REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN FOR **AMERICAN EEL** ***(Anguilla rostrata)***

2006 FISHING YEAR

Prepared by:

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(Anguilla rostrata)

I. Status of the Fishery Management Plan

Date of FMP approval:	November 1999
Addenda:	Addendum I (February 2006)
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.

II. Status of the Stock

Current stock status for American eel is poorly understood due to limited and non-uniform stock assessment efforts and protocols across the range of the species. Reliable indices of abundance of this species are scarce. Limited data from indirect measurements (harvest by various gear types and locations) and localized direct stock assessment information are currently collected.

Although eel have been continuously harvested, consistent data on harvest are often not available. Harvest data are often a poor indicator of abundance because harvest is dependent upon demand and may consist of annually changing combinations of year classes. Most of the data collections were of short duration and were not standardized between management agencies. Harvest data from the Atlantic coastal states (Maine to Florida), indicate that the harvest has declined after a peak in the mid-1970s. Annual eel catch ranged from 641,225 pounds to 3,951,936 pounds between 1970 and 2005. The lowest harvest (between 1970 and 2005) was 641,225 pounds, which occurred in 2002. Because fishing effort data is unavailable for the entire time series, finding a correlation between population numbers and landings data is difficult.

As stated in Section 2 of the FMP, the purpose of this management effort is to reverse any local or regional declines in abundance and institute consistent fishery-independent and dependent monitoring programs throughout the management unit.

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 American eel stock. Available data point to decreasing recruitment, combined with localized declines in abundance. This information is cause for concern and represents an

opportunity for cooperation with other entities such as the GLFC to preserve the American eel stock.

A stock assessment was presented to the Management Board during the February 2006 Meeting Week. The stock assessment failed some of the terms of reference according to the peer review advisory report. In May 2006, the Board tasked the American Eel Stock Assessment Subcommittee with following up on specific recommendations in the peer review report to improve the 2005 stock assessment. The Stock Assessment Subcommittee follow up to the peer review report will be presented to the Board at the October 2006 Annual Meeting.

III. Status of the Fishery

American eel currently support important commercial fisheries throughout their range. Fisheries are executed in rivers, estuaries, and ocean. Commercial fisheries for glass eel/elver exist in Maine, South Carolina, and Florida (though in Florida, no commercial glass eel/elver landings were recorded in 2005), whereas yellow/silver eel fisheries exist in all states/jurisdictions with the exception of Pennsylvania and the District of Columbia (though in New Hampshire, Rhode Island, South Carolina and Georgia, no commercial yellow/silver eel landings were recorded in 2005).

Commercial:

Commercial landings decreased from the high of 1.8 million pounds in 1985 to a low of 641 thousand pounds in 2002. Landings of yellow/silver eels in 2005 totaled 867,861 pounds.[1] New Jersey, Delaware, Maryland, and the Potomac Rivers Fisheries Commission each reported landings over 100,000 pounds of eel, and together accounted for 83% of the coastwide commercial total landings in 2005. Landings data for 2005 comes from the 2006 State Compliance Reports.

Recreational:

Few recreational anglers directly target eel. For the most part, hook and line fishermen catch eel incidentally when fishing for other species. The NMFS Marine Recreational Fisheries Statistics Survey (MRFSS), which has surveyed recreational catch in ocean and coastal county waters since 1981, shows a declining trend in the catch of eel during the latter part of the 1990's. According to MRFSS[2], 2005 recreational total catch was 94,119 fish, which represents a slight decrease in number of fish from 2004 (112,001 fish). Florida and Georgia combined, represent 53% of the recreational American eel catch; Florida, Georgia, Delaware, and Maryland combined, represent 78% of the recreational American eel harvest in 2005. About 87% of the eel caught were released alive by the anglers (MRFSS 2005 total recreational harvest was 12,100

[1] Harvest data for 2005 comes from the 2006 State Compliance Reports. The all landings are preliminary and some are incomplete.

[2] MRFSS Data for American Eel are unreliable. 2005 Proportional Standard Error (PSE) values for recreational harvest in Rhode Island, New Jersey, Delaware, Maryland, Virginia, and South Carolina are 98.1, 100, 96.6, 70.1, 100.5, 100, and 79.1, respectively.

fish). 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.

Current Commercial Regulations by State as of November 2005*

State	Size Limit	License/Permit	Other
ME		Harvester and dealer license; dealer reporting	Seasonal closures. Gear restrictions.
NH	6"	Commercial saltwater license; 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 records	Nets, pots, spears, and angling only. Mesh restrictions. Each of 52 coastal towns has its own regulations.
RI	6"	Commercial fishing license required for the sale of American eel	
CT	6"	Commercial license with dealer reporting	Gear restrictions
NY	6”	Commercial harvester and dealer license and harvester reporting	Gear restrictions.
NJ	6"	License Required	Seasonal closures. 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"	Harvest report and license required	Seasonal closures. Gear restrictions.
VA	6"	License with two-year delayed entry system, mandatory monthly reporting	Mesh size restrictions on eel pots
NC	6"	Standard Commercial Fishing License for all commercial fishing	Mesh size restrictions on eel pots. Bait limit of 50 eels/day.
SC		Permits by gear and area fished, mandatory monthly reporting, license for all commercial fishing and sale	Various gear restrictions
GA	6"	Personal commercial fishing license and commercial fishing boat license, harvester/dealer reporting required	Gear restrictions on traps and pots

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

Current Recreational Regulations by State as of November 2005**

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	Seasonal closures
PA	6"	50 eels/person/day	Gear restrictions
DE	6"	50 eels/person/day	Two pot limit/person
MD	6"	No possession limit in tidal areas; 25/person/day limit in non-tidal areas	Gear restrictions
DC	6"	10 eels/person/day	Five trap limit
PRFC	6"	50 eels/person/day	Seasonal closures
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, noncommercial special device license, allowed two eel pots under Recreational Commercial Gear license
SC	None	None	Gear restrictions
GA	None	None	
FL	None	None	
** For specifics on licenses, gear restrictions, and area restrictions, please contact the individual state.			

IV. Status of Research and Monitoring

The FMP requires States/jurisdictions with a declared interest to conduct an annual young-of-the-year survey for the purpose of monitoring annual recruitment of each year’s cohort. The FMP does not require any other research initiatives in participating states/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

- Documentation of the commercial eel fishery should be more accurate 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 coast wide 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 *Anguicolla crassus* on the growth and maturation, migration to the Sargasso Sea, and the spawning potential of American eel.
- Evaluate the impact, both upstream and downstream, of barriers on eel 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:
  - Local and regional movement and migration patterns
  - Natural, fishing, and/or discard mortality; survival
  - Growth
  - Validation of aging method(s)
  - Abundance
  - Reporting rates
  - Tag shedding or tag attrition rate

  A tagging study to examine local and regional movement has been completed by a graduate student at Delaware State University and other studies on local movements and abundance are currently being conducted by other Delaware graduate students.
- 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 should be researched.
- 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.
- 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

- Economics studies are necessary to determine the value of the fishery and the impact of regulatory management.
- The historic participation level of subsistence fishers in wildlife management planning needs to be reviewed, and relevant issues brought forth with respect to those subsistence fishers involved with American eel.
- Examination of the mechanisms for exit from the Sargasso Sea and transport across the continental shelf.
- Mechanisms of recognition of the spawning area by silver eel, mate location in the Sargasso Sea, spawning behavior, and gonadal development in maturation should be researched.
- Age at entry of glass eel into estuaries and fresh waters should be examined.
- Migratory routes and guidance mechanisms for silver eel in the ocean should be examined.
- The degree of dependence on the American eel resource by subsistence harvesters such as Native American Tribes, Asian and European ethnic groups, etc, needs to be investigated.
- Examine the mode of nutrition for leptocephalus in the ocean.
- Provide analysis of food habits of glass eel while at sea.

Completed Research Needs

- Location and triggering mechanism for metamorphosis from leptocephalus to eel should be examined
    - Wang, C.H. and W.N. Tzeng. 2000. The timing of metamorphosis and growth rates of American and European eel leptocephali: a mechanism of larval segregative migration. Fisheries Research 46: 191-205.
- A stock assessment committee should identify the best stock assessment methods for American eel.
    - American Eel Stock Assessment Subcommittee. 2001. Report to the American Eel Board: Stock assessment methodologies and approaches for American eel. Atlantic States Marine Fisheries Commission.

V. Status of Management Measures and Issues

The FMP required that all states/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 requires all states/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/charter (for-hire) employment, for bait purposes during fishing. Recreational fishermen are not allowed to sell eel without a State license permitting such activity. Commercial fisheries management measures stipulate that states/jurisdictions shall maintain existing or more conservative American eel commercial fishery regulations, including gear specification contained in Table 2 of the FMP, for all life stages.

In addition to these mandatory regulations, federal agencies are working to implement the recommendations to the Secretaries as listed in the FMP.

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. At that same meeting, the Board tasked the American Eel Technical Committee (TC) with reviewing state proposals for implementation of Addendum I to the American Eel Fishery Management Plan. The TC provided their comments on the state's proposals to the Board in a memo on July 7, 2006.

VI. Current State-by-State Implementation of FMP Compliance Requirements (as of November, 2005)

The PRT reviewed the state compliance for 2005. The PRT finds that all states are currently implementing the required provisions of the American Eel Fishery Management Plan.

In 2005, the States of New Hampshire, Massachusetts, Pennsylvania, South Carolina, Georgia, Florida, and the District of Columbia requested and met the qualification criteria for *de minimis* status. Qualification for *de minimis* in 2006 was determined from state reported landings found in Compliance Reports and the National Marine Fisheries Service website for the years 2003 and 2004, as NMFS landings information for 2005 is not available. There are discrepancies between state-reported landings and NMFS landings, NMFS landings were used to calculate *de minimis* unless NMFS reported no landings for a state that had reported it's own landing in its Compliance Report. The States of Massachusetts, Pennsylvania, Georgia, and Florida, and the District of Columbia request and qualify for *de minimis* status in 2006.

VII. Recommendations/findings of the Plan Review Team

1. The PRT requests that state personnel highlight notable trends in annual reports.

2. The PRT continues to express concern over the lack of data available for states to report landings by life stage.

3. The PRT affirms the value of the young-of-the-year surveys and is adamant that they need to be performed on an annual basis. The PRT strongly recommends that all states and jurisdictions continue to implement the young-of-the-year survey.

4. State compliance reports were prepared in a variety of formats. The PRT requests that the states and jurisdictions prepare their reports following the outline that will be provided to them prior to the due date of the next annual compliance report.