

Primary Data Sources to Potentially Include in Maryland Oyster Stock Assessment

	Page
1. Fall Dredge Survey.....	2
2. Disease Bars Fall Survey	3
3. Patent Tong Data	4
4. Buy Tickets	5
5. Harvest Reports.....	6
6. Bushel Tax Receipts	7
7. Habitat.....	8

Compiled by Maryland Department of Natural Resources/University of
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Stock Assessment Term of Reference #1

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Fall Dredge Survey

Data Source: Fall Dredge Survey

Location: Maryland DNR

Format: Electronic database (Microsoft Access)

Survey Objective: Provide indices related to the oyster population in Maryland, such as spatfall intensity, relative abundance, mortality, and biomass.

Potential Uses in Stock Assessment: The fall survey data can potentially be used to (1) examine changes in relative abundance over time for different sized and staged (spat, small, market) oysters, and (2) estimate natural mortality over time for small and market sized oysters.

Time Series: 1980 – 2016 for electronic database, but there are data available on oyster spat that goes back to the 1930s.

Spatial Scale: Statewide

Data Elements: The fall survey provides data on the number of live oysters (spat, small, and market) per bushel and the number of dead oysters (i.e., boxes) per bushel at each sample location. Size ranges and observed average size; 1 mm shell heights for individual oysters at ~30% of the stations since 2010. It is also used as a platform to acquire disease samples.

Survey Design: Between 311 and 385 dredge samples are collected at fixed stations throughout Maryland each fall.

Sanctuary Information: Yes

Weaknesses:

- Fixed site design only allows inference to sampled sites
- Units of measurement (number per bushel)
- Potential changes in dredge efficiency over space and time
- Potential data quality issues with pre-1985 data

Strengths:

- Good spatial coverage
- Primary focus is oysters
- Length of time series
- Fixed site design allows following trends at same sites over time

Changes to Survey:

- No major changes

Disease Bars Fall Survey

Data Source: Disease Bars Fall Dredge Survey (Conducted in conjunction with fall dredge survey described above)

Location: Maryland DNR

Format: Electronic database (Microsoft Access)

Survey Objective: Determine prevalence and intensity of disease (i.e., Dermo and MSX) on oyster bars in Maryland.

Potential Uses in Stock Assessment: Disease data can potentially be used to correlate natural mortality with disease prevalence and intensity.

Time Series: 1990 - 2016, but there are data going back to the 1970s.

Spatial Scale: Statewide

Data Elements: Data on shell height and disease prevalence and intensity are collected from individual oysters.

Survey Design: Thirty oysters are collected from the same 43 sentinel bars in the fall survey every year. Fixed supplemental non-index sites were established to enhance spatial coverage.

Sanctuary Information: Yes

Weaknesses:

Fixed site design only allows inference about diseases to apply to sampled sites

Strengths:

Height data for individual oysters

Length of time series

Good spatial coverage

Fixed site design allows following disease trends at the same sites over time

Changes to Survey:

No major changes

Patent Tong Data

Data Source: Patent Tong Surveys

Location: Maryland DNR, Annapolis

Format: Electronic database (Microsoft Access) and spreadsheets (Microsoft Excel)

Survey Objective:

1975-1978: Map oyster habitat in Chesapeake Bay

1989-1995: Investigate oyster population and disease trends in three salinity regimes

2011 - present: Assess oyster populations in sanctuaries

Potential Uses in Stock Assessment: The patent tong data can potentially be used to examine oyster populations within sanctuaries in more detail.

Time Series: 1975 - 1978; 1989 - 1995; 2011 - present

Spatial Scale:

1975- 1978: Individual bar scale

1989 - 1995: Individual bar scale

2011 - present: Individual sanctuary scale

Data Elements: Data on the number of live oysters (spat, small, and market), dead oysters (i.e., boxes), size (shell height in mm), habitat data expressed as cultch and grey shell volume for each sample site.

Survey Design:

1975 - 1978: Multiple systematic samples taken from individual bars

1989 - 1995: Multiple systematic samples taken from individual bars, from different habitat types within individual sanctuaries.

2011 - present: Multiple random samples taken from different habitat types within individual sanctuaries.

Sanctuary Information: Yes

Weaknesses:

Limited spatial and temporal coverage

Relatively small area per sample (1 meter squared)

Systematic design poses issues for statistical analyses

Strengths:

Individual Height Data for oysters.

Provides an estimate of density

Data at multiple times at some locations (e.g., 1975 and 1993)

Changes to Survey: No major changes within individual surveys but see entries above for differences among surveys.

Buy Tickets

Data Source: Maryland DNR Shellfish Buy Tickets

Location: Maryland DNR, Annapolis

Format: Electronic Database (Microsoft Access)

Survey Objective: Dealers report how many bushels of oysters are harvested in Maryland waters of the Chesapeake Bay to determine the amount of tax to be paid by dealers.

Potential Uses in Stock Assessment: The shellfish buy tickets can potentially be used to (1) estimate the amount of oysters harvested over time and (2) amount of effort used to harvest a given amount of oysters.

Time Series: 1988-1989 season through 2015-2016 season

Spatial Scale: Statewide

Data Elements: Data on area where harvest occurred, quantity of oysters harvested, and date of harvest.

Survey Design: Fishery dependent; self-reports from oyster dealers

Sanctuary Information: Data on areas before they were designated as sanctuaries.

Weaknesses:

Less than 100% reporting

Some data missing for records

Strengths:

Spatial and temporal scale of time series

Changes to Survey: No major changes over time

Harvest Reports

Data Source: Maryland DNR Oyster Harvester Reports

Location: Maryland DNR, Annapolis

Format: Electronic Database (Microsoft Access)

Survey Objective: Oyster harvest reported by harvesters in greater detail than provided by dealers (e.g., bar-specific harvest).

Potential Uses in Stock Assessment: The oyster harvester reports can potentially be used to (1) estimate the amount of oysters harvested over time and (2) amount of effort used to harvest a given amount of oysters.

Time Series: 2009 - present

Spatial Scale: statewide

Data Elements: Data on bar-specific harvest location, quantity of oysters harvested, gear used, and the date of harvest.

Survey Design: Fishery dependent; self-reports from oyster harvesters

Sanctuary Information: No

Weaknesses:

Less than 100% reporting

Some data missing for records

Strengths:

Bar and gear specific harvest data

Changes to Survey: No major changes over time

Bushel Tax Receipts

Data Source: Oyster severance tax paid to the state of Maryland

Location: Maryland DNR, Annapolis

Format: Electronic database (Microsoft Access)

Survey Objective: Document amount of taxes paid for the total number of bushels harvested in Maryland each year.

Potential Uses in Stock Assessment: The oyster harvester reports can potentially be used to estimate the amount of oysters harvested over time.

Time Series: 2000 to present

Spatial Scale: Statewide

Data Elements: Data on the dollar amount of taxes paid each year for oyster bushels harvested in Maryland.

Survey Design: Fishery dependent; dollar amount reported is based on taxes paid by dealers for each bushel of oysters they report buying from watermen.

Sanctuary Information: No

Weaknesses:
Only statewide, cannot look at smaller scales

Strengths:
Provides additional estimate of statewide oyster harvest each year.

Changes to Survey: No major changes over time.

Habitat

Data Source:

- Yates Survey
- Bay Bottom Survey
- Side Scan Sonar
- Shell and Seed Plantings
- Fall Oyster Survey

Location: Most of these can be found as GIS files online at <http://data.imap.maryland.gov/> by searching for the appropriate terms (e.g., oysters, bay bottom survey)

Format: Electronic files

Survey Objective:

- Yates Survey and Bay Bottom Survey: Map extent of oyster habitat in Maryland portion of Chesapeake Bay
- Side Scan Sonar: Map extent of oyster habitat in specific locations in Maryland portion of Chesapeake Bay
- Shell Plantings: track location of shell plantings over time

Potential Uses in Stock Assessment: The habitat data can potentially be used to estimate changes in the area of oyster habitat over time.

Time Series:

- Yates Survey: 1906 – 1912
- Bay Bottom Survey: 1975 - 1983
- Side Scan Sonar: 2005-2013
- Shell Plantings: 1960 - present
- Fall Oyster Survey: 2005 – present

Spatial Scale:

- Yates Survey: Statewide
- Bay Bottom Survey: Statewide
- Side Scan Sonar: Specific tributaries
- Shell plantings: Statewide
- Fall Oyster Survey: Statewide

Data Elements:

- Yates Survey (From metadata online): Representation of historic oyster bottom as charted prior to the present, legally designated Natural Oyster Bars (NOB's), using source materials from 1906 to 1977

- Bay bottom survey (From metadata online): Polygon dataset characterizing

Habitat

bottom type designations determined by MD DNR's Acoustic Bay Bottom Survey conducted from 1975 to 1983. Bottom type designations include cultch, mud, sand, leased bottom, hard bottom, mud with cultch and sand with cultch.

Side Scan Sonar: Polygon dataset characterizing bottom type designations determined by Maryland Geological Survey (MGS) and NOAA side scan sonar surveys. NOAA designated bottom types according to the Coastal and Marine Ecological Classification Standard and so Bay Bottom Survey categories of cultch, mud with cultch, and sand with cultch were all classified as oyster habitat. MGS categories of shell, mud with shell, and sand with shell were classified as oyster reef habitat.

Shell Plantings: Polygon dataset characterizing date, locations, and amount of shell or seed planted at sites throughout Maryland portion of Chesapeake Bay.

Fall Oyster Survey: total volume of substrate in dredge over a measured tow distance

Survey Design:

Yates Survey: systematic sampling
Bay Bottom Survey: systematic sampling
Side Scan Sonar: fixed sites
Shell Plantings: fixed sites
Fall Oyster Survey: fixed sites

Sanctuary Information: Yes

Weaknesses:

Most habitat data are now out of date and up to over 100 years old

Strengths:

Estimates of area of bottom occupied by oyster shell over long time period

Changes to Survey: No major changes within individual surveys, but see details above for differences among surveys.