SHELLFISH SURVEY GUIDELINES

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Compiled by Jeffrey C. Lockwood
National Marine Fisheries Service
Habitat and Protected Resources Division
Sandy Hook Laboratory
Highlands, NJ 07732

(modified for regional New England use)

These guidelines are intended for distribution to applicants and their consultants when environmental review agencies request information about shellfish populations to evaluated dredging, pier construction, or other waterway development activities. For the most part, state fisheries agencies have surveyed shellfish populations within their state waters. If a project is reasonably near a station mapped as supporting commercially viable densities of shellfish, then an applicant-sponsored shellfish is neither necessary nor desirable. Additional shellfish data from a single sampling date would not disprove that such an area is capable of supporting shellfish, because shellfish populations change over time, even if the habitat remains unchanged.

However, data from shellfish surveys can help in evaluating projects located near the edge of mapped shellfish habitat, in areas not previously surveyed, or in areas where environmental conditions have changed since mapping was completed. The methods described below can be used for estimating the density and size distribution of hard clams (Mercenaria mercenaria) or Eastern oyster (Crassostrea virginica) in unconsolidated sediments. Methods will differ for sampling soft clams (Mya arenaria) or other species. The National Marine Fisheries Service (NMFS) will compare survey results to data from other areas to determine the relative value of the habitat in question, so sampling of control areas generally is not needed.

Because shellfish typically are unevenly distributed, even in a suitable habitat, we cannot state a standard number of samples that should be taken per unit of surface area. However, some general sampling guidelines apply to most situations (Green 1979):

1) Carry out some preliminary sampling to evaluate sampling design and methodology

2) Verify that your sampling device or method is sampling the desired population, with equal and adequate efficiency over the entire range of sampling conditions to be encountered.

3) If the areas to be sampled (areas to be dredged, footprint of a marina , etc.) Has environmental gradients of depth, current speed, etc., break the area into

relatively homogeneous subareas, and allocate samples to each subarea in proportion to its size

4) Within each area or subarea, sample a sufficient number of sites to characterize the population in that sampling unit. Choose sampling sites randomly within each sampling unit

The goal sampling should be to obtain quantitative data on shellfish abundance and size distribution. Generally, both grab sampling (for juveniles) and dredging or raking (for adults) are required. The suggested methods follow:

GRAB SAMPLING

1) Use a Peterson, Ekman or Smith-McIntyre Grab with a minimum sampling area of 0.1 square meter

2) Take at least three replicate grabs at each sample site. For the typical private dock or small marina dredging project, at least 30 sample sites are needed

3) Sieve the sample through a 1 mm mesh screen

4) For each sample site, report abundance per square meter and size distribution (mean and range) of target species and other collected bivalve molluscs

5) Report general sediment type (mud, silty sand, shell, etc.) of each sample site

DREDGE SAMPLING

1) Use a crab dredge for sampling for hard clams. Use an oyster dredge for sampling oysters. Any dredge used should have a minimum width of 3 feet (0.9 m). Modify the dredge bag mesh to retain shellfish with a minim size of 1 inch (25 mm) or smaller. In soft sediment, 2 inch chain rings can be used in the bag to reduce clogging

2) Select transects using the general guidelines described above. Use marker buoys to mark the transects and to measure the distance the dredge is towed

3) Determine surface area sampled by multiplying (dredge width) by (distance towed)

4) Report same data as in numbers 4, 5, and 6 for grab sampling protocol

RAKE SAMPLING

1) Select transects using general guidelines described above. Use marker buoys or stakes to mark the transects and to estimate the distance raked

2) Use a Shinnecock or Bull Rake

3) Estimate the surface area sampled by multiplying (distance raked) by (width of rake)

4) Report same data as in numbers 4, 5, and 6 for grab sampling protocol

✖ A scientific collecting permit may be required by the state fishery agency for the sampling of shellfish

To avoid disputes over the validity of data, it is best to send a copy of the proposed sampling plan to NMFS for review before beginning the field work. After the review is complete, notify NMFS of the date that sampling is to occur by phoning the Habitat Conservation Division at (203) 579-7004.

Acknowledgments
Mr. James Joseph of the New Jersey Bureau of Shellfisheries described and recommended many of the sampling methods discussed in this paper. Mr. Clyde MacKenzie of the NMFS reviewed the manuscript and made several helpful suggestions.

Literature Cited
Green, R.H. 1979. Sampling Design and Statistical Methods For Environmental Biologists. John Wiley and Sons, New York. 257 pages.

SHELLFISH SURVEY GUIDELINES FOR NEW JERSEY

May 1991

Jeffrey C. Lockwood
National Marine Fisheries Service
Habitat and Protected Resources Division
Sandy Hook Laboratory
Highlands, New Jersey 07732

These guidelines are intended for distribution to applicants and their consultants when environmental review agencies request information about shellfish populations to evaluate dredging, pier construction, or other waterway development activities. The New Jersey Bureau of Shellfisheries (Bureau) has surveyed shellfish populations in most waterways of the state. If a project is reasonably near a station mapped by the Bureau as supporting commercially viable densities of shellfish, then an applicant-sponsored shellfish survey is neither necessary nor desirable. Additional shellfish data from a single sampling date would not disprove that such an area is capable of supporting shellfish, because shellfish populations can change over time, even if the habitat remains unchanged.

However, data from shellfish surveys can help in evaluating projects located near the edge of mapped shellfish habitat, in areas not previously surveyed, or in areas where environmental conditions have changed since the map was prepared. The methods described below can be used for estimating the density and size distribution of hard clams (Mercenaria mercenaria) or American oyster (Crassostrea virginica) in unconsolidated sediments. Methods will differ for sampling soft clams (Mya arenaria) or other species. The National Marine Fisheries Service (NMFS) will compare survey results to data from other areas to determine the relative value of the habitat in question, so sampling of control areas generally is not needed.

Because shellfish typically are unevenly distributed, even in a suitable habitat, we cannot state a standard number of samples that should be taken per unit of surface area. However, some general sampling guidelines apply to most situations (Green 1979):

1) Carry out some preliminary sampling to evaluate sampling design and methodology.

2) Verify that your sampling device or method is sampling the desired population, with equal and adequate efficiency over the entire range of sampling conditions to be encountered.

3) If the area to be sampled (area to be dredged, footprint of a marina, etc.) has environmental gradients of depth, current speed, etc., break the area into relatively homogeneous subareas, and allocate samples to each subarea in proportion to its size.

4) Within each area or subarea, sample a sufficient number of sites to characterize the population in that sampling unit. Choose sampling sites randomly within each sampling unit.

The goal of sampling should be to obtain quantitative data on shellfish abundance and size distribution. Generally, both grab sampling (for juveniles), and dredging or raking (for adults) are required. The New Jersey Bureau of Shellfisheries uses the English system of measurement for its shellfish survey records. For ease of comparison, we suggest that applicants use the same system. The suggested methods follow:

GRAB SAMPLING

1) Use a Peterson, Ekman or Smith-McIntyre Grab with a minimum sampling area of 1 to 1.5 ft^2.

2) Take at least three replicate grabs at each sample site. For the typical private dock or small marina dredging project, at least 30 sample sites are needed.

3) Sieve the sample through a 1 mm mesh screen.

4) For each sample site, report abundance per ft^2 and size distribution (mean and range) of target species and other collected bivalve mollusks.

5) Report general sediment type (mud, silty sand, shell, etc.) of each sample site.

6) Report species and viability of aquatic vegetation collected at each sample site.

DREDGE SAMPLING

1) Use a crab dredge for sampling hard clams. Use an oyster dredge for sampling oysters. Any dredge used should have a minimum width of 3 feet. Modify the dredge bag mesh to retain shellfish with a minimum size of 1 inch or smaller. In soft sediment, 2 inch chain rings can be used in the bag to reduce clogging.

2) Select transects using the general guidelines described above. Use marker buoys to mark the transects and to measure the distance the dredge is towed.

3) Determine surface area sampled by multiplying (Dredge Width) x (Distance Towed).

4) Report same data as in numbers 4, 5 and 6 for Grab Sampling Protocol.

RAKE SAMPLING

1) Select transects using general guidelines described above. Use marker buoys or stakes to mark the transects and to estimate the distance raked.

2) Use a Shinnecock or Bull Rake.

3) Estimate the surface area sampled by multiplying (Distance Raked) x (Width of Rake).

4) Report same data as in numbers 4, 5, and 6 for Grab Sampling protocol.

A scientific collecting permit may be required by the State of New Jersey for sampling shellfish. For information, contact:

New Jersey Marine Fisheries Administration
501 East State Street
CN 400
Trenton, NJ 08625
(609) 292-1056

The Enforcement Unit of the N.J. Division of Fish, Game and Wildlife should be notified of the date and location of sampling by calling (609) 748-2050. To avoid disputes over the validity of data, it is best to send a copy of the proposed sampling plan to NMFS for review before beginning the field work. After the review is complete, notify NMFS of the date that sampling is to occur by phoning the Habitat and Protected Resources Division at (908) 872-3023 or 872-3037.

ACKNOWLEDGEMENTS

Mr. James Joseph of the New Jersey Bureau of Shellfisheries described and recommended many of the shellfish sampling methods discussed in this paper. Mr. Clyde MacKenzie of the National Marine Fisheries Service reviewed the manuscript and made several helpful suggestions.

LITERATURE CITED

Green, R.H. 1979. Sampling design and statistical methods for environmental biologists. John Wiley and Sons, New York. 257 p.