

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Division of Fish and Wildlife  
Marine Fisheries



**2008 Management Plan for the Shellfish Fishery Sector**

developed in association with the  
commercial fishing licensing provisions set forth in the  
“Rules and Regulations Governing the Management of Marine Fisheries”

**January 4, 2008**

These rules and regulations are promulgated pursuant to Chapter 42-17.1, Section 20-1-4, Chapter 20-2.1 and Public Laws Chapter 02-047, in accordance with Chapter 42-35 of the Rhode Island General Laws of 1956, as amended.

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DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

BUREAU OF NATURAL RESOURCES

FISH AND WILDLIFE &  
LAW ENFORCEMENT

**PURPOSE**

The purpose of these rules and regulations is to manage the marine resources of Rhode Island.

**AUTHORITY**

These rules and regulations are promulgated pursuant to Chapter 42-17.1, Section 20-1-4, Chapter 20-2.1 and Public Laws Chapter 02-047, in accordance with Chapter 42-35 of the Rhode Island General Laws of 1956, as amended.

**ADMINISTRATIVE FINDINGS**

Rules and regulations are based upon the need to modify existing regulations (RIGL 20-3-2 through 20-3-6).

**APPLICATION**

The terms and provisions of these rules and regulations shall be liberally construed to permit the Department to effectuate the purposes of state law, goals, and policies.

**DEFINITIONS**

See Rhode Island Marine Statutes and Regulations, Part I, '1.3.

**SEVERABILITY**

If any provision of these Rules and Regulations, or the application thereof to any person or circumstances, is held invalid by a court of competent jurisdiction, the validity of the remainder of the Rules and Regulations shall not be affected thereby.

**SUPERSEDED RULES AND REGULATIONS**

On the effective date of these rules and regulations, all previous rules and regulations, and any policies regarding the administration and enforcement of this regulation shall be superseded. However, any enforcement action taken by, or application submitted to, the Department prior to the effective date of these Rules and Regulations shall be governed by the Rules and Regulations in effect at the time the enforcement action was taken, or application filed.

# Management Plan for the Shellfish Fishery Sector

## Bay Quahog Endorsement

### Stock Status

The quahog resource in Narragansett Bay is currently fully exploited with biomass below that needed to produce maximum sustainable yield (MSY). A biomass dynamic model is used by the Rhode Island Division of Fish and Wildlife (RIDFW) to assess the overall stock in Narragansett Bay (Gibson 1999). The assessment was updated in 2007 to incorporate new landings and survey data and to adjust nominal license effort to include only active participants. The adjustment, based on RIDFW boat counts and analysis of dealer landing slips, reduced the latent effort bias in the catch per unit effort calculations. The new assessment results indicate that stock biomass in 2006 (17,937 MT) was only about 39% of that needed to support biomass at maximum sustainable yield,  $B_{msy}$ , (45,629 MT) (Figure 1). Fishing mortality rates (F) have declined over the past decade and in 2006 was equal to 0.13, well below the target  $75\%F_{msy} = 0.16$  and the over fishing definition,  $F_{msy} = 0.22$  (Figure 2).

Recent low biomass follows an extended period of heavy over fishing and was likely exacerbated by an increase in predation by benthic invertebrates. The reduction in F in recent years is related to declining effort and landings are currently well below the MSY level for a rebuilt stock (Figure 3). Projections indicate that the stock can increase in biomass at a moderate rate if F remains at current levels.

Although the assessment is conducted on a bay wide basis, resource status may vary spatially within the overall stock area depending on intensity of harvest, proximity to protected spawning beds, and hydrodynamic conditions, which disperse larvae. The distribution of quahogs in the bay is patchy and the fishery selectively exploits patches of higher value product (new recruit necks) as they appear. Because of these factors, the bay wide assessment represents an average condition and not necessarily those at a local level.

**Management Program-** Quahogs are managed entirely within state waters by the Department of Environmental Management with advice from the Rhode Island Marine Fisheries Council. The Department, through the RIDFW, uses a set of management areas and a rotational transplant/harvest system to manage the resource. Permanent and conditional pollution closures restrict the fishery in addition to seasons, possession limits, and management closures.

A fishery management plan specifies that bay wide fishing mortality rates (F) should be maintained near the target level but below the  $F_{msy}$  over fishing definition to allow for biomass rebuilding (Ganz et al. 1999). This requires maintenance of fishing effort near current levels. The rotational harvest and transplant/spawner sanctuary program should be expanded to include more areas. Recent boat counts and analysis of dealer landings

slips indicate that about 350 active shell fishers prosecute the quahog fishery. Gibson (1999) recommended a target fishing mortality rate equal to 75% of the  $F_{msy}$  value to preserve an adequate level of spawner biomass in the face of uncertainty. Since current active effort is sufficient to generate  $F$  at the target level on a bay wide basis, additional effort will move the fishery toward the over fishing level and reduce the rate of biomass rebuilding. New licenses will essentially compete for a limited yield with current licenses.

### **Fishery Management Goals and Objectives:**

Goal- The following goal is consistent with the objectives of the Rhode Island quahog management plan (Ganz et al. 1999).

*Rhode Island will have a healthy bay quahog resource and a fishery management regime which provides for sustainable harvest, cooperative management by stakeholders, and appropriate opportunities for fishery participation.*

### Objectives-

1. Maintain fishing mortality rates and brood stock abundance at levels that minimize the risk of stock depletion and recruitment failure.
2. Conserve and rebuild quahog resources in Narragansett Bay with appropriate management strategies including transplanting, area closures and spawner sanctuaries.
3. Maintain existing social and cultural characteristics of the fishery wherever possible.
4. Provide for cooperative management with industry and efficient operation, consistent with biological objectives.
5. Provide for adaptive management that is responsive to unanticipated short term events or circumstances.
6. Provide for a simple, uniform and enforceable set of regulations.

### **Licensing Options and Recommendations:**

In 2007, the Department issued 13 new quahog endorsements for the basic commercial fishing license. This decision was based on the Division assessment of license renewals, which indicated that 46 principal effort licenses issued in 2005 were not renewed in 2006. Due to uncertainty in the activity of the non-renewed licenses, an exit/entrance ratio of 3 to 1 was applied, resulting in the availability of the 13 new licenses. These licensees were restricted to 3 bushels per day statewide.

In 2007 the Department issued 538 principal effort licenses with quahog endorsements compared to 587 in 2006, a difference of 49. Principal effort license holders with quahog endorsements have access to full harvest levels. For student shellfish licenses there was a net decrease of 11 (71 in 2006; 60 in 2007) and a net increase of 6 over 65 shellfish

licenses (130 in 2006; 136 in 2007). These two license categories are restricted to basic harvest levels.

According to the most recent assessment for quahogs, rates of fishing mortality have been declining since 1999 and are currently below the estimated level that would lead to maximum sustainable yield ( $F_{msy}$ ). Estimates of biomass are below maximum sustainable yield but have been constant since 1994. Since fishing mortality has declined to below  $F_{msy}$  and even though the biomass is below  $B_{msy}$ , the fishery could withstand a minimal increase in effort through the issuance of new licenses or quahog endorsements. Theoretically, as long as fishing mortality remains below  $F_{msy}$  biomass should increase. Based on the assessment and concerns over an ageing population of licensed quahog fishermen, issuance of new licenses or endorsements were permitted in past years on a conservative basis. The intention was to maintain current levels of effort by issuing a new license for every active license retired. Since the activity of licenses was unknown, a conservative exit/entrance ratio of 3 to 1 was used, as recommended by industry. This year the activity of licenses is known through the SAFIS reporting system. Of the 49 principal effort license holders with a quahog endorsement that were not renewed in 2007, three had some level of activity. Of 46 multi-purpose licenses not renewed, three had some activity of quahog sales. Therefore, 89 of the 95 licenses not renewed were inactive in 2006, which equals a 15:1 ratio between inactive and active licenses, assuming activity refers to at least one transaction involving quahogs. Since SAFIS only became fully operational in 2006, activity as defined by DEM of at least 75 transactions over two years cannot be determined.

RI Marine Fishery Council Advice- the Industry Advisory Committee (IAC) of the RIMFC, required under RIGL 20-2.1-11, has met twice to formulate advice for the Council on licensing. Several proposals were brought forward by this group on both quahog and soft shelled clams. The first quahog proposal was to issue new quahog endorsements in a 3:1 exit:entrance ratio to be based on all retired licenses eligible to harvest quahog. The second quahog proposal was to issue new quahog endorsements in a 3:1 exit:entrance ratio to be based on all retired PEL with quahog endorsements. The RIMFC recommendation to the Director was to adopt a 3:1 exit/entry ratio, and apply the ratio to eligible PEL's retired in 2007.

With regard to quahogs, the Director of DEM decided to retain the 3:1 exit/entry ratio, as applied to holders of Principal Effort Licenses (PELs) with Quahog endorsements that retired in 2007. Since there were 49 such retirees, 16 new Quahog endorsements on Commercial Fishing Licenses (CFLs) will be available in 2008.

As specified in regulation, new entry into the quahog fishery will be facilitated initially through the issuance of quahog endorsements to basic commercial license holders. These license holders will be permitted to prosecute the fishery on a limited basis, i.e. half the possession limit allowed to multipurpose and principal effort license holders.

#### **Future Management Considerations-**

DEM needs to continue work with industry to ensure a healthy quahog fishery consisting of resource sustainability and a licensing system that will maintain an active group of fishermen and facilitate entry of new participants.

Improvements in the landings data collection system along with RIDFW resource surveys will provide for innovations in management. Acquisition of fishery landings by market class and stratum will allow for stratum specific assessment and management. Fishery selectivity will be directly estimable and biological reference points can be refined to manage size composition in the harvest and spawning stock. In concert with transplanting and spawner sanctuaries, area specific regulation will be possible.

### **Non-Quahog Endorsement:**

**Stock Status-** Other species of shellfish commercially harvested within Rhode Island waters include soft-shell clams, oysters, surf clams, whelks and blue mussels. While these species are not routinely assessed by RIDFW and little data is available to conduct comprehensive analytical assessments, landings data and anecdotal evidence from the commercial fishing industry are useful pieces of information in identifying populations that warrant further research. Most notably in this category are soft-shell clams.

Commercial landings of soft-shell clams have increased dramatically over recent years, over 400% since 1999 (Figure 4). Increased levels of abundance along with increasing effort associated with the availability of commercial licenses have led to increased landings. Attractive market value and open access will undoubtedly lead to more effort. It is in the best interest of the fishery to consider constraints on landings either through effort controls or possession limit adjustments. Currently, licenses to harvest soft-shelled clams are available and the possession limits are 3 bushels per day within designated management areas and 12 bushels per day in all other areas open to shellfishing. With targeted populations residing in relatively few locations along with continued or increased rates of removal, local depletions are likely. It is therefore necessary to maintain sustainable levels of removal. According to Erkan and Gibson (2006), there was no evidence of overfishing on soft-shell clams in Potters Pond based on a survey conducted in 2005. However, the number of licenses to harvest soft-shell clams issued has increased by 78% since the survey was conducted. Whether the rise in licenses issued translates into increased effort is currently being determined through the SAFIS system. It is highly recommended that research on other populations located in the State be conducted to determine if overfishing is occurring. In the meantime other avenues of investigation should be conducted to determine the effect of increased landings. It is therefore also recommended that landings data collected through SAFIS be analyzed for changes in catch per unit effort and to identify whether possession limit adjustments is a viable alternative to control landings.

Attached to this management plan is a report on the stock status of soft shell clams (see Appendix A). The report indicates that a decreasing trend in CPUE in the soft shell clam fishery, namely in the upper bay area, may warrant managing the effort in this fishery in order to propagate a sustainable population.

Regarding the oyster stock, landings have decreased since the late 1990's (Figure 4). According to local researchers studying oyster populations within Narragansett Bay, the effects of disease, environmental conditions, poor sets of new recruits, and fishing pressure are all responsible for the sharp decline in abundance levels (Oviatt et. al, 1998). It is a reasonable assumption that given such high rates of natural mortality, fishing pressure can lead to local depletions of the resource. Further investigation into the effects of fishing effort is certainly warranted; however, until the extent of the influence that fishing effort has on abundance is ascertained the Division recommends maintaining status quo for 2008 and initiating further research to determine if management action is needed.

In 2007 the DEM proposed regulations for the first time regarding harvest of whelks. Proposed regulations include a minimum size, possession limits, marking requirements for pots, escape vent sizes for pots, tending requirements, and reporting requirements. These regulations were proposed in response to concerns raised by industry over increasing numbers of participants in the fishery and gear deployed in the Bay

**Management Program-** Steamer clams, oysters, blue mussels, and surf clams are managed in state waters by the Department of Environmental Management with advice from the Rhode Island Marine Fisheries Council. Additional federal regulations apply to surf clams and ocean quahogs in the EEZ. The Department uses seasons and possession limits to manage the state waters fishery. Permanent and conditional pollution closures further restrict the fishery in addition to the above management measures.

**Fishery Management and Licensing Recommendations-** The change recommended to the management program for other shellfish is to begin to manage effort in the soft shelled clam fishery. Better data is needed on resource status for all of the species in the non quahog shellfish category, which would allow resource managers to make better recommendations.

RI Marine Fishery Council Advice- the Industry Advisory Committee (IAC) of the RIMFC, required under RIGL 20-2.1-11, met twice to formulate advice for the Council on licensing. Several proposals were brought forward by this group on both quahogs and soft shell clams. The soft shell clam proposals were to create a new endorsement for soft shell clams and set a control date after which no new soft shell clam endorsements will be issued, or to move the soft shelled clams in to the restricted category with quahogs. The RIMFC recommendation to the Director was to adopt a new soft shell clam endorsement category but to add a provision that current PEL license holders be allowed to obtain the soft-shelled clam endorsements. The recommendation did not include the setting of a control date.

With regard to soft shell clams, the Director decided to establish some initial and defensible baseline management controls in the fishery, through licensing, by:

- 1) creating a new soft-shell clam endorsement;

2) making the new endorsement available only to those who, in 2007, held either a CFL with a Non-Quahog Shellfish endorsement or a PEL with a Quahog or Non-Quahog Shellfish endorsement; and barring the issuance of the new endorsement to anyone else; [all MPL holders will remain eligible to harvest soft-shell clams, without the need for an endorsement];

3) in accordance with statute, establishing a \$25 fee for the new endorsement on CFLs, and a \$75 fee for the new endorsement on PELs (but no charge if it is the only endorsement on the PEL); and

4) redefining the non-quahog shellfish endorsement category as “Other Shellfish,” to include all shellfish species available for commercial harvest except quahogs and soft-shell clams; with the same \$25/\$75 fee structure as noted above; available to anyone, without restriction.

He also decided to enact a control date of December 31, 2007 for the soft shell clam fishery.

### **Literature Cited**

Erkan, D.E. and M.R. Gibson (2006). 2005 Shellfish Survey of Potter Pond South Kingstown, Rhode Island. RI Division of Fish and Wildlife.

Ganz A.; Lazar N.; Valliere A.(1999). Narragansett Bay Quahog Management Plan. RI Division of Fish and Wildlife. Report to the Narragansett Bay Project and RI Marine Fisheries Council.

Gibson, M.R. 1999. Assessment of quahogs (*Mercenaria mercenaria*) in Narragansett Bay: technical analyses in support of a bay wide quahog management plan. RI Division of Fish and Wildlife. Res. Ref. Doc. 99/2.

Oviatt, C, Wolff, N, VanKeuren, D, and Nicosia, E. (1998). Oysters (*Crassostrea virginica*) as indicators of a climate warming trend in Northeast waters. CR822051-010 Final report. Funding agency: Environmental Protection Agency.

Figure 1. Estimated Exploitable Biomass of Quahogs in Narragansett Bay Relative to Bmsy

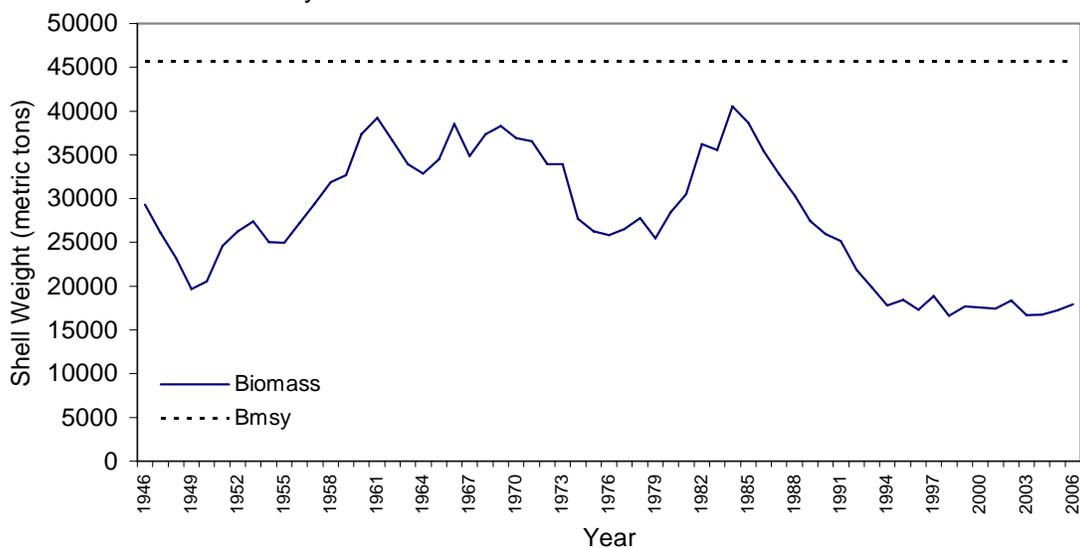


Figure 2. Estimated Rate of Fishing Mortality on Quahogs in Narragansett Bay Relative to Fmsy

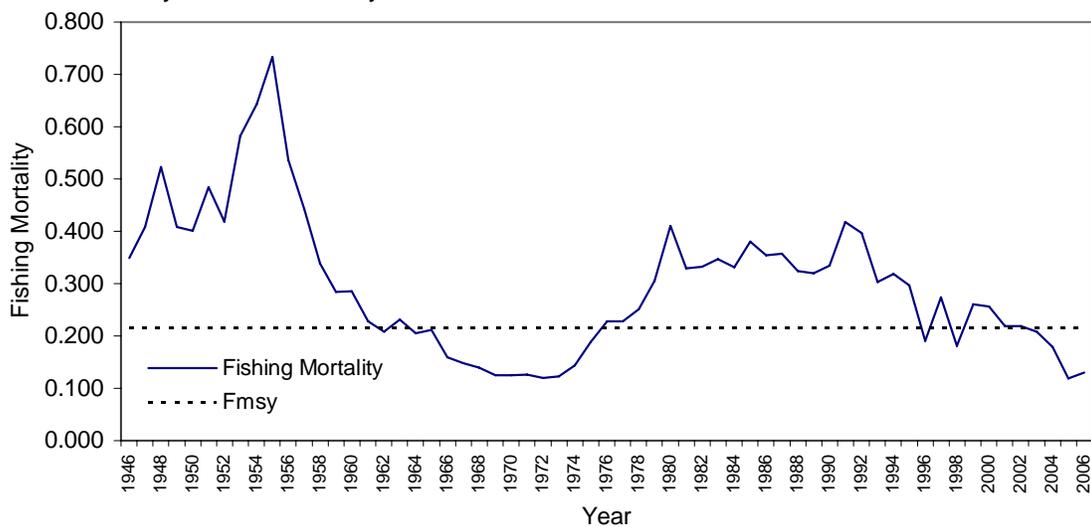


Figure 3. Commercial quahog landings in RI relative to estimated MSY

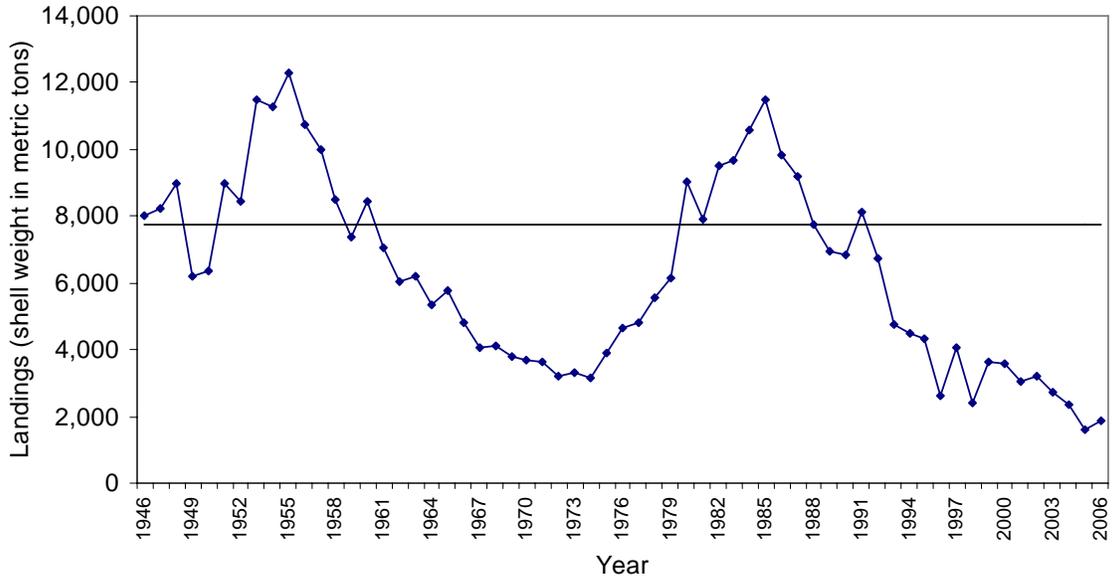
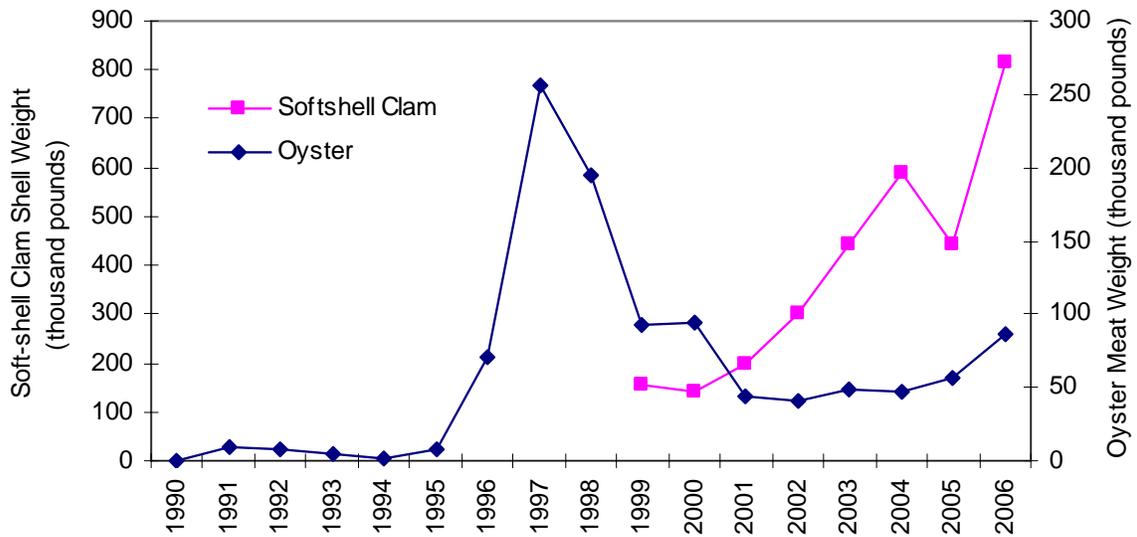


Figure 4. Commercial Landings of Soft-Shell Clams and Oysters in RI



## **Appendix A**

### **ESTIMATION OF CATCH PER UNIT EFFORT FOR COMMERCIAL SOFT SHELL CLAM (*Mya arenaria*) FISHERY IN RHODE ISLAND**

**Brian R. Murphy**

*Rhode Island Division of Fish and Wildlife*

*November 23, 2007*

#### **INTRODUCTION**

Since 1999, commercial landings of soft-shell clams in Rhode Island have increased by 661% (Figure 1). Presently there are no assessments on the resource being conducted and without a measure of abundance the effect of commercial harvesting is unknown. If the current rate of harvest is greater than the rate of productivity the population could become overfished causing a decrease in abundance. From a management perspective it is important to maintain sustainable levels of harvest to ensure a healthy resource environmentally and commercially.

Catch-per-unit-effort (CPUE) derived from commercial landings are often used as a measure of population abundance. The State of Rhode Island has collected detailed data on commercial landings of soft shell clams from all dealers in the State since 2006. The data consists of the amount landed and the location harvested for every sales transaction. This data therefore provides the opportunity to estimate CPUE by location and to monitor trends in CPUE over time.

#### **METHODS**

Commercial landings of soft-shell clams in 2006 and 2007 were obtained from the SAFIS reporting system. The total pounds landed, numbers of days fished, and numbers of participants were generated for each location and license type. CPUE was calculated for each licensee and location by dividing the total pounds landed for each month by the number of days fished. The unit of effort for this analysis was assumed to be a single day of fishing. A mean CPUE in each year was generated for all locations and then compared using t-tests to determine if there have been any changes over time. T-tests were run assuming equal variances unless a significant difference was found between group variances using the Brown-Forsythe test (SAS Institute, 2002). Means were log transformed to approximate a normal distribution of the data.

#### **RESULTS**

Commercial transactions of soft shell clams that occurred from January through October of 2006 and 2007 were analyzed to identify trends in the fishery. Both effort and landings have increased over the time period (Table 1A). The overall number of

participants in the fishery increased from 154 to 263 and the total number of days fished almost tripled from 2,217 to 6,464. The mean number of days fished per participant also rose from 8 to 14 days. Landings increased from 535,968 pounds to 1,188,423 pounds.

Majority of the commercial landings originated from the upper Narragansett Bay comprising approximately 77% and 86% for 2006 and 2007, respectively (Table 2). Landings and effort increased dramatically in this area of the Bay (Table 1B). Landings increased by 142% from 420,727 pounds to just over a million pounds. The number of days fished increased nearly four fold from 1,264 days to 4,943 days. In 2006, 57% of days fished for soft shell clams occurred within the Upper Bay. This figure increased to 76% in 2007. While of a much lower magnitude, landings and effort increased in Greenwich Bay and the West Passage of Narragansett Bay (Tables 1C and 1D). In the remaining areas, effort and landings decreased in the East Passage of Narragansett Bay and Quonochontaug Pond and there was no change in Point Judith Pond or the Sakonett River (Tables 1E, 1F, 1G, and 1H).

Changes in CPUE between years varied depending upon location (Table 3). The only significant difference occurred within the upper Narragansett Bay which showed a decrease from 276 pounds per day to 165 pounds per day ( $p < 0.05$ , t-test). For all other areas, there was no significant difference in CPUE between years.

In order rule out inexperience of new participants as a contributing factor to the decline in CPUE in the upper Bay, CPUE was compared between years for individuals that participated in the fishery in both years using a paired t-test (SAS Institute, 2002). The analysis was limited to participants with at least five transactions in each year. There were a total of 27 participants that fit these criteria and results of the paired t-test indicate that there was a significant decline in CPUE between 2006 and 2007 ( $p < 0.05$ ) (Table 4).

## **DISCUSSION**

Commercial landings of soft shell clams in Rhode Island have risen dramatically over the past several years along with effort in the form of new participants and average number of days fished by licensed participants. The results clearly show that the overall trends are primarily governed by events occurring within upper Narragansett Bay. This was the only location where there was a significant change in CPUE, which dropped by 38% between 2006 and 2007. This decline is a good indication that the abundance of soft shell clams in this area has also declined. The boundary of the upper Narragansett Bay reporting area encompass conditional areas A and B and includes the Conimicut Point area where tremendous sets of soft shell clams have been reported by participants in the fishery.

The concern with effects of inexperience of new participants on CPUE was addressed with the analysis of CPUE for participants that fished in both years. There were 110 new participants fishing within upper Narragansett Bay in 2007. With the availability of commercial licenses to harvest soft shell clams it is conceivable that many of the new participants lack experience in the fishery. It is expected that the CPUE of an

inexperienced person would be lower than someone with knowledge of the fishery where to harvest, techniques etc. An influx of inexperienced participants could account for the observed decline in CPUE. However, analysis of just the individuals who participated in the fishery in both years revealed a significant decline in CPUE as well which lends support to the results of the overall analysis.

For this analysis effort was defined as a single day and therefore the assumption that there is no difference in the amount of time spent harvesting within a day must be made. If this assumption is violated and more time was spent harvesting on average in 2007 then the difference in CPUE for areas showing a decline is underestimated. If the converse is true and more time was spent harvesting in 2006 then the difference would have been overestimated. However, based on personal communication with individuals participating in the fishery more time was needed this year to harvest equivalent amounts as in previous years. Therefore the decline in CPUE for the upper Bay may in fact be even greater than the estimate generated in this analysis.

A major concern when using CPUE as a measure of abundance is a lack of information on the functional relationship between the two variables (Hilborn and Walters, 1992). The types of relationships that have been documented range from hyperstability to hyperdepletion. Hyperstability occurs with highly aggregated populations that require a minimal amount of search time. The observed effect is a rapid decrease in the true abundance relative to CPUE; abundance is actually much lower than the measure of CPUE indicates. Hyperdepletion arises when a few highly vulnerable concentrations are targeted while the greater less accessible population remains relatively untouched. In this instance CPUE decreases dramatically compared with the population abundance.

The question arises as to the functional relationship between CPUE and abundance of soft shell clams. In this case, it can be argued that the relationship is not important because the warnings pertain to estimates of population abundance across geographical areas that encompass fished and unfished locations. CPUE is only reliable if measures of effort are distributed at random which they are not for commercial fisheries (Hilborn and Walters, 1992). These measures only reflect abundance in high density areas where fishermen focus their efforts. Therefore, this analysis is suitable because it is the dynamics of the populations in the areas that are being fished that management has concern. Furthermore, due to the sedentary nature of soft shell clams localized depletions are likely to occur with unsustainable levels of harvest. The decline in CPUE shown in this analysis along with the dramatic rise in landings and increased levels of effort is strong evidence warranting further restrictions on the harvest of soft shell clams than currently allowed for the purpose of sustaining the resource.

## REFERENCES

- Hilborn, R and C.J. Walters. 1992. *Quantitative Fisheries Stock Assessment: Choice, Dynamics & Uncertainty*. Chapman & Hall, New York.
- SAS Institute. (2002). *JMP Statistics and Graphics Guide, Version 5*. SAS Institute Inc. Cary, N.C.

Table 1A. Reported commercial landings of soft shell clams and number of days fished by license type from January through October in 2006 and 2007 within Rhode Island.

	2006			2007		
	Number of Participants	Total pounds landed	Total Days Fished	Number of Participants	Total pounds landed	Total Days Fished
Commercial Fishing License	22	57,903	265	82	261,838	1,893
Principal Effort	55	167,326	611	76	467,843	2,263
Multipurpose	70	310,778	1,263	90	435,475	2,139
Over 65	2	1,247	6	1	4,772	39
Student	4	731	5	9	9,534	76
Lobster Pot	1	1,314	5	1	5,353	23
Unknown	na	10,597	111	na	3,608	31
Min		1.5	1		1	1
Max		27,041	64		42,945	136
Mean		1,970	8		2,529	14
Total	154	549,896	2,217	263	1,188,423	6,464

Table 1B. Reported commercial landings of soft shell clams and number of days fished by license type from January through October in 2006 and 2007 within Upper Narragansett Bay.

	2006			2007		
	Number of Participants	Pounds landed	Days Fished	Number of Participants	Pounds landed	Days Fished
Commercial Fishing License	13	43,635	120	71	235,135	1,477
Principal Effort	43	138,837	418	68	401,199	1,780
Multipurpose	51	234,736	705	69	363,268	1,553
Over 65	1	912	4	1	4,772	39
Student	2	446	3	11	8,978	67
Lobster Pot	1	1,314	5	1	4,834	18
Unknown	na	847	9	na	1,474	9
Min	na	1.5	1	na	10	1
Max	na	27,041	59	na	42,945	136
Mean	na	3,669	11	na	4,593	22
Total	111	420,727	1,264	221	1,019,660	4,943

Table 1C. Reported commercial landings of soft shell clams and number of days fished by license type from January through October in 2006 and 2007 within Greenwich Bay.

	2006			2007		
	Number of Participants	Total pounds landed	Total Days Fished	Number of Participants	Total pounds landed	Total Days Fished
Commercial Fishing License				7	1,007	7
Principal Effort	2	666	2	10	3,194	16
Multipurpose	5	1,445	9	12	3,023	20
Over 65						
Student	1	237	1			
Lobster Pot						
Unknown						
Min	na	112	1	na	10	1
Max	na	237	2	na	1,036	5
Mean	na	195	1.4	na	249	1.5
Total	8	2,348	11	29	7,224	43

Table 1D. Reported commercial landings of soft shell clams and number of days fished by license type from January through October in 2006 and 2007 within the West Passage of Narragansett Bay.

	2006			2007		
	Number of Participants	Total pounds landed	Total Days Fished	Number of Participants	Total pounds landed	Total Days Fished
Commercial Fishing License	5	8,809	91	38	15,790	184
Principal Effort	9	9,205	57	33	37,900	259
Multipurpose	17	29,047	197	39	46,221	354
Over 65	1	81	1			
Student				2	309	3
Lobster Pot				1	519	5
Unknown	na	3,666	23	na	2,134	22
Min	na	23	1	na	10	1
Max	na	6,144	64	na	9,519	92
Mean	na	1,505	11	na	902	7.3
Total	32	49,681	363	113	102,873	827

Table 1E. Reported commercial landings of soft shell clams and number of days fished by license type from January through October in 2006 and 2007 within the East Passage of Narragansett Bay.

	2006			2007		
	Number of Participants	Total pounds landed	Total Days Fished	Number of Participants	Total pounds landed	Total Days Fished
Commercial Fishing License	5	1,534	16	3	314	5
Principal Effort	14	11,724	65	1	1,933	8
Multipurpose	18	24,150	126	7	2,286	41
Over 65						
Student						
Lobster Pot						
Unknown						
Min	na	6	1	na	44	1
Max	na	4,905	19	na	1,933	31
Mean	na	997	5.5	na	412	4.9
Total	37	37,408	203	11	4,533	54

Table 1F. Reported commercial landings of soft shell clams and number of days fished by license type from January through October in 2006 and 2007 within the Sakonett River.

	2006			2007		
	Number of Participants	Total pounds landed	Total Days Fished	Number of Participants	Total pounds landed	Total Days Fished
Commercial Fishing License	1	1,083	8	4	951	10
Principal Effort	2	778	6	4	586	9
Multipurpose	2	1,310	9	4	1,639	14
Over 65						
Student						
Lobster Pot						
Unknown						
Min	na	47	1	na	50	1
Max	na	1,112	7	na	1,402	10
Mean	na	566	4.2	na	265	2.75
Total	5	3,171	23	12	3,176	33

Table 1G. Reported commercial landings of soft shell clams and number of days fished by license type from January through October in 2006 and 2007 within Point Judith Pond.

	2006			2007		
	Number of Participants	Total pounds landed	Total Days Fished	Number of Participants	Total pounds landed	Total Days Fished
Commercial Fishing License	7	1,352	18	12	4,359	147
Principal Effort	7	2,783	46	7	9,594	144
Multipurpose	17	11,946	147	21	7,326	79
Over 65						
Student	1	48	1	2	14	2
Lobster Pot						
Unknown	na	4,490	64			
Min	na	18	1	na	1	1
Max	na	5,108	64	na	6,563	102
Mean	na	619	8.27	na	507	8.85
Total	33	20,425	273	42	21,293	372

Table 1H. Reported commercial landings of soft shell clams and number of days fished by license type from January through October in 2006 and 2007 within Quonochontaug Pond.

	2006			2007		
	Number of Participants	Total pounds landed	Total Days Fished	Number of Participants	Total pounds landed	Total Days Fished
Commercial Fishing License	2	268	4	2	2,558	51
Principal Effort	3	703	8	3	285	4
Multipurpose	5	619	11	2	1,968	14
Over 65						
Student						
Lobster Pot						
Unknown	na	530	8			
Min	na	7	1	na	62	1
Max	na	530	8	na	2,452	50
Mean	na	182	2.72	na	687	9.9
Total	11	2,120	31	7	4,811	69

Table 2. Commercial soft shell clam landings (pounds) by area

	2006		2007	
	Landings (pounds)	%	Landings (pounds)	%
Upper Narragansett Bay	420,727	77%	1,019,660	86%
Greenwich Bay	2,348	0%	7,224	1%
West Passage of Narragansett Bay	50,807	9%	102,873	9%
East Passage of Narragansett Bay	37,408	7%	4,532	0%
Sakonett River	3,171	1%	3,176	0%
Point Judith Pond	20,619	4%	21,293	2%
Quonochontaug Pond	2,120	0%	4,811	0%
Ninigret Pond	89	0%	471	0%
Winnapaug	0	0%	2,614	0%
Unknown	12,607	2%	21,770	2%
Total	549,896		1,188,423	

Table 3. Comparison of CPUE between years by license type and area using two sample t-tests and Brown-Forsythe tests for homogeneity of variance. Sample size indicated in parentheses.

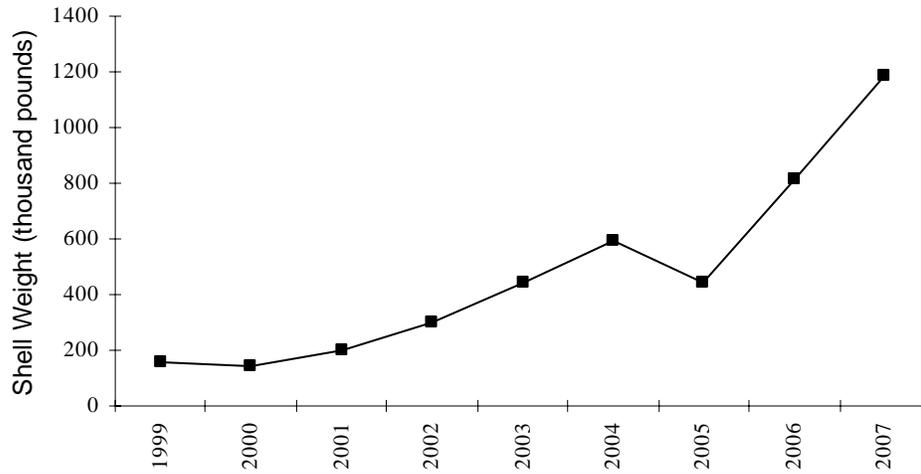
	2006 Mean	2007 Mean	T-Test	Prob > t
Upper Narragansett Bay	267 (112)	165 (222)	4.814	<.0001
Greenwich Bay*	165 (8)	163 (29)	1.491	0.149
West Passage of Narragansett Bay	158 (33)	127 (114)	1.676	0.096
East Passage of Narragansett Bay	161 (37)	91 (11)	1.835	0.073
Sakonett River	115 (5)	97 (12)	0.746	0.467
Point Judith Pond*	59 (33)	60(42)	1.532	0.131
Quonochontaug Pond	61(11)	85(7)	-0.956	0.353

\* Significant difference in variances between years

Table 4. Paired t-test for CPUE between the years 2006 and 2007 within the Upper Narragansett Bay

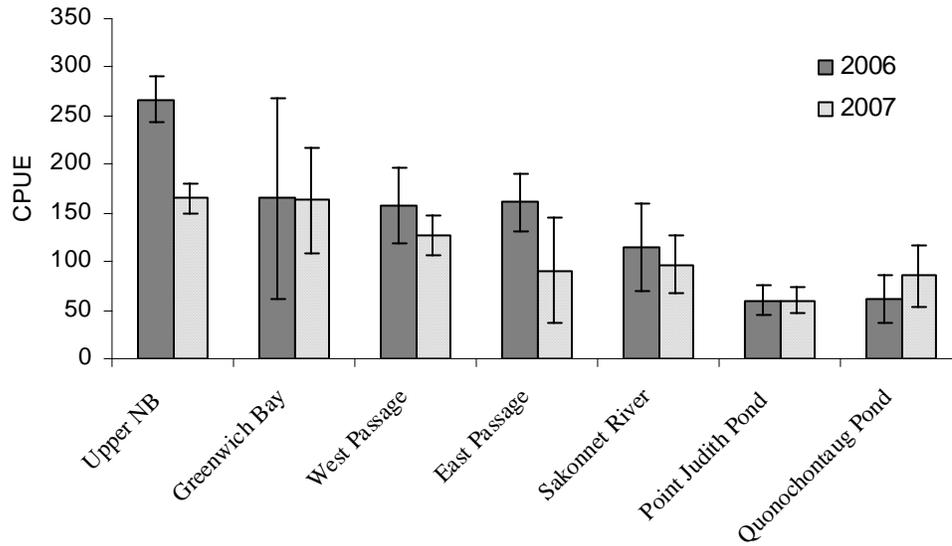
CPUE		T-Test	df	Prob > t
2006	2007			
348	157	6.505	26	<.0001

Figure 1. Commercial landings of soft shell clams in Rhode Island, 1999 - 2007



\*Landings in 2007 are for January - October only

Figure 2. Catch per unit effort (CPUE) of soft shell clams by area in 2006 and 2007. Error bars indicate 95% confidence intervals.



## Rule 8. EFFECTIVE DATE

The foregoing rules and regulations Rhode Island Marine Statutes and Regulations, after due notice, are hereby adopted and filed with the Secretary of State this 4<sup>th</sup> day of January 2008 to become effective 20 days from filing, unless **otherwise indicated below**, in accordance with the provisions of Chapter 42-17.1, Section 20-1-4, Chapter 20-2.1 and Public Laws Chapter 02- 047, in accordance with Chapter 42-35 of the Rhode Island General Laws of 1956, as amended.

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W. Michael Sullivan  
Director, Department of Environmental Management

Notice Given: 09/24/2007  
Public Hearing: 10/24/2007

Filing date: 01/04/2008  
Effective date: 01/04/2008