

Atlantic States Marine Fisheries Commission

**ADDENDUM XVI TO THE AMERICAN LOBSTER FISHERY MANAGEMENT PLAN
FOR PUBLIC COMMENT**

Reference Points



ASMFC Vision Statement:

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

Approved May 2010

1.0 Introduction

The Atlantic States Marine Fisheries Commission (ASMFC) has coordinated interstate management of American lobster from 0-3 miles offshore since 1996. The management unit includes all coastal migratory stocks between Maine and North Carolina. American lobster is currently managed under Amendment 3 and Addenda 1-XV to the Fishery Management Plan (FMP). Management authority in the Exclusive Economic Zone (EEZ) from 3-200 miles from shore lies with NOAA Fisheries.

The purpose of this addendum sets new reference points in each of the three lobster stocks. The addendum also changes procedures for adopting and implementing new reference points.

2.0 Statement of the Problem

2.1 Reference Points

The biological reference points in Addendum VIII required revision. The reference point estimates were based on the 2006 assessment covering 1982-2003. They were not compatible with the 2009 assessment which covered data from 1982-2007. The Lobster Technical committee and the review panel for the 2009 American Lobster stock assessment recommended developing new reference points for future management.

2.2 Stock Status Determination Criteria

Previously, to incorporate new stock status determination criteria (overfishing/depleted status) that may result from updated, peer-reviewed science, the Board would enact an addendum adjustment or amendment to the American Lobster FMP. The stock status determination criteria are defined under Section 2.3.1 of Addendum VIII to the FMP. Though these criteria could be modified or replaced through an addendum or amendment, the timing of updated survey information, subsequent analysis and peer-review, and the addendum or amendment process meant that the availability of the best available scientific information could be significantly delayed from entering the management process and responding to poor stock health.

3.0 Background

3.1 Reference Points

Previous reference points were adopted by ASMFC in section 2.3.1 of Addendum VIII to Amendment 3 of the Interstate Fishery Management Plan for American Lobster. Stock status was determined by comparison of average F and average abundance during the most recent three years to stock-specific median values (computed for the fixed years 1982-2003 for GOM and GBK and 1984-2003 for SNE). Median abundance and median fishing mortality over these stock-specific fixed time periods are used as threshold reference points. Additionally, abundance and F targets are a minimum of one estimated standard error from the threshold (ASMFC 2006).

Based on these reference points, “overfishing” was occur if the average fishing mortality rate for the three most recent years were higher than the median threshold. A stock was “depleted” if average abundance for the three most recent years fell below the median threshold level. In either of these cases, corrective management action should be implemented.

In May 2009 a new assessment and peer review report for American lobster was accepted by the Lobster Management Board. These two documents described the current health of the American lobster stocks. The two reports recommended differing reference points. Appendix 1: Figures 1, 3, and 5 show the current status of lobster abundance (3 year running average) over time for each of the three lobster stocks. They also show the median abundance (TC recommended reference point) and 1/5 the median (peer review recommended reference point). Appendix 1 Figures 2, 4, and 6 show the current fishing exploitation. They also show the median (TC recommended reference point) and the 90th percentile of the median (peer review recommended reference point).

The Technical Committee (TC) recommended revised reference points that were different than used in previous assessments and that are intended to improve communication between assessment scientists and managers and the public. Traditional stock assessments for many species, including previous lobster assessments based on the Collie-Sissenwine Model (CSM) and Life History models, use annual instantaneous fishing mortality rates that are applied to abundance of the fishable stock. Previous lobster assessments used fishable abundance to describe trends in the stock as a whole because the CSM model estimates fishable abundance. These traditional approaches are problematic in describing assessment results for lobster because of changes in the minimum legal size and changes in other management measures (gear regulations and v-notching) that change fishery selectivity patterns and the basis of the fishable stock.

Instantaneous rates of fishing mortality are convenient for use in assessment model calculations and accurately reflect the force of fishing on vulnerable lobster population size groups. However, they are relatively difficult to understand, particularly in cases like lobster where mortality is often high. Instantaneous rates may range from zero to very large values and are often larger than one for lobster. Casual readers may have trouble understanding or believing that fishing mortality rates can exceed one. Moreover, it is difficult to appreciate the practical consequences of changes in instantaneous rates when they are high.

It is also difficult to understand time series of fishable abundance and instantaneous fishing mortality rates when fishery selectivity patterns change due to management measures or fishing patterns. Consider a hypothetical case where overfishing is occurring in year one and over time recruitment and mortality is the same. To respond to overfishing in the second year, the minimum legal size is increased and fishable abundance is reduced by 30%. Catch also decreases by 30% in this hypothetical example because the instantaneous fishing mortality rate is unchanged. The practical effects of the change of minimum size are obscured by the traditional measures of fishable abundance and exploitation that have been used in the past for lobster. In particular, fishable abundance decreased by 30% while the instantaneous fishing mortality rate and conventional exploitation rate (catch numbers / fishable abundance) were unchanged even though total abundance was the same during both years and catch numbers declined by 30%. The practical point is that since F did not change, overfishing would still be occurring even though minimum size limits were changed and the catch declined by 30%. The conventional measures obscure the underlying situation in this example because the basis of the fishable stock changed and because the overall change in mortality was not reflected by a corresponding change in the instantaneous fishing mortality rate or conventional exploitation rate.

The TC recommended revisions to the set of reference points used in the 2006 assessment (ASMFC 2006) for management of American lobster stocks based on the results of the 2009 stock assessment. Revised reference points include median reference abundance and median exploitation rate thresholds for sexes combined over the fixed time period of 1982-2003 in GOM and GBK and 1984-2003 in SNE. The TC further recommended that stock status be determined by comparing the average reference abundance and average exploitation rate for sexes combined during the most recent three years to stock-specific threshold values.

The 2009 Assessment Peer Review Panel rejected the limit reference points recommend by the TC that were based on median values. Median values calculated from empirical data were considered inappropriate as limit reference points, because it would be expected that 50% of observations would fall below the median value. If medians are used, a well managed fishery would exceed the reference points half of the time, thereby providing no useful management guidance.

The Panel recommended revisions to these reference points. Revised reference points include recasting the median reference abundance and the median exploitation rate as target reference points for sexes combined over the fixed time period of 1982-2003 in GOM and GBK and 1984-2003 in SNE. The Panel recommended the threshold reference point for determining whether a stock is overfished should be one-half the median reference abundance and the threshold reference point for determining whether overfishing is occurring should be the 90th percentile of the distribution of exploitation rates. The Panel further recommended that stock status be determined by comparing the average reference abundance and average exploitation rate for sexes combined during the most recent three years to stock-specific values.

The panel noted that the trend based reference points are acceptable interim measures until more defensible, biologically-based reference points can be developed.

In January of 2010 the Gulf of Maine Lobster Foundation held a lobster summit. After considerable discussion at the summit, the group focused on a proposed solution creating a more traditional threshold and target but applying the “stop light approach” to managing towards them. The group was concerned that having reference points that were “lines” in the sand where if a stock is below them then action must be taken and above them no action would be required. Moreover, the application of the PR recommendation to the Southern New England fishery would mean it would not be depleted. This conclusion did not make sense to the group given the massive decline of the stock in the SNE region (possibly due to natural mortality, F, or climate change causing a loss of optimal habitat).

The proposed solution created a more conservative standard as a threshold than recommended by the peer review but not as conservative as the technical committee. The proposed solution target is higher than those previously considered. These proposed solutions are the 25th and 75th percentiles which have statistical properties, meaning that there will always be observed values above and below the target and threshold.

3.2 Stock Status Determination Criteria

The American lobster stocks undergo formal scientific peer-review as part of the ASMFC external review process about every 5 years which may result in revised or different stock status determination criteria. This addendum proposes to allow for the incorporation of new, peer-reviewed stock status determination criteria (both the methods used to set reference points and the reference point values), when available, through board action. This would improve the timeliness of incorporating the best available scientific information into the management of these three stocks.

This addendum would broaden the descriptions of stock status determination criteria contained within the American lobster FMP to allow for greater flexibility in those definitions, while maintaining objective and measurable status determination criteria for identifying when stocks or stock complexes covered by the FMP are overfished. Further, this proposed action would establish acceptable categories of peer-review for stock status determination criteria. When these specific peer-review metrics are met and new or updated information is available, the new or revised stock status determination criteria may be incorporated by the Board directly into the management measures. This action does not have a direct influence on fishing effort or fishery removals but instead facilitates use of the most current scientific information available to define the status determination criteria for these stocks, so that these stocks can be managed to prevent overfishing and managed such that stocks are not depleted.

4.0 Management Measures

4.1 Biological Reference Points: Thresholds and Targets

This section replaces section 2.3.1 Biological Reference Points: Thresholds and Targets of Addendum VIII to Amendment 3 to the American Lobster Fishery Management Plan.

These reference points are intended as interim reference points until biological based reference points can be developed.

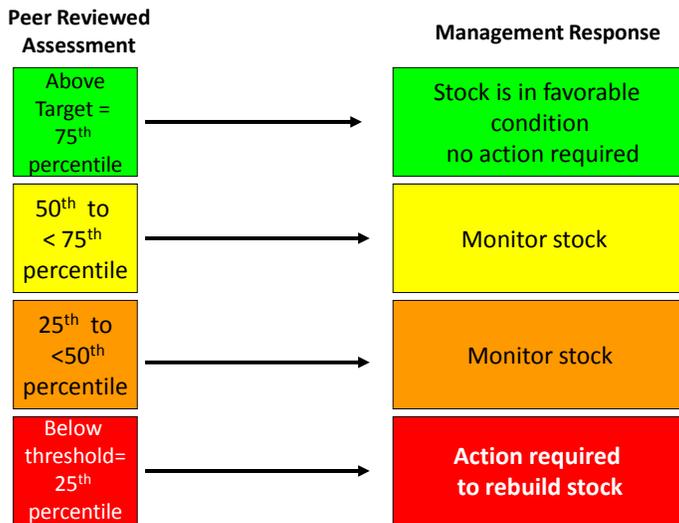
“Reference abundance” and “effective exploitation” would be the primary descriptors of annual abundance and annual fishing pressure (N and F reference point). Reference abundance is the number of lobster 78+ mm carapace length (CL) on January 1 plus the number that will molt and recruit to the 78+ CL group during the year. The 78 mm CL size was chosen because it is lower end of the model size group that contains the lowest minimum legal size (81 mm or 3 ¼ inches) in all three stocks. Effective exploitation is the annual catch in number divided by the reference abundance.

This addendum establishes a four-tiered approach to define abundance reference points in the Gulf of Maine (GOM) and Georges Bank (GBK), a four-tiered approach to define exploitation reference points for all three stock units, and a three-tiered approach to define abundance reference points for Southern New England (SNE). This approach is fully described in TC Memo 10-034. The Board set the SNE abundance reference points to a lower target level than the GOM and GBK stocks because it believes the SNE stock has limited ability to rebuild to higher historical levels. Members of the Board believe that environmental and ecosystem changes have reduced the resource’s ability to rebuild to historical levels.

**Abundance Reference Point:
For the GOM and GBK Stocks:**

A stock is considered below the limit reference point (threshold), and overfished, if model abundance is less than the 25 percentile (In the lowest quartile, the red zone of table 1) relative to the 1982-2003 reference period. Immediate action would be required if a stock were to fall below the 25th percentile. If the stock abundance is at or above the 75th percentile (green), a stock is considered in favorable condition.

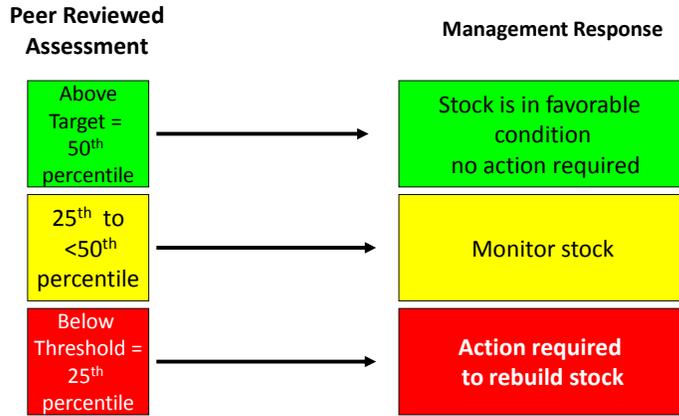
Table 1. GOM and GBK Abundance Reference Point



For the SNE Stock:

The SNE stock is considered below the limit reference point (threshold), and overfished, if model abundance is less than the 25 percentile (In the lowest quartile, the red zone of table 2) relative to the 1984-2003 reference period. Immediate action would be required if a stock were to fall below the 25th percentile. If the stock abundance is at or above the 50th percentile (green), a stock is considered in favorable condition.

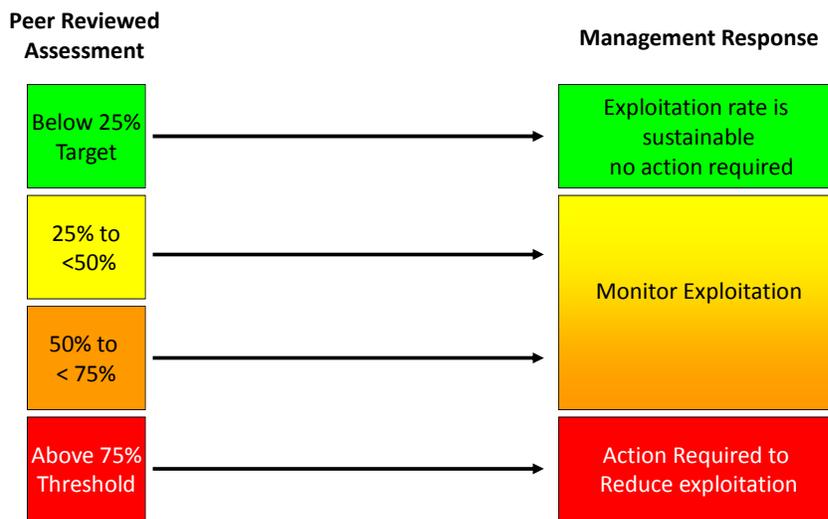
Table 2. SNE Abundance Reference Point



Exploitation

The exploitation reference point is designed to be a conditional target as exploitation has remained relatively stable in all areas over a wide range of abundance during the reference period. A stock is considered below the limit reference point (threshold), and overfishing is occurring, if model exploitation is greater than the 75 percentile (In the lowest quartile, the red zone of table 3) relative to the 1982/84-2003 reference period. Immediate action would be required if a stock were at or above the 75th percentile. If the stock exploitation is at or above the 25th percentile (green), a stock is considered in favorable condition.

Table 3. Exploitation Reference Point for all 3 Stocks



Current Status (based on results of the 2009 Lobster stock assessment)

The GOM stock is in favorable condition. The stock is above the reference abundance threshold and slightly below the effective exploitation threshold. *Therefore the GOM lobster stock is not overfished and overfishing is not occurring.*

The GBK stock is in a favorable condition. The stock is above the reference abundance threshold and below the effective exploitation threshold. *Therefore the GBK lobster stock is not overfished and overfishing is not occurring.*

The SNE stock is in poor condition. The stock is below the reference abundance threshold and below the effective exploitation threshold. Model runs that incorporated increasing trends (50%-100%) in natural mortality (M) also predicted reference abundance below the median. *Therefore the SNE lobster stock is depleted but overfishing is not occurring.*

4.2 Stock Status Determination Criteria

A of the goal of the FMP is to optimize yield from the fishery while maintain harvest at a sustainable level. The maximum fishing mortality threshold (F_{MSY}) or a reasonable proxy may be defined as a function of (but not limited to): total stock size (abundance or biomass), spawning stock size (abundance or biomass), exploitable stock size (abundance or biomass), total egg production, or egg per recruit, and may include males, females, both, or combinations and ratios thereof which provide the best measure of productive capacity. Exceeding the established fishing mortality threshold constitutes overfishing as defined by the FMP.

A goal of the FMP is to maintain a minimum stock size threshold or $\frac{1}{2} B_{MSY}$ (or a reasonable proxy thereof) at levels which would minimize risk of stock depletion and recruitment failure. The minimum stock size threshold ($\frac{1}{2} B_{MSY}$) or a reasonable proxy may be defined as (but not limited to): total stock size (abundance or biomass), spawning stock size (abundance or biomass), exploitable stock size (abundance or biomass), total egg production, and may include males, females, both, or combinations and ratios thereof which provide the best measure of productive capacity. Should the measure of stock size for the stock fall below this minimum threshold, the stock is considered overfished.

The definitions for status determination criteria for each stock are broadened under this option to allow for greater flexibility in incorporating changes to the definitions of the maximum fishing mortality threshold and/or target and/or minimum stock size threshold and/or target as the best scientific information becomes available. Changes to these methods could be made through a Board action following a peer reviewed stock assessment. The Board could adopt any of the advice of the stock assessment or peer review.

Sources of Peer Reviewed Scientific Advice

The following describes the potential sources of peer-reviewed scientific advice on status determination criteria and the current process of how that scientific advice will move forward in the development of management advice through the Board's annual specification process.

Specific definitions or modifications to the status determinations criteria, and their associated values, would result from the most recent peer-reviewed stock assessments and their panelist recommendations. The Board could take action on any specific advice to change reference point values or methods through a Board vote. The Board could not take action that deviated from the advice of the assessment and/or peer review. The ASMFC external peer review is the primary process utilized to develop scientific stock assessment advice for lobster. Reviews that occur outside the external review process are listed below. These reviews would be subject to rigorous peer-review and may also result in scientific advice to modify or change the existing stock status determination criteria.

- ASMFC External Peer Review
- ASMFC Internal Peer Review
- NMFS Internally Conducted Review (e.g., Comprised of NMFS Scientific and Technical Experts from NMFS Science Centers or Regions)
- NMFS Externally Contracted Review with Independent Experts (e.g., Center for Independent Experts – CIE or SAW SARC)
- TRAC (Transboundary Resource Assessment Committee)

The listing of the above peer-review entities does not preclude groups from bringing independent stock assessments performed for these three stocks forward to the attention of fisheries managers.

5.0 Compliance Schedule

Management programs addressing the biological reference point specification for American lobster stocks will be effective immediately upon approval of the addendum document.

6.0 Recommendations for Actions in Federal Waters

The Atlantic States Marine Fisheries Commission believes that the measures contained in Amendment 3 and Addenda I-XVI are necessary to limit the expansion of effort into the lobster fishery and to rebuild lobster stocks to recommended levels. ASMFC recommends that the Federal government promulgate all necessary regulations to implement the measures contained in Section 3 and 4 of this document.

7.0 Reference

ASMFC, 2009. American Lobster Stock Assessment Peer Review Advisory Report. Stock Assessment Report No. 09-01. ASMFC, Washington, DC

ASMFC, 2009. American Lobster Stock Assessment report for peer review. Stock Assessment Report No. 09-01(Supplement). ASMFC, Washington, DC

Appendix 1

Reference Points figures that had been recommended by the TC and Peer Review but were not all adopted.

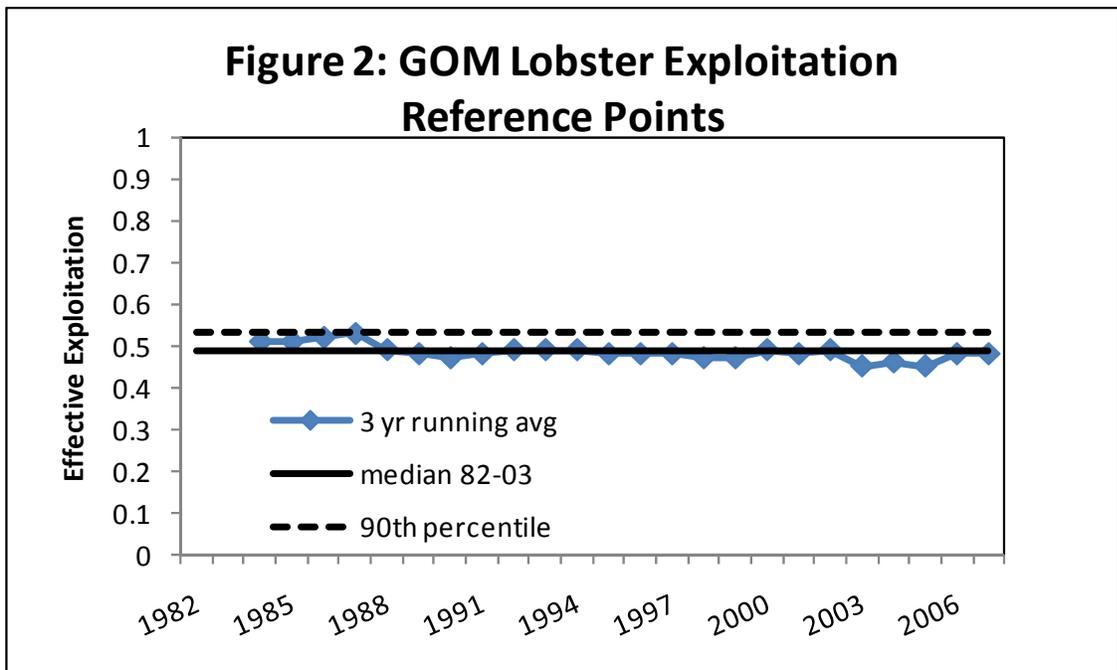
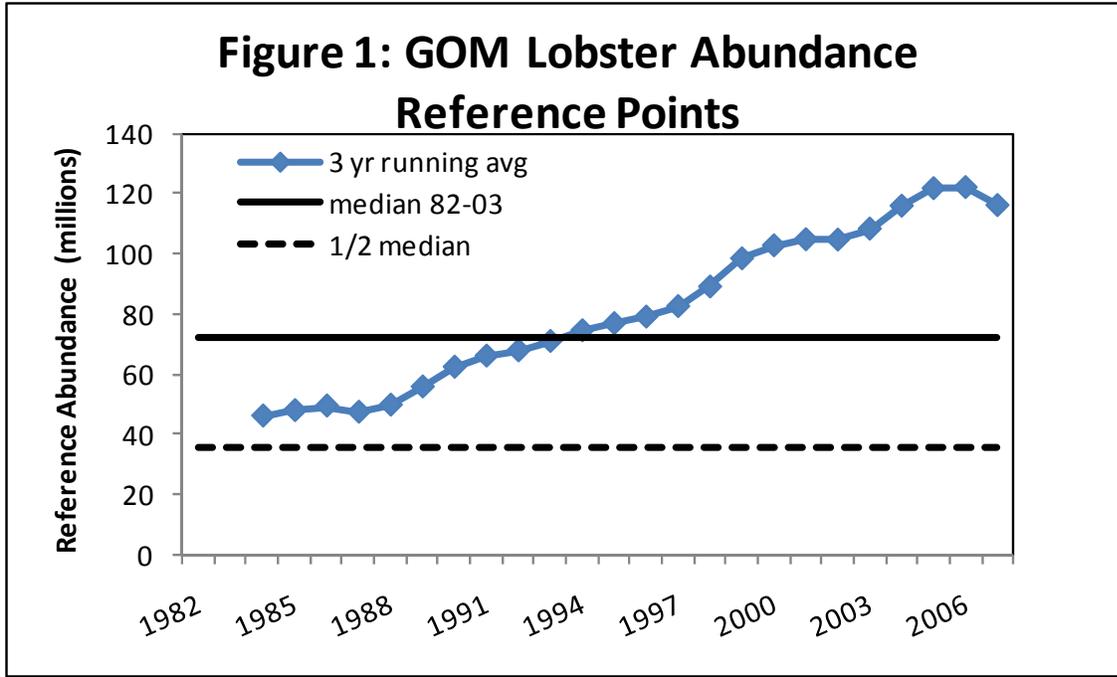


Figure 3: GBK Lobster Abundance Reference Points

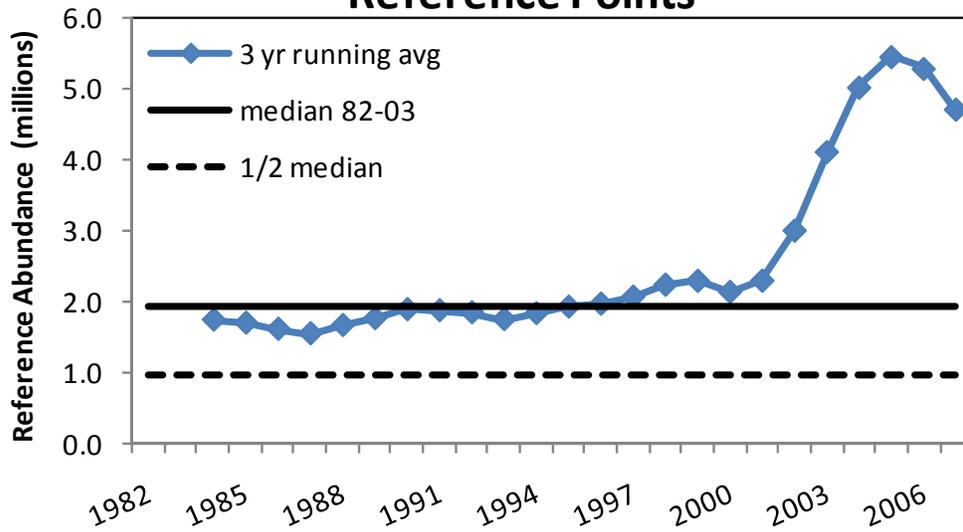
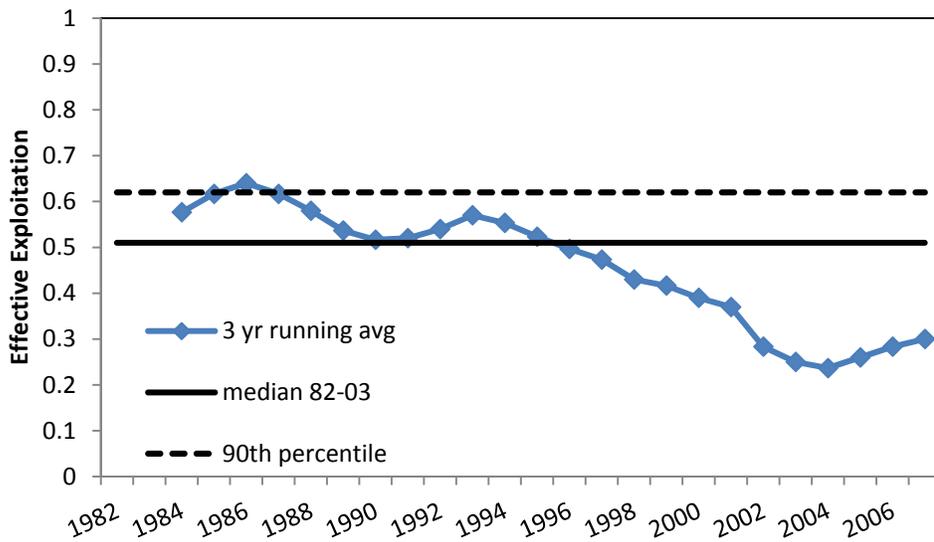
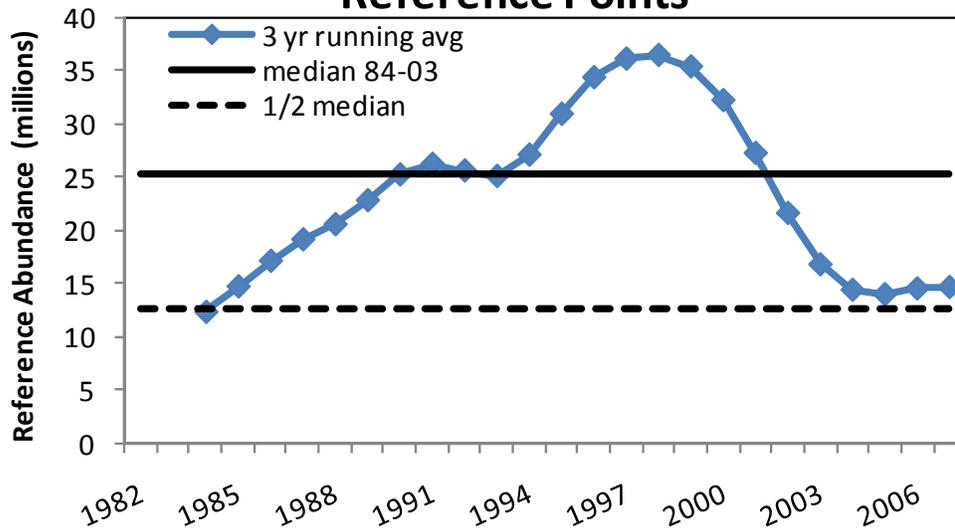


Figure 4: GBK Lobster Exploitation Reference Points



**Figure 5: SNE Lobster Abundance
Reference Points**



**Figure 6: SNE Lobster Exploitation
Reference Points**

