIA

Comments or trends highlighted in state report:

- State reported commercial landings: 141,232 pounds (with an estimated 131,743 harvested in state waters). The majority of Virginia's in-state harvest was from the Rappahannock River (24%).
- 180 pounds of live eels (*Anguilla* spp.) were exported from Virginia in 2012.
- The harvest rate for American eels harvested by commercial eel pots in Virginia over the past 18 years (1994 through 2012) has been variable, with evidence of an overall decline since 2000. The harvest rate for 2012 was slightly higher than 2011 but 17% lower than the 1994 through 2012 time series average harvest rate.
- In 2012, MRIP estimates that 9,196 eels were harvested and 18,261 eels were released alive in Virginia. These estimates are not considered representative.
- A total of 4,185 eels were observed passing through the ladder at Millville Dam, which was the second highest (2003-2012).
- Recruitment of glass eels was average or above average at all monitoring sites in 2012
- Studies of yellow and silver eel migration in the Shenandoah River are planned for 2013.
- One violation related to American eel was reported by the VMRC Law Enforcement Division in 2012.

Unreported information:

- None.

Areas of concern:

- Estimates of personal use and percent harvest for food or bait not available.
- The VMRC's Biological Sampling Program collects biological data from Virginia's commercial and recreational fisheries. However, American eels are not one of the program's target species. The PDT request that American eel be made a priority species.

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

NORTH CAROLINA

Comments or trends highlighted in state report:

- State reported commercial landings: 66,580 pounds from 193 commercial trips. Eel pots were the dominant commercial gear and the majority (88%)of the landings occurred in the Albemarle Sound.
- The YOY monitoring program was eliminated in 2009 due to state budget issues. For 2009 - 2012 YOY data has been requested from the NOAA bridge net survey for North Carolina. NMFS currently has a backlog of samples and funding sources are being sought to process them.
- The Recreational Commercial Gear License survey ended in 2008 due to budget constraints.

Unreported information:

None

Areas of concern:

- The report does not provide 1) an estimated percent of harvest going to food versus bait, 2) estimates of export by season, 3) commercial catch permitted for personal use.
- Biological data were not collected from the commercial fishery.

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

SOUTH CAROLINA

Comments or trends highlighted in state report:

- State reported commercial landings: 186 pounds of glass eels were caught from dip nets and 1,265 pounds of glass eels were caught with fyke nets.
- No yellow eels were landed in 2012.
- There was little to no flow over the dam at Goose Creek Reservoir for the early part of the year. When a high flow event occurred in early March, the sampling gear was damaged by high water and wind, resulting in a week of lost sampling. The total catch over the sampling period was 80 YOY.
- Experimentation in collection/upstream passage feasibility of elvers at St. Stephen Dam on the Rediversion Canal, Santee River. Because of problems with equipment failure, limited water flow, and the lack of replicates no conclusions can be made at

this time from the experimental ladders, however, trials will continue next season in order to develop an elver passage protocol for the St. Stephen Dam

Unreported information:

- None

Areas of concern:

- No estimates of exports. No estimates of illegal or undocumented fisheries, scientific losses, or mass mortalities.

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- The State of South Carolina requests *de minimis*. South Carolina meets the requirements for *de minimis* for their yellow eel fishery.

GEORGIA

Comments or trends highlighted in state report:

- Landings are considered confidential due to the low number of dealers who report harvest.
- The recreational harvest of eels in Georgia in minimal at best, Therefore, Georgia does not regulate nor plan to regulate the fishery at this time. During 2012 MRIP reported 6 anglers on six trips catching 6 eels, all f which were released alive. The Inland Wildlife Resources Division reported 118 eels harvested and 940 released alive in the Altamaha River.
- The 2012 YOY American eel survey caught a total of 135 elvers, the highest on record since 2006 and the fifth highest in the time series (since 2000).

Unreported information:

- None.

Areas of concern:

- CPUE for the commercial fishery is not provided.

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- The State of Georgia requests *de minimis* status. Georgia meets the requirements for *de minimis.*

FLORIDA

Comments or trends highlighted in state report:

- State reported commercial landings: 11,845 which was ~50% decrease from 2011.
- In 2012 90% of harvested eels went for food with the remaining 10% sold as bait. Most of the eels stay in state.
- The YOY survey CPUE was the lowest on record since 2001.

Unreported information:

- The report does not characterize other losses to the eel population.

Areas of concern:

- No information on characterization of other losses (impingement, bycatch, poaching,

etc..)

Compliance issues:

- None

Recommendations for action by the American Eel Management Board:

- None

De minimis

Section 4.4.2 of the FMP stipulates that states may apply for *de minimis* status for each life stage if (given the availability of data), for the preceding two years, their average commercial landings (by weight) of that life stage constitute less than 1% of the coastwide commercial landings for that life stage for the same two-year period. States meeting this criterion are exempted from having to adopt commercial and recreational fishery regulations for a particular life stage listed in Section 4 and any fishery dependent monitoring elements for that life-stage listed in Section 3.4.1.

In 2012, the states of Massachusetts, Pennsylvania, South Carolina, and Georgia requested *de minimis* status for their yellow eel fisheries. Qualification for *de minimis* was determined from state reported landings found in compliance reports. All states that applied for *de minimis* meet the *de minimis* standard.

VII. Recommendations/Findings of the Plan Review Team

1. The PRT recommends *de minimis* be granted to the states of Massachusetts, Pennsylvania, South Carolina, and Georgia.

2. The PRT requests that state personnel highlight notable trends in annual reports. The PRT also requests that state personnel describe any circumstances that prevented sampling from occurring as required in the FMP and Addendum I, or reasoning for sampling not occurring in a manner consistent with previous years.

3. The PDT requests that states collect biological data from landings.

4. The PDT requests that states work with the law enforcement agencies to include information on any confiscated poundage from illegal or undocumented fisheries.

5. The PDT requests that states that do not regulate their personal use fishery, be required, at a minimum, to permit participants in this fishery and collect harvest data in order to provide an estimate of effort and catch.

North Carolina Department of Environment and Natural Resources
Division of Marine Fisheries

Pat McCrory
Governor

Dr. Louis B. Daniel III
Director

John E. Skvarla, III
Secretary

October 17, 2013

American Eel Management Board
Atlantic States Marine Fisheries Commission
1050 North Highland Street, Suite 200A-N
Arlington, Virginia 22201

Dear American Eel Management Board Members,

The purpose of this letter is to solicit the Board's help in securing a limited glass eel allocation for North Carolina aquaculture facilities. Two facilities already expressed interest in eel aquaculture within North Carolina. The Board had an opportunity to hear and speak with a representative of one of these facilities at the ASMFC Summer Meeting and there seems to be general support for allocating at least some quantity of glass eels to domestic, bona fide, brick and mortar, eel grow-out facilities. To my knowledge, North Carolina has the only facilities in the United States specifically designed for rearing eels.

It is important for us to foster this type of domestic operation where doing so is compatible with sound fishery management. These domestic operations give us the unique opportunity to conduct data collection and limited harvest in a highly monitored and verifiable setting. For North Carolina, this limited harvest would provide both needed data and needed jobs. We want to support this type of initiative and job creation in a sound, scientifically supportable manner.

The Board agreed to examine this issue in Addendum IV; however, there is need for a Board-approved allocation of glass eels for this late winter and spring season. I ask the Board to consider allowing me to use a controlled harvest of up to 750 pounds of glass eels in North Carolina coastal waters for grow out in an aquaculture facility as part of a scientific effort to better understand our glass eel population and the eel lifecycle. This operation would be conducted under a N.C. Division of Marine Fisheries Scientific and Educational Collection Permit. Our permit conditions would include: timely harvest reporting, production statistics, and review of the potential for returning a portion of the grown out eels back into the wild. The aspect of subsequent restocking back into the wild from aquaculture is a possible permit condition that Addendum IV will need to address.

While I understand the sensitivity of the glass eel fishery, I do not believe this request would result in any measureable impact to the stock. Instead, it could provide significant information and value for our eel aquaculture operations. I would be happy to answer any questions that anyone may have on this issue and hope we can have a favorable review during the Annual Meeting.

Thank you for your consideration,

Louis B. Daniel III, Director
N.C. Division of Marine Fisheries

LBD/kw/mrw

3441 Arendell Street, P.O. Box 769, Morehead City, North Carolina 28557
Phone: 252-726-7021 \ FAX: 252-726-0254 \ Internet: portal.ncdenr.org/web/mf

Atlantic States Marine Fisheries Commission

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

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. Comments on this draft document may be given at the appropriate time on the agenda during the scheduled meeting. 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 2013

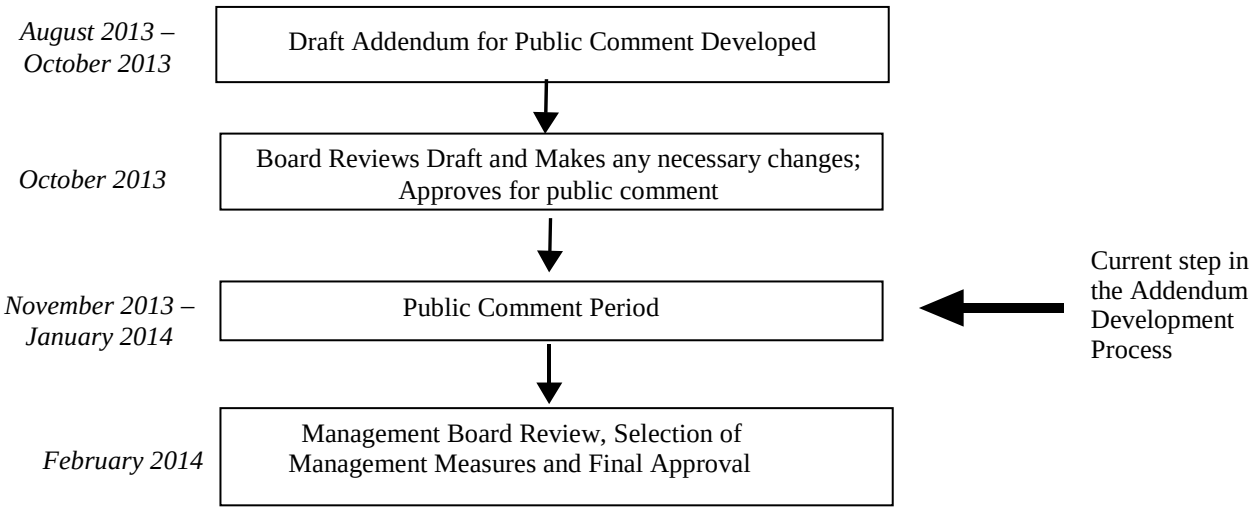
PUBLIC COMMENT PROCESS AND TIME LINE

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

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

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

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



EXECUTIVE SUMMARY

The Commission's American Eel Management Board (Board) initiated the development of Draft Addendum III in August 2012 in response to the 2012 Benchmark American Eel Stock Assessment, which found the American eel population in U.S. waters is depleted. The assessment found the stock is at or near historically low levels due to a combination of historical overfishing, habitat loss and alteration, productivity and food web alterations, predation, turbine mortality, changing climatic and oceanic conditions, toxins and contaminants, and disease. Draft Addendum III included a range of options for the commercial glass, yellow, and silver eels fisheries, as well as the recreational fishery. In August 2013, the Board approved some of the measures from Draft Addendum III (predominately the commercial yellow eel and recreational fishery management measures) and split out the remainder of the management measures (commercial glass and silver eel fisheries) for further development in Draft Addendum IV.

The goal of Draft Addendum IV is to reduce overall mortality and increase conservation of American eel stocks. Specifically, the management options under consideration are:

Commercial Glass Eel Fisheries Management Options
Option 1 – Status Quo
Option 2 – Closure of Glass Eel Fishery (Immediate or Delayed)
Option 3 – Quota Based on Landings (1998 – 2010)
Option 4 – Quota Based on ORCS Method
** Options 5 – 7 are only applicable if either Option 3 or 4 above is selected by the Board*
Option 5 – Quota Overages
Option 6 – Quota Underages
Option 7 – Research and Aquaculture Allowances
Option 8 – Reporting Requirements
Option 9 – Monitoring Requirements

Commercial Yellow Eel Fisheries Options
Option 1 – Status Quo
Option 2 - Yellow Eel Quota Based on Landings (1998 – 2010, 2000 – 2010, 2005 – 2010)
Option 3 – Yellow Eel Quota Based on ORCS (1998 – 2010, 2000 – 2010, 2005 – 2010)
** Options 4 and 5 are only applicable if either Option 2or 3 is selected by the Board*
Option 4 – Quota Overages
Option 5 – Quota Transfers
** Option 6 is only applicable if Option 2 or 3 under Commercial Yellow Eel Fisheries is selected by the Board as well as Option 3 or 4 under Commercial Glass Eel Fisheries*
Option 6 – Yellow to Glass Eel Transfers

Commercial Silver Eel Fisheries Measures
Option 1 – Status Quo
Option 2 – Extension of Sunset Provision
Option 3 – Effort Reduction / Time Closures
Option 4 – License Cap

TABLE OF CONTENTS

1. INTRODUCTION

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

2. STATEMENT OF THE PROBLEM

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

2.1. BACKGROUND

American eel (*Anguilla rostrata*) inhabit fresh, brackish, and coastal waters along the Atlantic from the southern tip of Greenland to Brazil. American eel eggs are spawned and hatch in the Sargasso Sea. After hatching, leptocephali—the larval stage—are transported by ocean currents to the coasts of North America and the upper portions of South America. After ocean drift, metamorphosis transforms leptocephali into glass eel. In most areas, glass eel enter nearshore waters and begin to migrate up-river, although there have been reports of leptocephali found in freshwater in Florida. Glass eel grow in fresh, brackish, and marine waters, becoming yellow eel. Eel reach the silver eel life stage upon nearing sexual maturity. Silver eel migrate to the Sargasso Sea, completing sexual maturation en route, where they spawn and die.

Yellow eel can metamorphose into a silver eel (termed *silvering*) from three years old and up to twenty-four years old, with the mean age of silvering becoming greater with increasing latitude. Environmental factors (e.g., food availability and temperature) may play a role in the triggering of silvering. Additionally, males and females differ in the size at which they

begin to silver. Males begin silvering at a size typically greater than 14 inches and females begin at a size greater than 16-20 inches (Goodwin and Angermeier 2003). Actual metamorphosis is a gradual process occurring in the summer and fall; a drop in temperature appears to trigger the final events of metamorphosis, which lead to migratory movements under the appropriate environmental conditions.

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

American eel occupy a significant and unique niche in the Atlantic coastal reaches and tributaries. Historically, American eel were very abundant in East Coast streams, comprising more than 25 percent of the total fish biomass. Eel abundance had declined from historic levels but remained relatively stable until the 1970s. More recently, fishermen, resource managers, and scientists postulated a further decline in abundance based on harvest information and limited assessment data. This resulted in the development of the ASMFC Interstate Fishery Management Plan (FMP) for American Eel.

The goals of the FMP are:

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

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

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

The FMP was modified three times. Addendum I (approved in February 2006) established a mandatory catch and effort monitoring program for American eel. Addendum II (approved in October 2008) made recommendations for improving upstream and downstream passage for American eels. Addendum III (approved in August 2013) made changes to the commercial

fishery, predominately the yellow eel fishery, as well as reduced the recreational creel limit from 50 fish to 25 fish per day.

2.2. 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 (TC) and Stock Assessment Subcommittee (SAS) caution that although commercial fishery landings and effort have declined from high levels in the 1970s and 1980s (with the recent exception of the glass eel fishery), current levels of fishing effort may still be too high given the additional stressors affecting the stock such as habitat loss, passage mortality, and disease as well as potentially shifting oceanographic conditions. Fishing on all life stages of eels, particularly young-of-the-year and in-river silver eels migrating to the spawning grounds, could be particularly detrimental to the stock, especially if other sources of mortality (e.g., turbine mortality, changing oceanographic conditions) cannot be readily controlled.

2.3. 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. In recent years, Maine is the only state reporting significant glass eel and elver harvest. Harvest has increased the last few years as the market price has risen to over $2,000 per pound. Although yellow eels were harvested for food historically, today's fishery sells yellow eels primarily as bait for recreational fisheries. Glass eels are exported to Asia to serve as seed stock for aquaculture facilities.

From 1950 to 2012, 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 and have fluctuated around one million pounds for the past decade. The value of U.S. commercial American eel landings as estimated by NOAA Fisheries has varied from less than a $100,000 (prior to the 1980s) to a peak of $6.4 million in 1997 (Figure 1).

3. MANAGEMENT OPTIONS

It is important to emphasize the 2012 American Eel Stock Assessment was a benchmark or baseline assessment that synthesized all available fishery-dependent and independent data yet it was not able to construct eel population targets that could be related to sustainable fishery harvests. This is not an uncommon result of baseline stock assessments. The development of sustainable population and fishery thresholds will be a priority of future stock assessment.

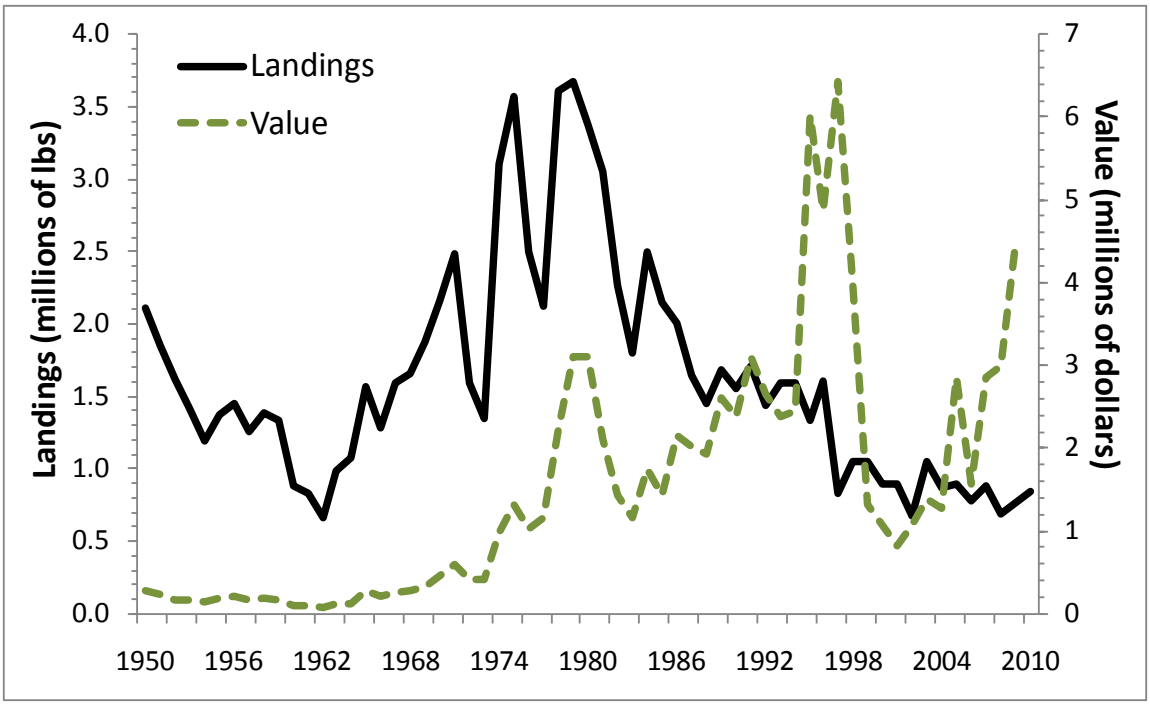


Figure 1. Total commercial landings of American eels and value in 2010 dollars along the U.S. Atlantic Coast, 1950–2010.

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 while enhancing and restoring habitat. This approach is further justified in light of the public interest in eel population conservation demonstrated by two recent petitions to list American eel under the Endangered Species Act.

The implemented provisions will be considered a compliance requirement and are effective 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.

3.1 COMMERCIAL FISHERY MANAGEMENT OPTIONS

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

3.1.1 Glass Eel Fisheries Management Options

The following options apply to the glass eel fisheries operating in Maine and South Carolina (Table 1). For all other jurisdictions, states are required to maintain existing or more conservative measures at the time of implementation of the American Eel FMP. These measures prohibit the development of glass eel fisheries in the remaining states and jurisdictions. Addendum III restricts the development of pigmented eel fisheries in states that allow glass eel harvest.

Option 1 – Status Quo

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

Option 2 – 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 1. Harvest (in pounds) and value of the glass eel fishery in Maine and South Carolina from 2007 - 2012. **South Carolina landings are confidential. ^ 2013 data are preliminary.*

	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	20,764	$38,760,490	<5,000	<$2,500,000
2013^	18,076	$32,926,991	<5,000	<$2,500,000

Option 3 – Glass Eel Quota Based on Landings

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

Under this option, glass eel landings will be managed through a quota system, with allocation based on the average landings from 1998 – 2010. The annual quota would be set at 5,293 pounds, with 98% (5,223 pounds) allocated to Maine and 2% (70 pounds) allocated to South Carolina (Table 2; Figures 2 and 3). This period was chosen as it includes reliable harvest from recent years and it includes the time period covered by the 2012 American Eel Stock Assessment[1]. The American Eel Plan Development Team (PDT) does not recommend using landings data from 2011 and 2012 as these years were not representative of the historic operation of the fishery given the recent spike in demand for glass eels and illegal harvest of glass eels. Additionally, recent research by Carruthers et al (2013) has found that methods to set catch limits at or above the average of recent catches has led to some of the highest probabilities of overfishing. The Board has the ability to re-visit quota allocation through subsequent addenda.

Table 2. Estimated value of the glass eel fishery in Maine and South Carolina under quota management based on the harvest average from 1998-2010. 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 harvest from 2012. Value does not account for any underreporting or illegal harvest that may have occurred.

	Allocation	Difference*	Estimated Value		
			$100/pound	$1000/pound	$2500/pound
Maine	5,223	-75%	$522,300	$5,223,000	$13,057,500
South Carolina	70	-95%	$7,000	$70,000	$175,000

Option 4 – Glass Eel Quota based on ORCS Method

The Reauthorization of the MSA in 2009 presented challenges to the Federal Fishery Management Councils, in that they are required to specify an ABC (or Allowable Biological Catch) that incorporates scientific uncertainty, and provide a removal level appropriate to the councils risk policy, including data poor fisheries. In these data poor situations, most Councils typically look to their landings/catch data as the only reliable means of setting quotas. A recent method, "Calculating Acceptable Biological Catch for Stocks that have reliable Catch Only Data (ORCS)", has been developed to address this challenge and serves to guide the Councils in setting interim removal levels under data poor conditions (Berkson et al, 2011). This method could be applied to American eels given the data poor status of the stock. The objective of using this method would be to provide the American Eel Management Board with routinely used procedures in to set harvest levels when there are no quantitative assessment or reference points.

The ORCS method generally uses an average of landings from a time period when both stock and fishery were stable. For the glass eel quota option the time period 1998 – 2010 was selected by the PDT, although the level of stability in the fishery and stock during this time is

[1] 1998 was the first year that landings were required to be submitted by harvesters or dealers. Prior to this time period it was voluntary. The American Eel Stock Assessment analyzed landings data through 2010.

uncertain. A conservation multiplier adjusts this average to produce the final removal estimates. This multiplier reflects, in a qualitative and ad hoc way, the risk associated with those removals. Further, the multiplier also takes into account the life history of the stock in question (such as vulnerability and longevity), ecosystem role, qualitative information on relative stock status, and certainty of the landings data.

While the current status of American eel is not well known, the general consensus and peer reviewed stock status conclusion is that the stock is depleted relative to historic abundance levels. Additionally, the ESA 90 day finding also suggests action under the ESA may be warranted. Using the ORCS scoring criteria this would potentially suggest a starting multiplier of 0.5 as the stock is at very low levels compared to historic level (Table 3). However the productivity of glass eels, their relatively high natural mortality rate, and their limited exploitation coast wide would suggest a more moderate 0.75 multiplier to account for scientific uncertainty. A further multiplier of 0.9 would be recommended to account for management uncertainty (associated with the landings that make up the catch during this time period and illegal harvest).

Under this option, glass eel landings will be managed through a quota based on the ORCS analysis using average landings from 1998 – 2010. The coastwide quota for glass eels would be set at 3,573 pounds, 98% of which would be allocated to Maine (3,501 pounds; Table 4 and Figure 2) and 2% would be allocated to South Carolina (71 pounds; Table 4 and Figure 3). The Board has the ability to re-visit quota allocation through subsequent addenda.

For more information on the ORCS analysis see Appendix A.

Table 3. Risk multiplier given various risk levels. A higher risk level is associated with a less precautionary approach and a lower risk level is associated with a more precautionary approach. The recommended level is in shaded in grey.

Acceptable Risk Level	Scientific Uncertainty	Management Uncertainty
Low	0.5	0.75
Medium	**0.75**	**0.9**
High	1	1

Table 4. Estimated value of the glass eel fishery in Maine and South Carolina under ORCS quota management based on the harvest average from 1998-2010. 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 harvest from 2012. Value does not account for any underreporting or illegal harvest that may have occurred.

	Allocation	Difference*	Estimated Value		
			$100/pound	$1000/pound	$2500/pound
Maine	3,501	-83%	$357,300	$3,573,000	$8,932,500
South Carolina	71	-95%	$7,100	$71,000	$177,500

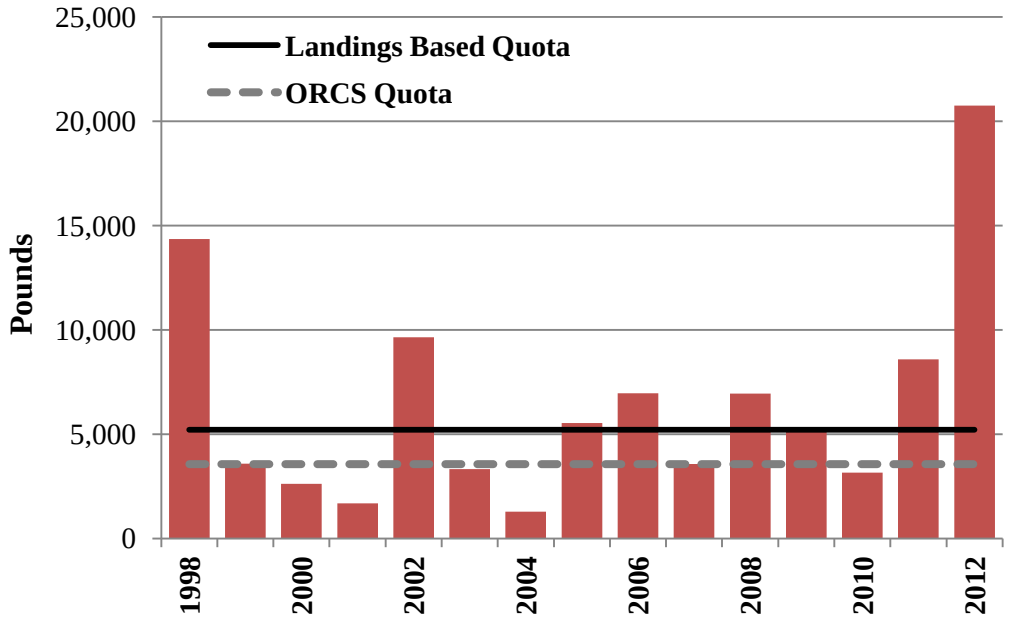


Figure 2. Maine glass eel landings and respective quotas under Option 3 (Landings Based) and Option 4 (ORCS Based), in pounds.

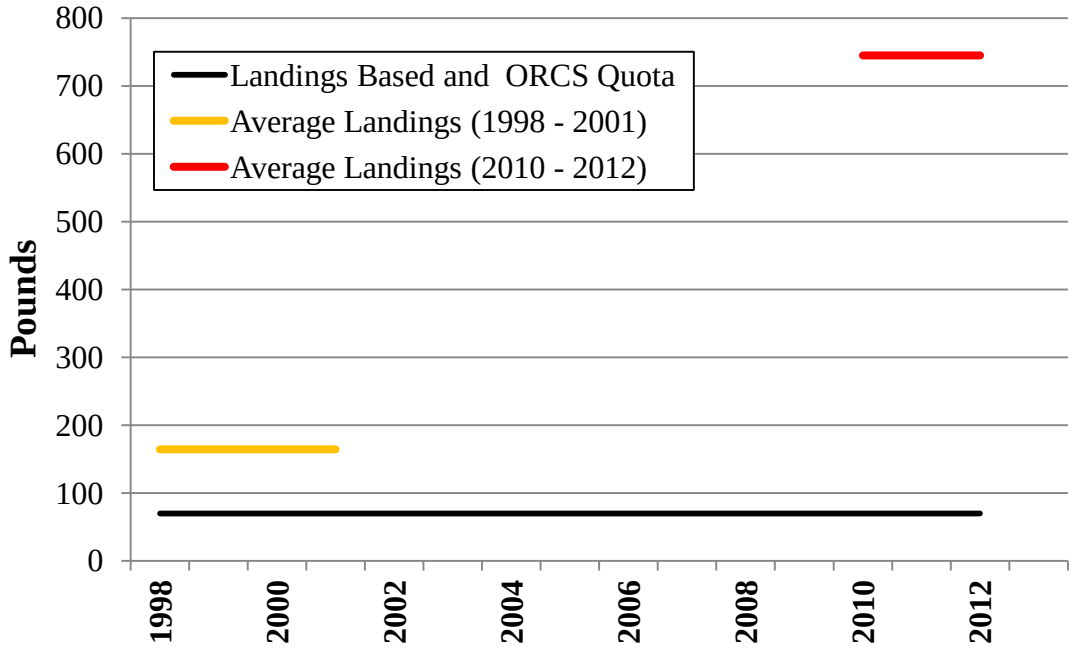


Figure 3. South Carolina glass eel landings (1998 – 2001 and 2010 – 2012 averages) and respective quotas under Option 3 (Landings Based) and Option 4 (ORCS Based), in pounds. South Carolina landings are confidential, therefore are presented as an average from 1998 – 2001 and 2010 – 2012 to provide a snapshot of the fishery**.**

Option 5 – Quota Overages
This option is only applicable if quota management is chosen (Option 3 or Option 4 of this Section).

If a quota system is implemented, the Board may choose to implement a mechanism to address quota overages. The sub-options are not mutually exclusive and may be considered in combination.

Sub-Option A – Equal Payback
If overages occur, the state will be required to deduct their entire overage from the quota the following year, pound for pound.

Sub-Option B – Quota Overage Tolerance
Given the low quota amounts, administrative requirements to monitor the quota, and the environmental factors that influence harvest levels a tolerance of up to 5% overage would be allowed without payback. If a state exceeds the quota above 5% the entire amount must be paid back. The quota overage tolerance can be re-visited through Board action.

Option 6 - Quota Underages
This option is only applicable if quota management is chosen (Option 3 or Option 4 of this Section).

If a quota system is implemented, the Board may choose to implement a mechanism to address quota underages. An inability to utilize all or a significant portion of a quota in a given year could be a result of declining spawning stock biomass, but it could also be the results of unfavorable weather patterns and oceanographic conditions which alter glass eels migration to state waters where fisheries exist.

Under this option, up to 25% percent of the unused quota may be added to the states quota the following year. Any quota that is rolled over can only be used in the year following the underage and cannot be carried over for any additional years.

For example: A state has a quota of 500 pounds. 100 pounds were unused in 2012. In 2013, the state's quota will be 525 pounds (500 pounds allocated plus 25 pounds rolled over).

Option 7 - Research and Aquaculture Allowances
Either of these sub-options can only be considered if quota management is chosen (Option 3 or Option 4).The sub-options can be considered in combination.

Sub-Option 7a – Research Set Aside
A research set-aside (RSA) program is being proposed as a vehicle to fund research projects that address research priorities concerning the American eel fishery through the sale of quota set-aside. This addendum proposes to establish a procedure through which up to 5% percent a state glass eel quota may be set-aside to fund research. Quota can be allocated either through a bidding process, where fishermen bid on

quota with the funds raised distributed to approved research projects, or through an application process, where the quota is allocated to researchers with harvest sold to fund approved research projects. Monitoring requirements as specified under Addendum III can be funded through the RSA program but must be conducted by or under strict supervision of state personnel.

No direct funds are provided for research under this program, but rather the opportunity to fish, with the catch sold to generate funds to advance scientific understanding of American eels or contribute to the body of information on which management decisions are made. It is the option of any state with a glass eel quota to allow for a RSA program. Priority will be given to proposals that investigate research priorities identified by the Commission and/or state. Research projects would be subject to review and approval by the participating state, in consultation with the TC. The state may issue an Experimental Fishing Permit or Letter of Authorization, as applicable, which may provide special fishing privileges in response to research proposals selected under the RSA Program, not the Board. Set-aside amounts will be tracked and monitored by the participating state and reported in the state's annual compliance report. The research compensated trips must be conducted in the state from which the set-aside was derived. The RSA must be utilized in the same fishing year in which it was distributed (i.e., RSA and compensated trips cannot be rolled over into future years). However, the money generated from the RSA may be rolled over into, or used to fund research in future years (i.e. for a multi-year proposal). If a research project is terminated for any reason prior to completion, any funds collected from the catch sold must be refunded to the state. In the event that the approved proposals do not make use of any or all of the set-aside quota, the unutilized portion of the set-aside quota would be released back to the state. The state and Commission shall not be liable for any costs incurred during a project. Specific regulations that may not be waived include reporting requirements.

<u>Sub-Option 7b - Glass Eel Harvest for Aquaculture</u>
Currently, domestic aquaculture facilities cannot compete with low foreign labor prices, high prices for eels, and high shipping costs. This sub-option would allow for a small portion (recommended up to 5%) of a state or jurisdictions quota of glass eels to be harvested and used for aquaculture research purposes. Requests for aquaculture harvest would be subject to TC review and Board approval. Participants in this fishery would be subject to all applicable glass eel monitoring and management provisions as specified under Addendum III and any other applicable glass eel requirements as mandated under this addendum. The goal is not to allow the development o f new commercial glass eel fisheries, but to foster a better understanding of American eel aquaculture and biology, provide economic benefit to states, and stimulate domestic aquaculture. Any requests that include a stocking provision would have to ensure stocked eels were certified disease and *A. Crassus* free according to standards developed by the TC and approved by the Board. Eels sold from aquaculture may not be sold until they reach the legal size in the jurisdiction of operations, unless otherwise specified. The PDT stresses the need for the LEC to review this option.

Option 8 – Reporting Requirements
Under this option states with a glass eel fishery would be required to implement daily trip level reporting with daily electronic accounting to the state for harvesters and dealers in order to ensure accurate reporting of glass eel harvest. This type of system would be essential for quota monitoring accuracy given the sharp increase in market value and rise in illegal harvest. Increased dealers license requirements would also help address the underreporting problem by preventing people without a long-term interest in the fishery from entering.

Option 9 – Monitoring Requirements
Under this option states or jurisdictions with a commercial glass eel fishery must implement a fishery independent life cycle survey covering glass, yellow, and silver eels within at least one river system. If possible and appropriate, the survey should be implemented in the river system where the glass eel survey (as required under Addendum III) is being conducted. This survey would include but not be limited to collecting the following information: age of entry into the fishery/survey, biomass and mortality of glass and yellow eels, sex composition, age structure, prevalence of *A. crassus,* and average length and weight of eels in the fishery/survey. This information has been deemed as high priority information to collect by the SAS. Survey proposals will be subject to TC review and Board approval.

3.1.2 Yellow Eel Fisheries Management Options

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

Option 1 – Status Quo
Under this option the current regulations for yellow eel fisheries as specified under Addendum III will remain in place.

Option 2 - Yellow Eel Quota based on Landings
Under this option yellow eel harvest for states and jurisdictions with a yellow eel fishery will be regulated annually through a quota system. The minimum allocated quota would be fixed at 2,000 pounds (i.e. if a state's proposed quota under any of the sub-options was less than this amount it was automatically set at 2,000 pounds, see Table 5) providing all state's a quota level sufficient to cover any directed or bycatch landings without creating an administrative burden. The 2,000 pounds quota is not expected to promote a notable increase in effort in the fishery. The Board has the ability to re-visit quota allocation through subsequent addenda. Examples for quota management are described in the following sub-options.

Sub-option 2a – Average Landings from 1998 – 2010
Under this sub-option, yellow eel landings will be managed through a quota system, with allocation based on the average landings from 1998-2010. This period was chosen as it includes a range of years that captures a more productive time in the

Table 5. Quota and Allocation based on landings from three different time periods. Difference refers to the difference between allocation and the harvest from 2012.

	Quota Allocation			Difference From Current Harvest		
	1998-2010	**2000-2010**	**2005-2010**	**1998-2010**	**2000-2010**	**2005-2010**
Maine	19,437	15,582	9,992	80%	44%	-8%
New Hampshire	2,000	2,000	2,000			
Massachusetts	4,252	3,580	2,857	699%	573%	437%
Rhode Island	2,000	2,039	3,438		37%	132%
Connecticut	3,160	2,291	2,000	26%	-8%	-20%
New York	4,277	4,989	6,087	-91%	-89%	-83%
New Jersey	108,821	111,827	140,182	-3%	0%	25%
Delaware	112,168	108,884	95,053	107%	101%	75%
Maryland	287,940	289,961	333,763	-50%	-49%	-42%
PRFC	125,803	114,826	78,814	40%	28%	-12%
Virginia	101,128	91,668	76,519	-7%	-16%	-30%
North Carolina	85,820	84,058	54,931	29%	26%	-17%
South Carolina	2,000	2,000	2,000			
Georgia	2,000	2,000	2,000			
Florida	9,331	8,177	7,713	-21%	-31%	-35%
Total	868,766	842,288	816,711	-18%	-21%	-23%

fishery as well as years for which reliable data is available. Under this sub-option, the annual quota would be set at 868,766 pounds, with allocation and difference from 2012 landings specified in Table 5.

Sub-option 2b – Average Landings from 2000 – 2010
Under this sub-option, yellow eel landings will be managed through a quota system, with allocation based on the average landings from 2000-2010. 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 842,288 pounds, with allocation and difference from 2012 landings specified in Table 5.

Sub-option 2c –Average Landings from 2005 – 2010
Under this sub-option, yellow eel landings will be managed through a quota system, with allocation based on the average landings from 2005-2010. This period was chosen because it is based on recent landings which more accurately reflects the current distribution of the fishery. Under this sub-option, the annual quota would be set at 816,711 pounds, with allocation and difference from 2012 landings specified in Table 5.

Option 3 – Yellow Eel Quota based on ORCS Method
See Option 4 under Glass Eel Management Options for a synopsis of the ORCS method to set the quota. A more detailed analysis of the method is contained in Appendix A. The minimum allocated quota is proposed to be fixed at 2,000 pounds (i.e. if a state's proposed quota under any of the sub-options was less than this amount it was automatically set at 2,000 pounds see Table 8) providing all state's a quota level that is sufficient to cover any directed or bycatch landings without creating an administrative burden. The 2,000 pound quota is not expected to promote a notable increase in effort in the fishery. The Board has the ability to re-visit quota allocation through subsequent addenda.

Analysis
Similarly to setting the glass eel quota, starting with a multiplier of 0.5 would be appropriate since the American eel stock is at very low levels compared to past (Table 6). However, unlike glass eels, yellow eels face an increasing number of threats and for longer periods of time across their entire range. Additionally natural mortality at this life phase is more similar to fishing mortality, and overall productivity at this stage is less than it is for glass eels. Therefore a multiplier of 0.5 is recommended to account for scientific uncertainty. A multiplier of 0.9 is recommended to account for management uncertainty (associated with illegal, unregulated, and unreported landings).

Sub-Option 3a - ORCS Method based on landings from 1998 – 2010
Under this option, yellow eel landings will be managed through a quota based on the ORCS analysis using average landings from 1998 - 2010. The coastwide quota for yellow eels would be set at 388,880 pounds (Table 7). Allocation of this quota to states and jurisdictions would be based on the average landings from this time period (Table 8).

Sub-Option 3b – ORCS Method based on landings from 2000 - 2010
Under this option, yellow eel landings will be managed through a quota based on the ORCS analysis using average landings from 2000 - 2010. The coastwide quota for yellow eels would be set at 377,129 pounds (Table 7). Allocation of this quota to states and jurisdictions would be based on the average landings from this time period (Table 8).

Sub-Option 3c - ORCS Method based on landings from 2005 - 2010
Under this option, yellow eel landings will be managed through a quota based on the ORCS analysis using average landings from 2005 – 2010 (Table 7). The coastwide quota for yellow eels set at 365,139 pounds. Allocation of this quota to states and jurisdictions would be based on the average landings from this time period (Table 8).

Table 6. Multiplier given various risk levels. A higher risk level is associated with a less precautionary approach and a lower risk level is associated with a more precautionary approach. The recommended level is in shaded in gray.

Acceptable Risk Level	Scientific Uncertainty	Management Uncertainty
Low	**0.5**	0.75
Medium	0.75	**0.9**
High	1	1

Table 7. Resulting quota for cost wide yellow eel harvest as outlined by the ORCS method for various levels of management uncertainty and the scientific uncertainty set at 0.5.

	Management Uncertainty Acceptable Risk Level		
	Low	**Medium**	**High**
1998 - 2010	324,067	388,880	432,089
2000 - 2010	314,274	377,129	419,032
2005 - 2010	304,283	365,139	405,710

Option 4 – Quota Overages
This option is applicable only if quota management is chosen (Option 2 or Option 3 of this Section).

If a quota system is implemented, the Board may choose to implement a mechanism to address quota overages. If overages occur then the state will be required to deduct their following year quota by the same amount the quota was exceeded, pound for pound. For state's that qualify for the automatic 2,000 pound quota, any overages would be deducted from the 2,000 pound allocation.

Table 8. Quota based on risk analysis (Scientific Uncertainty Risk Level = 0.5 and Management Uncertainty Risk Level = 0.9) and allocation based on average landings from varying time periods. *Total is slightly higher due to 2,000 quota allowances.

	Quota Allocation			1998-2010	2000-2010	2005-2010
	1998-2010	2000-2010	2005-2010	Percent Allocation based on harvest average		
Maine	8,747	7,012	4,497	2.25%	1.86%	1.23%
New Hampshire	2,000	2,000	2,000	0.02%	0.01%	0.01%
Massachusetts	2,000	2,000	2,000	0.49%	0.43%	0.35%
Rhode Island	2,000	2,000	2,000	0.21%	0.24%	0.42%
Connecticut	2,000	2,000	2,000	0.37%	0.27%	0.23%
New York	2,000	2,000	2,739	0.34%	0.35%	0.67%
New Jersey	48,969	50,322	63,082	12.61%	13.37%	17.29%
Delaware	50,475	50,475	42,774	13.00%	13.41%	11.72%
Maryland	129,573	129,573	150,193	33.37%	34.42%	41.17%
PRFC	56,611	56,611	35,466	14.58%	15.04%	9.72%
Virginia	45,508	45,508	34,434	11.72%	12.09%	9.44%
North Carolina	38,619	38,619	24,719	9.95%	10.26%	6.78%
South Carolina	2,000	2,000	2,000	0.00%	0.01%	0.00%
Georgia	2,000	2,000	2,000	0.01%	0.01%	0.01%
Florida	4,199	3,680	3,471	1.08%	0.98%	0.95%
Total	388,880*	377,129*	365,139*			

Option 5 – Quota Transfers
This option is only applicable if quota management is chosen (Option 2 or Option 3 of this Section).

Under this option states may transfer its yellow eel quota to another states yellow eel quota if requested, with the exception of states that receive the automatic 2,000 pound quota. States that receive the automatic 2,000 pound quota would not be eligible to participate in these transfer management measures. Transfers must be submitted to the Management Board for review and approval. Transfer requests for the current fishing year must be submitted by December 31 of that fishing year.

Option 6 – Yellow to Glass Eel Transfers
Note: This option is only applicable if the Board approves quota management for the yellow eel fishery (Options 2 or 3 of this section) as well as quota management for the glass eel fishery (Options 3 or 4 under Section 2.1).

Under this option states or jurisdictions may petition the Board to transfer all or a portion of their yellow eel quota to a glass eel fishery in that state or jurisdiction, with the exception of states that receive the automatic 2,000 pound quota. These states would not be eligible to participate in these transfer management measures. The petitioning state must develop a transfer plan that details the scientific analysis the transfer is based on and clearly show the transfer will not increase overall eel fishing mortality in the state. The TC will develop a template of minimum standards for the transfer plans. Transfer plans are subject to TC review and Board approval. Transfer plans must be submitted by July 1st of the preceding fishing year. For states or jurisdictions that are interested in the development of a glass eel fishery but have minimal yellow eel landings to transfer, those states or jurisdictions would be allowed to petition for a glass eel quota based on a combination of 1) historical landings in the yellow eel fishery, 2) habitat improvements, 3) enforcement capacity, 4) monitoring requirements, and 5) other conservation measures. If approved, all monitoring and management regulations specific to the glass eel fishery must be followed. If approved, the state or jurisdiction is locked into that transfer and cannot transfer the quota back to a yellow eel quota. This is to promote stability in both the glass and yellow eel fisheries and to decrease the uncertainty that participants might have if either fishery was eligible for transfer at anytime. State -to-state yellow eel transfers are not eligible for conversion to glass eel transfer. The Board has the ability to re-visit transfers through a subsequent addendum.

3.1.3 Silver Eel Fisheries

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

> *Section 4.1.3: States and jurisdictions are required to implement no take of eels from September 1st through December 31st from any gear type other than baited traps/pots or spears (e.g. fyke nets, pound nets, and weirs). These gears may still be fished, however retention of eels is prohibited. A state or jurisdiction may request an*

alternative time frame for the closure if it can demonstrate the proposed closure dates encompass the silver eel outmigration period. Any requests will be reviewed by the TC and submitted to the Board for approval.

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

Option 1 – Status Quo
Under this option the current regulations will remain in place and the one year extension granted to New York would expire at midnight on December 31, 2014. At that time the regulations as specified under Section 4.1.3 in Addendum III would go into effect.

Option 2 – Extension of the Sunset Provision
Under this option the sunset provision could be extended by a timeframe as specified by the Board.

Option 3 – Effort Reduction / Time Closure
Under this option the state of New York would be required to implement no take of eels in the Delaware River and its tributaries within New York from August 15th through September 30th from any gear type other than baited traps/pots, or spears and weirs (e.g. fyke nets and pound nets). Refer to Table 9 for a summary of the average landings (2003 – 2012) of American eel by month from the weir fishery in the Delaware River and its tributaries.

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

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

Option 4 – License Cap
Under this option, the Delaware River weir fishery would be limited to those permitted New York participants that fished and reported landings anytime during the period from 2010 – 2013. Refer to Figure 4 for the number of licenses issued annually and the number of active participants in the fishery. Once issued, licenses are not eligible for transferability. Only one license can be issued per participant.

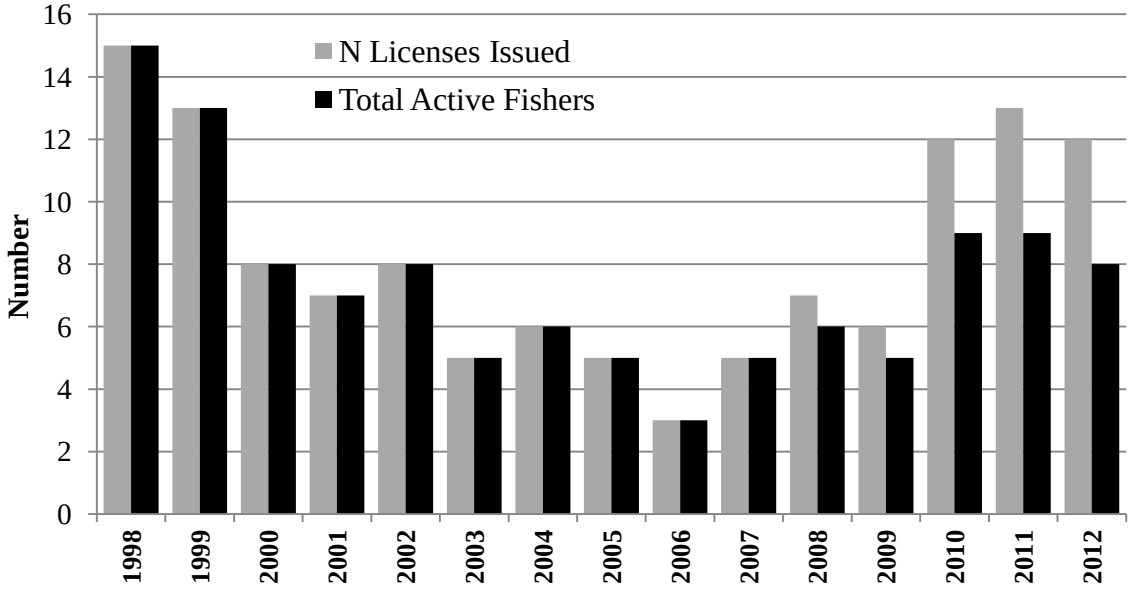


Figure 4. The number of licenses and active or reporting fishermen in the American eel weir fishery in the Delaware River and its tributaries from 1998 – 2012.

3.2 LAW ENFORCEMENT RECOMMENDATIONS

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

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

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

4. COMPLIANCE

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

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

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

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

5. LITERATURE CITED

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APPENDIX A:

Glass and Yellow Eel Quota Specification Process Based on ORCS Methodology

Introduction

The PDT discussed an alternative quota setting process based in part on the Catch Only Data (ORCS) for the glass and yellow eel fisheries. This paper explicitly explains how these values of the multiplier were derived in setting the quota for each of these fisheries.

In general the ORCS methodology was derived to set an Over Fishing Level (OFL) and Allowable Biological Catch (ABC), and Annual Catch Limit (ACL) for stock that had only landings and discard data. While ASMFC does not use an OFL/ABC/ACL framework explicitly such an approach can be useful given its familiarity among mangers, scientists, and stakeholders involved in federal fisheries. In general OFL $\geq$ ABC $\geq$ ACL The buffer between OFL and ABC accounts for scientific uncertainty in the federal system, while the buffer between ABC and ACL accounts for management uncertainty (Figure 1). In the previous white paper we combined these uncertainties in an effort to be straight forward in approach. However breaking these two types of uncertainty out, and following directly the framework outlined in the ORCS report, maybe more useful.

Glass Eel Fishery

Step 1: Setting OFL

OFL can be obtained by using some average landings across a time period multiplied by a scaling factor which reflects status of the stock, productivity, risk of overfishing, and other factors. The methods for selecting the appropriate time period are contained in the ORCS report. Here we will focus on the 1998-2010 timeframe, with other time periods shown as a comparison.

While the current status of American eel is not well known, the general consensus and peer reviewed stock status conclusion is that the stock is in poor shape. Additionally, the ESA 90 day finding also suggests that action under the ESA maybe warranted. Given ORCS scoring criteria this would potential suggest a multiplier of 0.5 as a heavily exploited/depleted stock (Table 1) as the stock is at very low levels compared to past. However the productivity of glass eels, their relatively high natural mortality rate, and their limited exploitation coast wide suggests a more moderate 0.75 multiplier (Tables 2 & 3)

Step 2: Setting ABC/ACL

In data rich assessments reductions from OFL to ABC account for scientific uncertainty, while reductions from ABC to ACL account for management uncertainty. In the case of Catch Only stocks, mangers risk policy or risk tolerance must be factored in. As such, it's probably most useful for mangers to set a combined ABC/ACL multiplier based on scientific advice. Here scientific information on stock productivity, life history, reliability of the data, and other information can be used by the TC/PDT to arrive at a recommended multiplier and buffer between OFL and ABC/ACL (Table 4) as well as the range. Managers could then select their preferred risk level.

The PDT/TC recommends a 0.9 multiplier from OFL to ABC/ACL this accounts for the uncertainty associated with the landings that make up the catch during this time period. This coupled with some degree of IUU fishing (Illegal, Unregulated, Un-reported) would suggest an reduction of 0.10 from a multiplier of 1.0; culminating in a recommended coast wide quota for glasses eels in Table 5.

Yellow Eel Fishery

Step 1: Setting OFL

Similarly to glass eels setting the OFL is based on some historical average of landings (Table 6) with some multiplier to account for life-history, exploitation/status of the stock, and other factors. Given ORCS scoring criteria this would potential suggest a multiplier of 0.5 as a heavily exploited/depleted stock (Table 1) as the stock is at very low levels compared to past. Unlike glass eels, yellow eels are more exposed which targets them (and for longer periods) across the entire range. Additionally natural mortality at this life phase is more similar to fishing mortality, and overall productivity at this stage is less than it is for glass eels. As such an OFL multiplier of 0.5 is appropriate (Tables 2 & 6).

Step 2: Setting ABC/ACL

Again the PDT/TC recommends a 0.9 multiplier from OFL to ABC/ACL (Table 4) this accounts for the uncertainty associated with the landings that make up the catch during this time period. This coupled with some degree of IUU fishing (Illegal, Unregulated, Un-reported) as well as unknown recreational catch would suggest a reduction of 0.10 from a multiplier of 1.0; culminating in a recommended coast wide quota for glasses eels in Table 7.

Table 1: Recommended OFLs using ORCS Working Group Approach (from ORCS, 2011)

Stock category		
Lightly exploited ($B > B_{65\%}$)	Moderately exploited ($B \sim B_{MSY}$)	Heavily exploited ($B < B_{20\%}$)
2.0 x catch statistic	1.0 x catch statistic	0.50 x catch statistic

Table 2: Table of attributes for assigning stock status for historical catch-only assessments. Overall scores are obtained by an unweighted average of the attributes for which scoring is possible, although alternative weighting schemes could also be considered. An initial assignment to a stock status category is: mean scores>2.5—heavily exploited; stocks with mean scores 1.5-2.5--moderately exploited; and stocks with mean scores<1.5--lightly exploited. When the attribute does not apply or is unknown it can be left unscored. (From ORCS, 2011).

Attribute	Stock status		
	Lightly exploited (1)	**Moderately exploited (2)**	**Heavily exploited (3)**
Overall fishery exploitation based on assessed stocks	All known stocks are either moderately or lightly exploited. No overfished stocks	Most stocks are moderately exploited. No more than a few overfished stocks	Many stocks are overfished
Presence of natural or managed refugia	Less than 50% of habitat is accessible to fishing	50%-75% of habitat is accessible to fishing	>75% of habitat is accessible to fishing
Schooling, aggregation, or other behavior responses affecting capture	Low susceptibility to capture (specific behaviors depend on gear type)	Average susceptibility to capture (specific behaviors depend on gear type)	High susceptibility to capture (specific behaviors depend on gear type)
Morphological characteristics affecting capture	Low susceptibility to capture (specific characteristics depend on gear type)	Average susceptibility to capture (specific characteristics depend on gear type)	High susceptibility to capture (specific characteristics depend on gear type)
Bycatch or actively targeted by the fishery	No targeted fishery	Occasionally targeted, but occurs in a mix with other species in catches	Actively targeted
Natural mortality compared to dominant species in the fishery	Natural mortality higher or approximately equal to dominant species ($M \geq \overline{M}$)	Natural mortality equal to dominant species ($M \approx \overline{M}$)	Natural mortality less than dominant species ($M < \overline{M}$)
Rarity	Sporadic occurrence in catch	Not uncommon, mostly pure catches are possible with targeting	Frequent occurrence in catch
Value or desirability	Low value (< $1.00/lb, often not retained (< 33% of the time)	Moderate value ($1.00 - $2.25), usually retained (34-66% of the time)	Very valuable or desirable (e.g., > $2.25/lb), almost always retained (>66% of the time).
Trend in catches (use only when effort is stable)	Catch trend increasing or stable (assign score of 1.5)	Catch trend increasing or stable (assign score of 1.5)	Decreasing catches

Table 3: Recommended Multipliers from OFL to ABC and resulting buffer as interpreted for glass eels using the ORCS report.

	Multiplier: OFL				
years	1	0.8	0.75	0.7	0.65
1998-2012	6,677	5,342	5,008	4,674	4,340
1998-2010	5,293	4,234	3,970	3,705	3,440
2010-2012	11,577	9,262	8,683	8,104	7,525
2007-2012	8,409	6,727	6,307	5,886	5,466

Table 4: ABC/ACL multiplier given various risk levels. The recommended level is in Green

Risk Level	Multiplier: ABC
Low	0.75
Medium	0.9
High	1

Table 5: Resulting quota for cost wide glass eel harvest as outlined by the ORCS method. Recommended quota in Green (Combination of tables 3 & 4)

	Risk Level		
Years	Low	Medium	High
1998-2010	2,977	3,573	3,970

Table 6: Recommended Multipliers from OFL to ABC and resulting buffer as interpreted for Yellow eels using the ORCS report.

	Multiplier: OFL			
years	1	0.75	0.5	0.25
1998-2010 Average	864,179	648,134	432,089	216,045
2000-2010 Average	838,064	628,548	419,032	209,516
2005-2010 Average	811,420	608,565	405,710	202,855

Table 7: Resulting quota for cost wide yellow eel harvest as outlined by the ORCS method. Recommended quota in Green (Combination of tables 4 & 6)

	Risk Level		
Years	Low	Medium	High
1998-2010	324,067	388,880	432,089
2000-2010	314,274	377,129	419,032
2005-2010	304,283	365,139	405,710

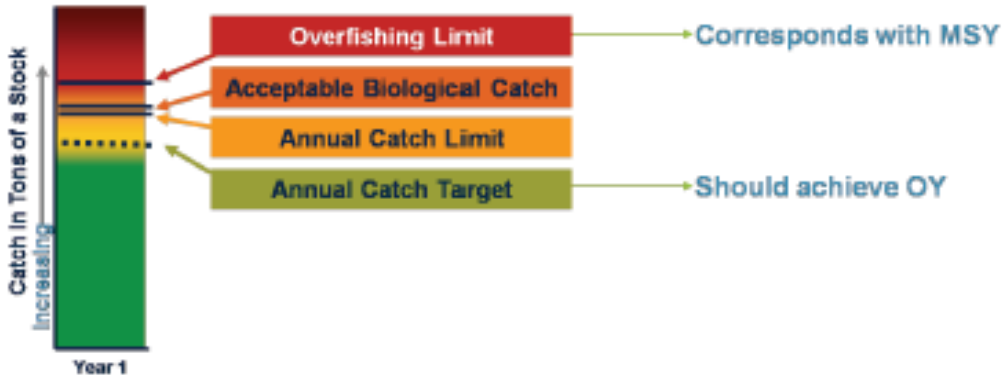

Figure 1. The relationship of catch reference points under National Standard.