

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT**

Division of Fish and Wildlife  
Marine Fisheries



**2013 Management Plan for the Shellfish Fishery Sector**

Developed in association with the  
commercial fishing licensing provisions set forth in the  
“Commercial and Recreational Saltwater Fishing Licensing Regulations”

**November 8, 2012**

These rules and regulations are promulgated pursuant to Chapter 42-17.1, Section 20-1-4, Section 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.

## TABLE OF CONTENTS

RULE #1 PURPOSE	3
RULE #2 AUTHORITY	3
RULE #3 ADMINISTRATIVE FINDINGS	3
RULE #4 APPLICATION	3
RULE #5 REGULATIONS	pp 4 - 12
RULE #6 SEVERABILITY	3
RULE #7 SUPERSEDED RULES AND REGULATIONS	3
RULE #8 EFFECTIVE DATE PAGE	13

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
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, Section 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**SUPERSEDED RULES AND REGULATIONS**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rules and regulations, and any policies regarding the administration and enforcement of this regulation shall be superseded.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

## Quahaug Endorsement

**Commercial Landings:** There are two very distinct peaks in commercial landings of quahaugs in Rhode Island since 1947, the first occurred in 1955 followed by a rapid decline until 1974 and then a second peak in 1985 (Figure 1). Landings have since declined reaching their lowest levels in the time series (Figure 1); however, in 2011 there was an increase in both landings and catch per unit effort (Figure 2). In 2011 landings totaled 2,320 metric tons (5,115,235 lbs, Table 1), which is a 61% increase from 2010. According to the Standard Atlantic Fisheries Information System (SAFIS) reporting system, 78% of the landings were harvested from Greenwich Bay, Conditional Areas A & B, and the West Passage of Narragansett Bay (Table 1). Most of the quahaugs landed by count are littlenecks, followed by top-necks, chowders and cherrystones.

**Resource Assessment:** RI Division of Fish and Wildlife (DFW) conducts a survey of quahaugs in Narragansett Bay on an annual basis that commenced in 1993 (Ganz et al 1999). Both fished and unfished sections of the bay are sampled. The sampling consists of towing a small hydraulic dredge (0.36 meter sweep) for a distance of 30.5 meters (100 ft) at each station. Pressurized water is delivered to the dredge manifold which dislodges shellfish from the substrate. The dredge is designed to retain legal-sized quahaugs ( $\geq 25.4$ mm thickness). All species retained in the dredge when hauled are identified and all shellfish are counted and measured. Based on the survey, the stratified mean density of quahaugs in Narragansett Bay, in general, declined from 1997 to 2003 and then increased gradually until 2009 (Figure 3).

In short, the Department evaluated the quahog dredge survey design in 2006 and suggested a change from sampling the entire bay in one year to a rotational design that would accommodate additional sampling in each strata. In 2008 the Department started to implement a partially-revised survey design; however, minimal survey work was conducted in 2010-2011 due to vessel age and repair needs. The 2012 the annual survey employs a fully-reconfigured design to increase sampling in specific strata in a given year, ultimately allowing all strata to be sampled over several years rather than in a single year as in years past. In general, the reconfiguration is designed to increase sampling intensity so that the number of samples per strata is sufficient to produce precise estimates of biomass by size class. The Department expects to accomplish the 2012 survey work scheduled in the reconfigured survey sample design. Surveys will include pollution closed areas and spawner sanctuaries. In addition, research is being conducted to improve the precision of the survey by relating observed quahaug densities to mapping of submerged sediments.

**Management Program:** Quahaugs are managed entirely within state waters by the RI Department of Environmental Management (RIDEM or Department) with advice from the Rhode Island Marine Fisheries Council (RIMFC or Council). The RIDEM, through the RI Division of Fish and Wildlife (DFW), 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.

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

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

*Rhode Island will have a healthy bay quahaug 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, enhance, and rebuild quahaug resources in Narragansett Bay and the coastal ponds with appropriate management strategies including transplanting, area closures, establishment of spawner sanctuaries, and daily possession limits based upon sustainability.
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 via establishment of shellfish management areas.
6. Provide for a simple, uniform, and enforceable set of regulations.

**Fishery Management and Licensing Recommendations:** In 2012 RIDEM issued 27 new quahaug endorsements for the basic commercial fishing license. A new 2:1 exit/entry ratio for the quahaug fishery was implemented in 2011. DFW believes that the number of individuals that are licensed to fish in this fishery is more an industry-based economic issue than a resource management issue. With the SAFIS system in place, and with the DFW's plans to refine the resolution of shellfish landings data with regard to areas fished, the DFW will have the ability to set harvest limits by area. As such, the number of people participating in the fishery is becoming less relevant from a resource management perspective. The new standard would strike an appropriate balance, allowing for a significant number of new licenses while not flooding the fishery with new participants. These licensees were restricted to 3 bushels per day statewide.

In 2012 the Department issued 398 Principal Effort Licenses (PEL) with quahaug endorsements compared to 429 in 2011, a decrease of 31 licenses. Principal effort license holders with quahaug endorsements have access to full harvest levels. Student shellfish licenses decreased by 6 (from 55 in 2011 to 49 in 2012) and over 65 shellfish licenses increased by 23 (217 in 2011 to 240 in 2012). These two license categories are restricted to basic harvest levels.

The provision set forth in section 6.7-4 (h) allowing an actively fishing basic commercial fishing license holder with a quahaug endorsement to upgrade to a principal effort license with a quahaug endorsement and an actively fishing student shellfish license holder to upgrade to a basic commercial fishing license with a quahaug endorsement will be continued in 2012.

**RI Marine Fisheries Council Advice** - The Industry Advisory Committee (IAC) of the RIMFC, required under RIGL 20-2.1-11, met to formulate advice for the Council on licensing and recommended status quo for the quahaug fishery in 2013. To continue to apply a 2:1 exit/entry ratio to all eligible licenses (MPLs + PELs with a quahaug endorsement) that retired in 2012. This would allow 23 new Commercial Fishing Licenses (CFLs) with a quahaug endorsement to be made available for 2013.

The RIMFC recommended remaining with the status quo status quo as recommended by the IAC which would allow 23 new Commercial Fishing Licenses (CFLs) with a quahaug endorsement to be made available for 2013.

**Future Management Considerations and Recommendations:** RIDEM needs to continue work with industry to ensure a healthy quahaug 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 DFW 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 regulations will be possible.

The Narragansett Bay Commission's combined sewer overflow project combined with more-intensive water quality monitoring by RIDEM Office of Water Resources (OWR), has resulted in water quality improvements in the Providence River as well as a decreased number and duration of rainfall-induced closures in Conditionally Closed Areas "A" and "B". The high densities of quahaug broodstock observed in the Providence River combined with prior rainfall-induced closures in the Conditionally Closed Areas have resulted in a significant and sustained level of harvest. In order to sustain this harvest, it is recommended that an area-specific management plan be developed and implemented for the Providence River, Conditional Area "A", Conditional Area "B" and the recently established "Conimicut Triangle". Alternatives include, but are not limited to, establishing new shellfish management areas, establish area-specific fishing periods, and adopting realistic possession limits. Establishment of "shellfish management areas" throughout RI coastal waters and comprehensive regulations would allow improved management by RI DEM and increased flexibility.

## Soft-shell Clam Endorsement

**Commercial Landings:** Commercial landings of soft-shell clams in Rhode Island increased from 1999 to 2007 (Figure 4) and have since decreased 83% and 74% relative to 2007 and 2010, respectively (Figure 5). With the introduction of SAFIS, landings data have been coded by area allowing for evaluation of landings by area (Table 2) and by catch per unit effort (Figure 5). The majority of landings continue to come from Upper Narragansett Bay; however the percent of total landings from this area decreased from 91.3% in 2010 to 61.5% in 2011 (Table 2). That said, the only areas that did not see a decline in landings were Greenwich Bay and the Eat Passage (Table 2).

**Resource Assessment:** Soft-shell clam resources are distributed from inter-tidal to sub-tidal zones of Narragansett Bay and the coastal ponds and estuaries with the bulk, estimated at about 86%, located in the Upper Narragansett Bay, particularly in the Conimicut Point area. In recent years, due to the successful results from the Narragansett Bay Commission's combined sewer overflow project, measurable water quality improvements were recorded in the Providence River resulting in a substantial reduction in the number of rainfall-induced closures in Conditionally Closed Areas "A" and "B" and opening of new areas, such as the new soft-shell clam grounds in the Conimicut Pt Area called the "Conimicut triangle". The Conimicut triangle area opened on June 13<sup>th</sup>, 2010 with the only change to the existing regulations consisting of increasing the minimum size from 1 ½" to 2". The daily catch limit of 12 bushels was not changed resulting in the biomass being depleted to less than 1/10<sup>th</sup> it's former abundance, and follow up surveys in the fall of 2011 showed astoundingly low densities (Gibson 2012). Despite the dramatic reductions in abundance the Conimicut Point area attracted new fishing effort for about 593 licensed fishermen holding a soft-shell endorsement and 700 Multi-purpose licenses, which is beyond the level of sustainability (Gibson 2012).

A dynamic depletion model for open populations based on the work of Restrepo (2001) and Sosa-Cordero (2003) was recently developed and applied to monthly catch and effort data for the period 2006 to 2011 (Gibson 2012). The preliminary depletion model results suggest that the population is declining from 2006 to present with recruitment failing to replace fishery removals (Gibson 2012). Although the model could benefit from another year of data, present results suggest that the recent increase in minimum size will not by itself stop overfishing and catch limits may need to be reduced to < 3 bushels per day to bring fishing mortality rate into balance with resource productivity (Gibson 2012).

In 2012 the Department continued with survey work in the Conimicut Point Management Area and the coastal ponds as done in previous years. During 2013 the Department plans to reevaluate the soft-shell clam survey design, which may suggest increased sampling intensity and inclusion of previously unsampled areas. Preliminary results from 2011 sampling suggest a dramatic decline in soft-shell clam densities in the Conimicut Point Management Area; however, further analyses of survey data are required. Final results will be included in the survey reevaluation and presented to the Shellfish Advisory Panel and the RI Marine Fisheries Council in 2013.

**Fishery Management and Licensing Recommendations:** Soft-shell clams are managed entirely within state waters by RIDEM with advice from the RIMFC. For 2008, in response to increased landings and evidence of population decline in upper Narragansett Bay, RIDEM limited the number of eligible participants in the fishery to the level present in 2007. The RIDEM issued 174 commercial fishing licenses and 256 principle effort licenses with soft-shell clam endorsement for 2012 (12 additional over 2011). Other restrictions in the fishery include permanent and conditional pollution closures, seasons, establishment of Conimicut Shellfish Management Area, a daily possession limit reduction from 12 bushels per day to 3 bushels per day in the area, a minimum size increase to 2 inches statewide and management closures.

**RI Marine Fisheries Council Advice** - The Industry Advisory Committee (IAC) of the RIMFC, required under RIGL 20-2.1-11, met to formulate advice for the Council on licensing and recommended status quo for the soft-shell clam fishery in 2013. To continue to apply a 5:1 exit/entry ratio to all retired licenses (MPLs + PELs w/SS + CFLs w/SS endorsement) that retired in 2012. This would allow 11 new Commercial Fishing Licenses (CFLs) with a soft-shell clam endorsement to be made available for 2013.

The RIMFC recommended remaining with the status quo as recommended by the IAC which would allow 11 new Commercial Fishing Licenses (CFLs) with a soft-shell clam endorsement to be made available for 2013.

**Future Management Considerations and Recommendations:** The Narragansett Bay Commission's combined sewer overflow project combined with more-intensive water quality monitoring by RIDEM OWR, has resulted in further water quality improvements in the Providence River as well as decrease the number of rainfall-induced closures in Conditionally Closed Areas "A" and "B". In 2012 RIDEM OWR again modified the rainfall thresholds for Conditional Areas A and B and Conditional Area C (the Conimicut triangle). Landings from the high densities of soft-shell clams at Conimicut Point area, currently subject to rainfall-closure limited harvest, have declined significantly since the overfishing that took place in 2010. Stocks could further decline without implementation of more realistic and sustainable management measures. The isolated characteristics of the Conimicut Point fishery make the clams particularly vulnerable to variations in fishing effort. Additionally, a permanent pollution closure line bisecting the bed makes enforcement problematic.

Establishment of comprehensive restrictions against the use of mechanical harvest, and/or air-assisted, and water-assisted harvest methods for all species in Narragansett Bay and the salt ponds with provisions for certain fisheries would aid in protecting soft-shell clam stocks. Individuals fishing for razor clams have been observed either harvesting soft-shell clams with water pumps and air compressors or facilitating harvest by others through substrate disturbance. These methods facilitate rapid shellfish harvest and make enforcement problematic.

Alternatives to protect this fishery include, but are not limited to, establishing new shellfish management areas, establishment of area-specific fishing periods, adoption of

reduced possession limits statewide, and maintaining the minimum legal size of 2 inches. Measures should be implemented for the Providence River while the aforementioned pollution-closure boundary at Conimicut Point is in effect.

## **Whelk Endorsement**

Recently, DFW conducted a new comprehensive analytical assessment on whelk resources in RI (Gibson 2010). This work constitutes the first attempt to assess the status of whelk and their fishery in Rhode Island waters. As such, it addresses statutory requirements for sustainable shellfish management plans (RIGL 20-2-44) and duties of the Director to develop fishery management plans in support of commercial licensing (RIGL 20-2.1-9(5)).

**Commercial Landings:** A commercial fishery for whelks has existed in Rhode Island for many years; however, until September 2009 it was not regulated or the subject of a stock assessment. There are two species commonly landed in RI, the channeled (*Busycotypus canaliculatus*) and knobbed (*Busycon carica*) Whelk. According to National Marine Fisheries Service (NMFS) statistics, RI whelk landings were 85,000 pounds of meat weight in 1950 and increased over time to a peak in 1986 at 347,000 pounds. After several years of high landings, the fishery declined rapidly and from 1994 to 2003, when reported landings were less than 2,200 pounds. Since 2006, whelk landings by species have been monitored through the SAFIS reporting system, which captures landings from both state and federally permitted fishers. From 2006-2011 commercial whelk landings averaged 545,921 pounds and are almost exclusively (96%) channeled whelk. A sharp increase in whelk landings occurred from 2008 to 2009, with years 2006-2008 averaging 384,489 pounds annually and years 2009-2011 averaging 707,353 pounds annually (Figure 6). The number of fishers reporting whelk landings and the average whelk landings per fisher also shows an increasing trend during the 2006-2011 time period, although the average whelk landings per fisher decreased in 2011 (Figure 7). Ex-vessel value of whelks from 1950 to 1976 was steady at about \$1.25 per pound of meat. It then increased sharply from \$1.27 to \$3.24 from 1976 to 1983. From 2004 to 2008, value has fluctuated around \$3.00 per pound (Gibson 2010).

**Resource Assessment:** On the basis of Biomass Dynamic Model observations, it was concluded that  $F_{msy} = 0.33$  is an appropriate overfishing reference point for whelk in Rhode Island and an  $F = 0.25$  would be an appropriate fishing mortality target providing a buffer between the overfishing threshold. Current  $F$  rate is at or below this level indicating that overfishing is not occurring (Gibson 2010). Biomass was estimated to be near the  $B_{msy}$  reference level so an overfished condition is not likely. In addition, a Yield Per Recruit (YPR) analysis indicated that the recently enacted minimum size of 2.5" shell width would produce little benefit to spawning stock biomass since the fishery harvests few animals smaller and some remain immature at 2.5". A second increase to 2.75" shell width would increase SSB/R levels about 7% at current  $F$  and provide a pre-cautionary buffer against recruitment declines without reducing fishery yield much. An increase to 3.0" shell width would produce a more substantive increase in SSB/R (23%) but with an

YPR loss of 15%. The fishery seems to have operated in a pulse fishing mode with periodic increases in abundance that attracted fishing effort. High fishing mortality rates ensued (1960's, 1980's), the stock declined, effort dissipated, and a biomass recovery followed. A minimum size limit alone cannot prevent reoccurrence of these fishing pulses. To avoid opportunistic expansions in effort, consideration will need to be given to effort limitation via license/permitting or through output controls such as catch limits and quotas (Gibson 2010).

**Fishery Management and Licensing Recommendations:** Whelks are managed entirely within state waters by the Department. Currently there is no licensing system to control the directed effort for whelk fishery in Rhode Island. To avoid opportunistic expansions in effort, a new endorsement directed at whelk fishing was added to the licensing system for 2012. The goal of the new endorsement will be to cap and monitor effort through the use of the endorsement category and avoid future boom and bust cycles that were observed over recent years (Gibson 2010). Other management measures should be considered to control output to limit fishing mortality such as quotas, daily possession limits, closed seasons, and a minimum size based upon sexual maturity. The RIMFC Ad Hoc Whelk Committee met in November 2011 and recommended a license moratorium on new whelk endorsements for the 2013 licensing year.

**RI Marine Fisheries Council Advice** - The Industry Advisory Committee (IAC) of the RIMFC, required under RIGL 20-2.1-11, met to formulate advice for the Council on licensing and supported a proposal to allow holders of a valid Commercial Fishing License (CFL) or Principal Effort License (PEL) with a Quahaug and/or Soft-Shell Clam endorsement, as of the immediately preceding year, would be eligible to obtain a Whelk endorsement in 2013.

The RIMFC recommended no new whelk endorsements, except to allow those “actively fishing” commercial fishing license (CFL) or principal effort license (PEL) holders with a quahaug and/or a soft-shell clam endorsement as of the immediately preceding year (2012) to obtain a whelk endorsement in 2013. (Note: “Active Fishing” meaning fished at least 75 days in the preceding two calendar years).

## **Other Shellfish Endorsements**

Other species of shellfish commercially harvested within Rhode Island waters include oysters, blue mussels, and razor clams. While these species are not routinely assessed by RI DFW 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.

**Commercial Landings:** Regarding the oyster stock, landings have decreased since the late 1990's. In 2011 only 4,125 pounds of wild oysters were landed in RI. 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. Recently dead oysters (open shells) are visual evidence of the oyster disease effects. This occurs in both fished and unfished RI waters. Further investigation into the effects of fishing effort is certainly warranted; however, until the extent of the influence that fishing effort and poor recruitment has on abundance is ascertained DFW recommends reducing the daily possession limit accordingly. Establishment of new spawner sanctuaries and harvest moratoria are considered important components of the collaborative oyster-restoration efforts that are underway. Initiating further research and monitoring to track abundance and recruitment success is needed.

**Management Program-** oysters and blue mussels are managed in state waters by the RIDEM with advice from the RIMFC. Additional federal regulations apply to surf clams and ocean quahaugs in federal waters. 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. The Department in cooperation with both federal government and non-government organizations has been conducting oyster restoration in the salt ponds and Narragansett Bay.

In 2006, the Natural Resources Conservation Service (NRCS) provided funding for a statewide oyster restoration project to help increase the spawning and recruitment levels sufficient to reestablish a self-sustaining oyster population. RI DEM is overseeing and authorizing the placement of the stocked oysters into the state's waters. Currently, there are six established shellfish spawner sanctuaries in state waters with habitat suitable for placement of the oysters. They are in designated portions of Winnapaug and Ninigret Ponds, Potters Pond, Jenny's Creek, and Bissell cove. The Nature Conservancy (TNC) is also assisting with restoration efforts. A current proposal is to place clean surf clam shell and place it in the spawner sanctuaries of established shellfish management areas. The culch would provide a substrate for juvenile attachment.

**Licensing Options and Recommendations-** No changes are recommended for the licensing program for shellfish that fall under the non-quahaug endorsement category excluding soft-shell clams and whelks until better data is available on their status. It is also recommended that new commercial licenses continue to have basic harvest levels equal to current licensees for this endorsement.

### **Shellfish Harvesting Methods Clarification**

Current harvesting regulations were developed and implemented to facilitate harvest of specific shellfish species of economic interest to the commercially fishing community. Permissible harvest methods were implemented with the intent of minimizing habitat impacts and protecting juvenile stocks while allowing a reasonable harvest. As demand has developed for alternative species of mollusks, crustaceans, and finfish; requirements relating to fishing methods have remained stagnant.

Species-specific regulatory language has resulted in commercial fishing activities targeting unregulated (or under-regulated) species. Industry has interpreted existing regulatory language to mean that harvest of unregulated species is permissible by fishing methods considered too intrusive or unsuitable by RIDFW. Examples include: dredging for whelk, horseshoe crabs (and other unregulated species) and the use of mechanical harvest methods (including air-assisted and water-assisted methods) in pursuit of razor clams and mantis shrimp in direct proximity to regulated species and inside established pollution closures. The species-specific regulations tie the hands of law enforcement. The insufficiencies also make proper resource management and habitat protection problematic.

Regulations need to be crafted that address omissions and insufficiencies in the regulations that do not prevent these activities (and associated impacts) while facilitating intended fishing opportunities.

## **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., and A. Valliere. 1999. Narragansett Bay Quahaug 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 quahaugs (*Mercenaria mercenaria*) in Narragansett Bay: technical analyses in support of a bay wide quahaug management plan. RI Division of Fish and Wildlife. Res. Ref. Doc. 99/2.
- Gibson, M.R. 2010. Stock Assessment of Whelk in Rhode Island and Recommendations for Research and Management. In progress
- Gibson, M.R. 2012. Stock Assessment of Soft-Shell Clams (*Mya arenaria*) in Rhode Island Using a Dynamic Depletion Model Applied to SAFIS Data. Draft Report - RI Division of Fish and Wildlife.
- Murphy, B.R. 2007. Estimation of Catch per Unit Effort for the Commercial Soft-shell Clam (*Mya arenaria*) Fishery in Rhode Island. RI Division of Fish and Wildlife.
- Oviatt, C, Wolff, N, VanKeuren, D, and E. Nicosia. 1998. Oysters (*Crassostrea virginica*) as indicators of a climate warming trend in Northeast waters. CR822051-010 Final report. Funding agency: Environmental Protection Agency.
- Restrepo, V.R. 2001. Dynamic depletion models. Pages 345-356, In: J. G. Cano and V.R. Restrepo, eds. Report on the FAO/DANIDA/CFRAMP WECAFC regional workshops on the assessment of spiny lobster *Panulirus argus*. Belize City,

Belize April 21- May 2, 1997 and Merida, Yucatan Mexico June 1-12, 1998. FAO Fish. Rep. 619. Part III: Stock Assessment Methods.

Sosa-Cordero, E. 2003. Trends and dynamics of the spiny lobster, *Panulirus argus*, resource in Banco Chinchorro, Mexico. Bull. Mar. Sci. 73: 203-217.

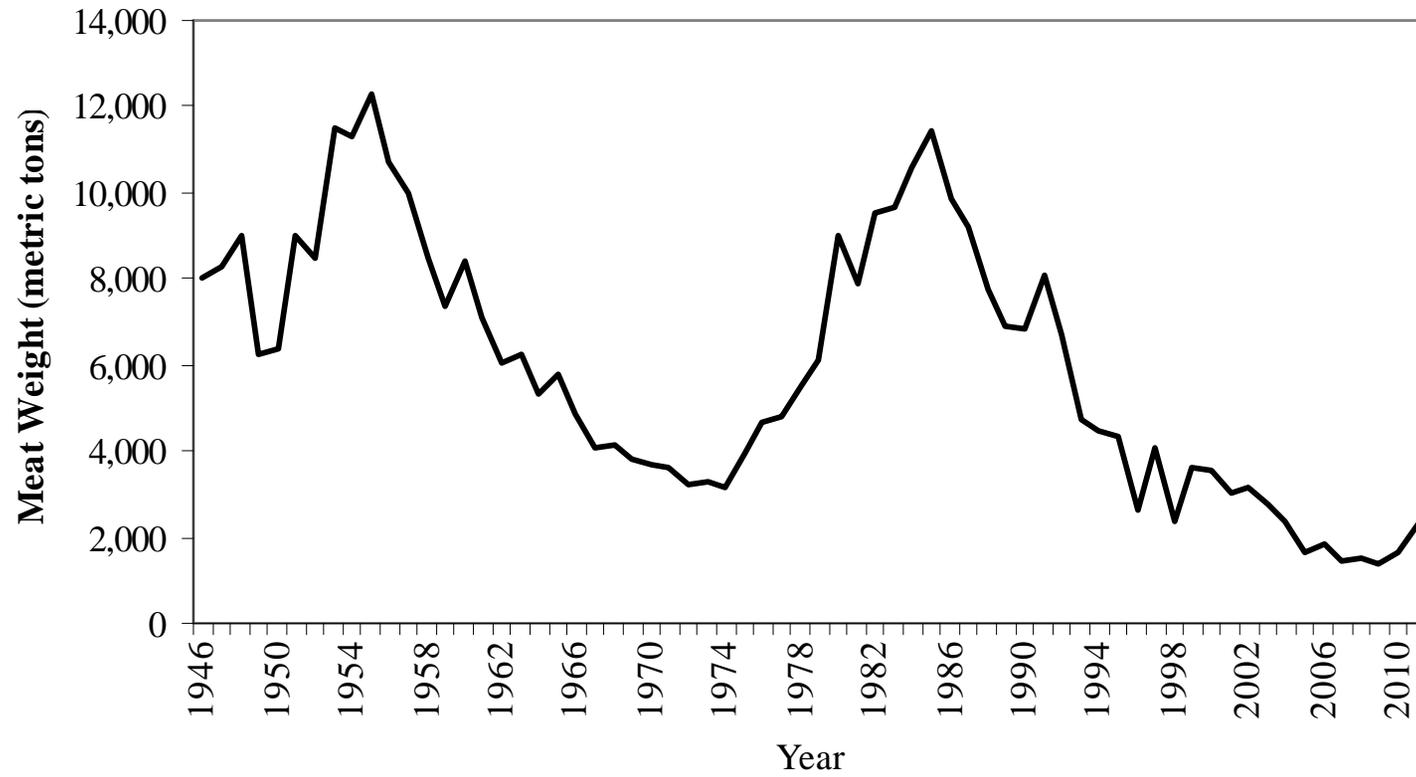
**Table 1. RI commercial quahaug landings (lbs) for 2011 by shellfish tagging area (broad areas) and market category.**

Shellfish Tagging Areas	Pounds (lbs) Landed by Market Category				Total Landings (lbs)	Percent of Total Landings
	Cherry	Chowder	Littleneck	Top Neck		
<i>Unknown</i>	923	8,780	14,731	8,003	32,437	0.6%
RI 1 - UPPER NARRAGANSETT BAY	27,131	168,865	262,914	128,511	587,421	11.5%
RI 1A - CONDITIONAL AREA A	11,073	178,231	238,592	117,150	545,046	10.7%
RI 2 - GREENWICH BAY	14,581	31,935	618,252	272,167	936,935	18.3%
RI 3 - NARRAGANSETT BAY-WEST PASSAGE	122,736	461,085	931,869	379,446	1,895,135	37.0%
RI 4 - NARRAGANSETT BAY-EAST PASSAGE	11,760	394,337	378,225	210,472	994,793	19.4%
RI 5 - SAKONNET RIVER	10	28,781	28,103	7,002	63,896	1.2%
RI 6 - BLOCK ISLAND & COASTAL PONDS	650	11,477	38,258	9,186	59,572	1.2%
<b>Total</b>	<b>188,864</b>	<b>1,283,491</b>	<b>2,510,945</b>	<b>1,131,936</b>	<b>5,115,235</b>	<b>-</b>

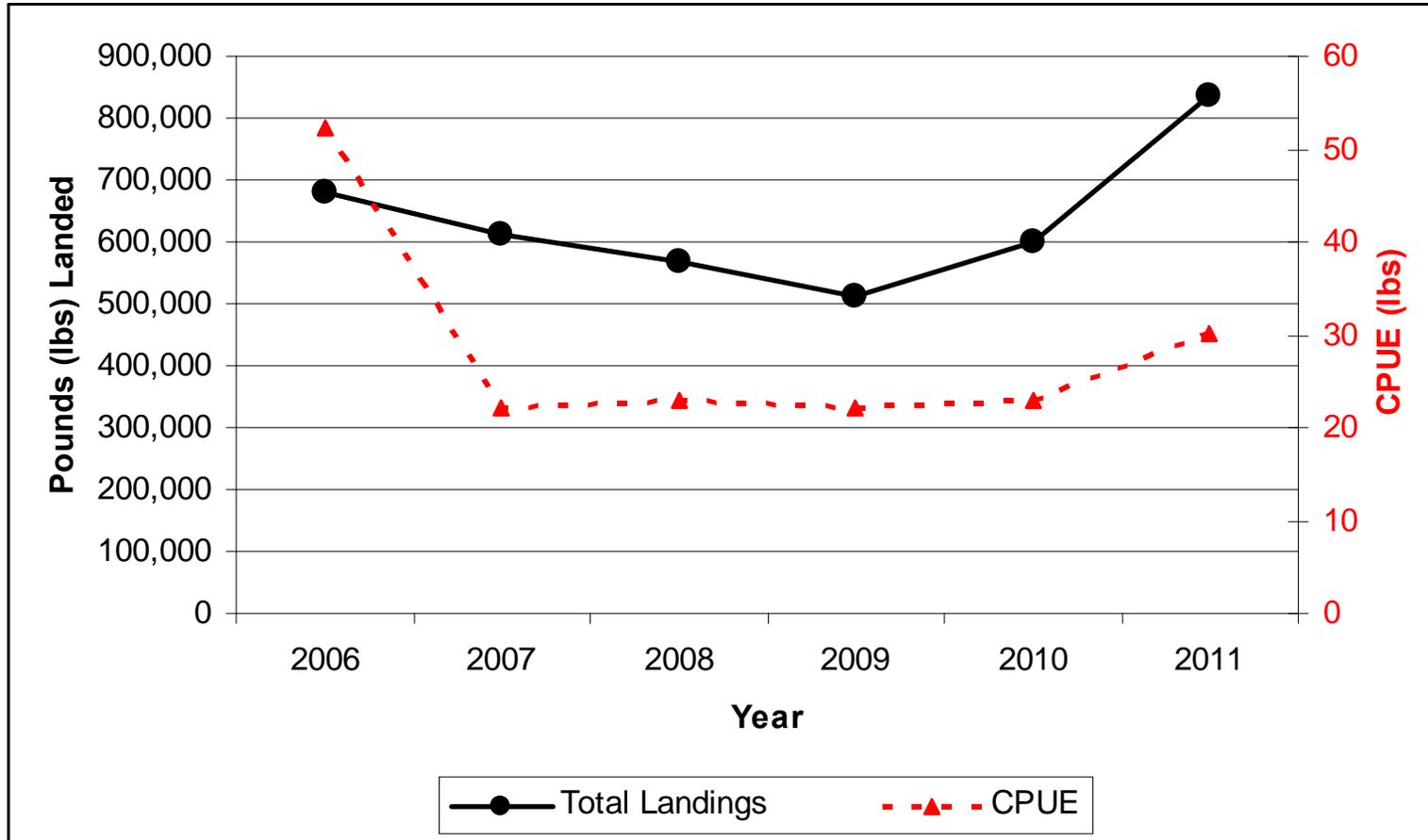
**Table 2. RI commercial soft-shell clam landings (lbs) for 2008-2011 by shellfish tagging area (broad areas).**

Shellfish Tagging Areas	2008		2009		2010		2011		% Δ from previous year
	lbs	% total							
<i>Unknown</i>	8,820	1.2%	46,169	9.3%	7,922	1.1%	183	0.1%	-97.7%
RI 1 - UPPER NARRAGANSETT BAY	519,762	72.8%	351,635	71.1%	138,754	19.9%	66,576	36.2%	-52.0%
RI 1A - CONDITIONAL AREA A	-	-	-	-	498,901	71.4%	46,476	25.3%	-90.7%
RI 2 - GREENWICH BAY	5,704	0.8%	4,182	0.8%	70	0.0%	358	0.2%	411.4%
RI 3 - NARRAGANSETT BAY-WEST PASSAGE	151,825	21.3%	72,660	14.7%	36,227	5.2%	16,745	9.1%	-53.8%
RI 4 - NARRAGANSETT BAY-EAST PASSAGE	4,856	0.7%	5,636	1.1%	2,692	0.4%	19,400	10.6%	620.7%
RI 5 - SAKONNET RIVER	860	0.1%	1,930	0.4%	427	0.1%	394	0.2%	-7.7%
RI 6 - BLOCK ISLAND & COASTAL PONDS	22,333	3.1%	12,421	2.5%	13,602	1.9%	33,619	18.3%	147.2%
<b>Total</b>	<b>714,160</b>		<b>494,633</b>		<b>698,595</b>		<b>183,751</b>		<b>-73.7%</b>

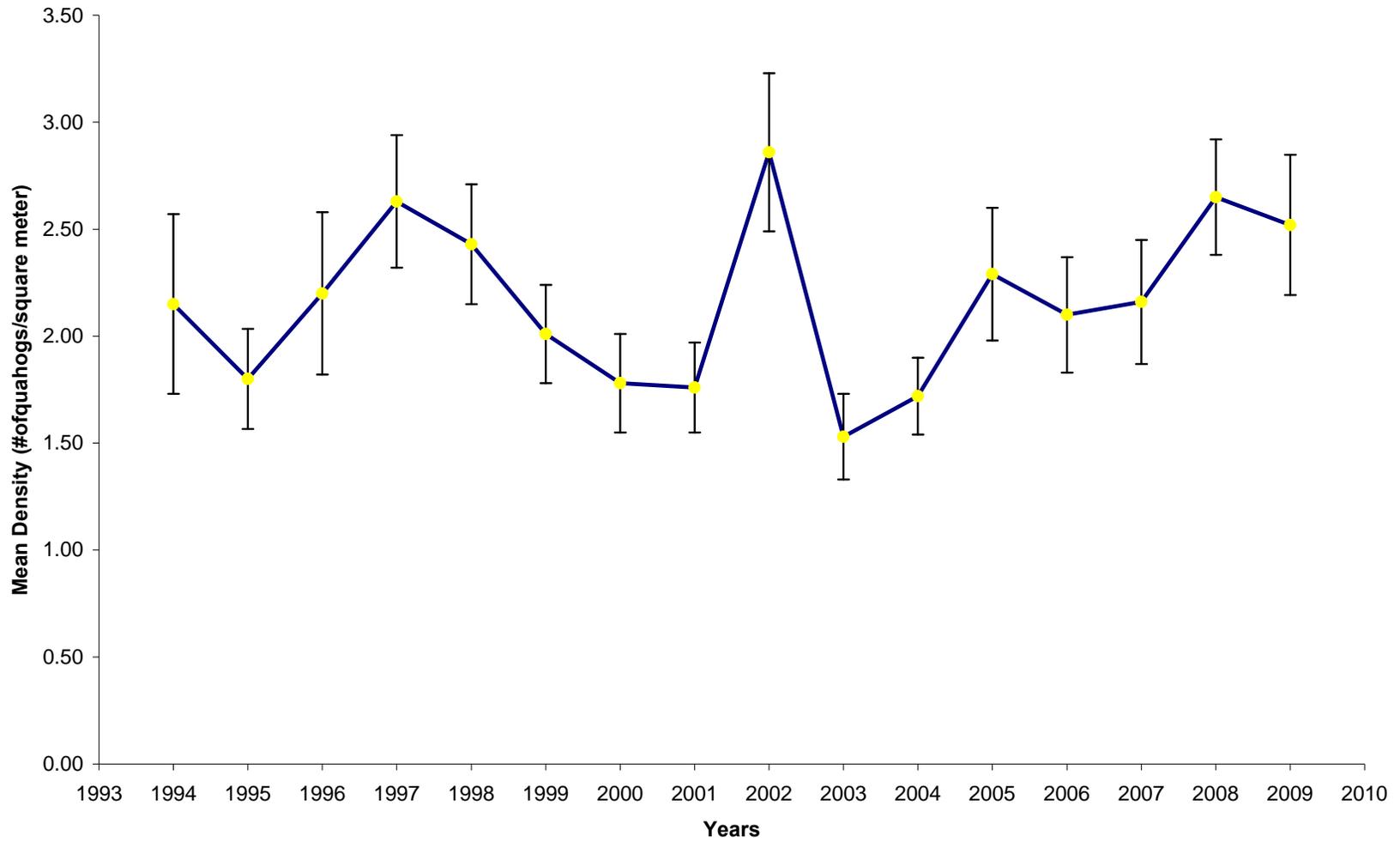
**Figure 1.** Meat weight (metric tons) of quahaugs commercially landed in Rhode Island from 1946 – 2011.



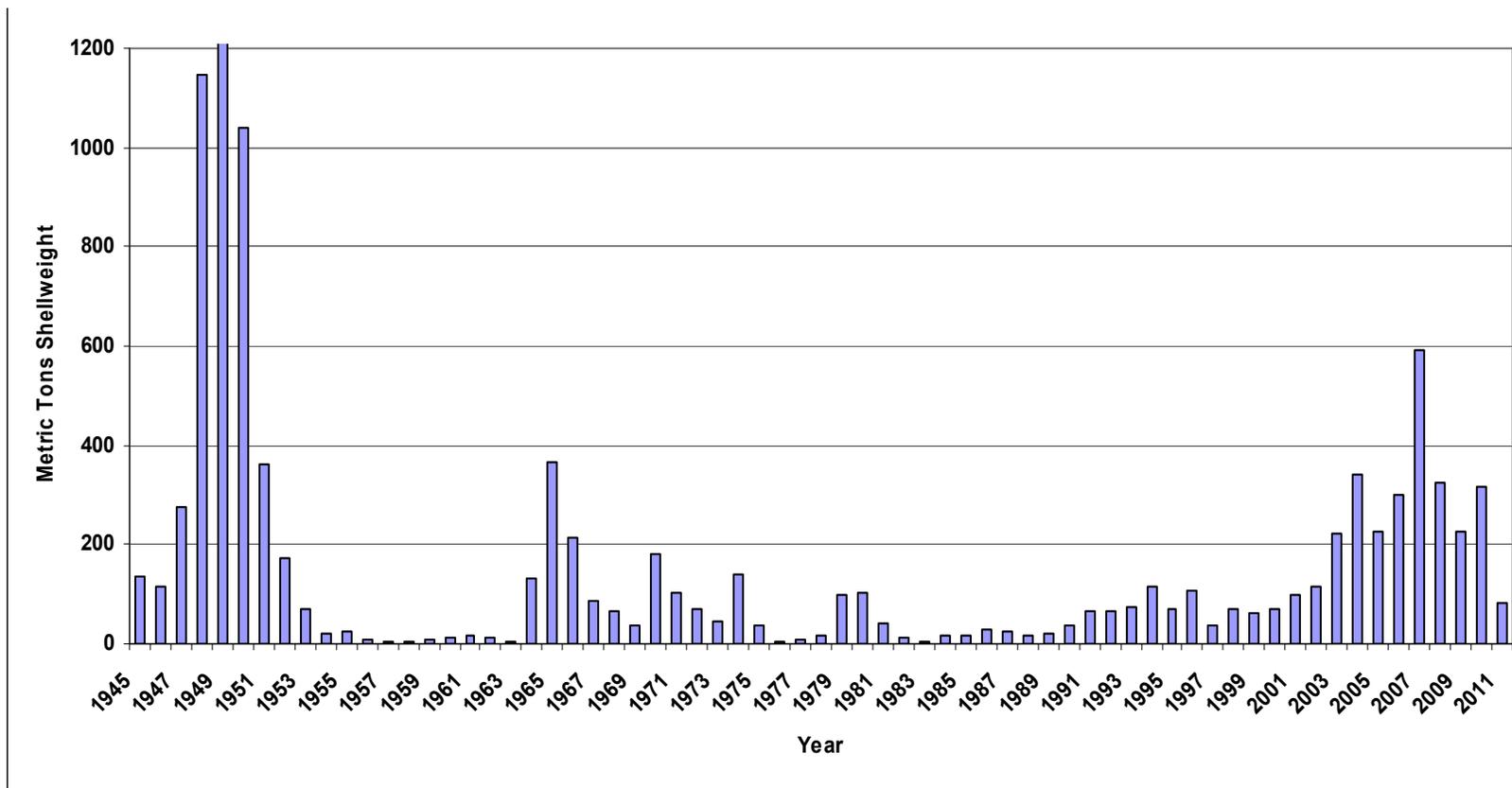
**Figure 2.** RI commercial quahaug landings and catch per unit effort (CPUE) from 2006-2011. CPUE was calculated as the total number of SAFIS trips divided by total pounds landed per year.



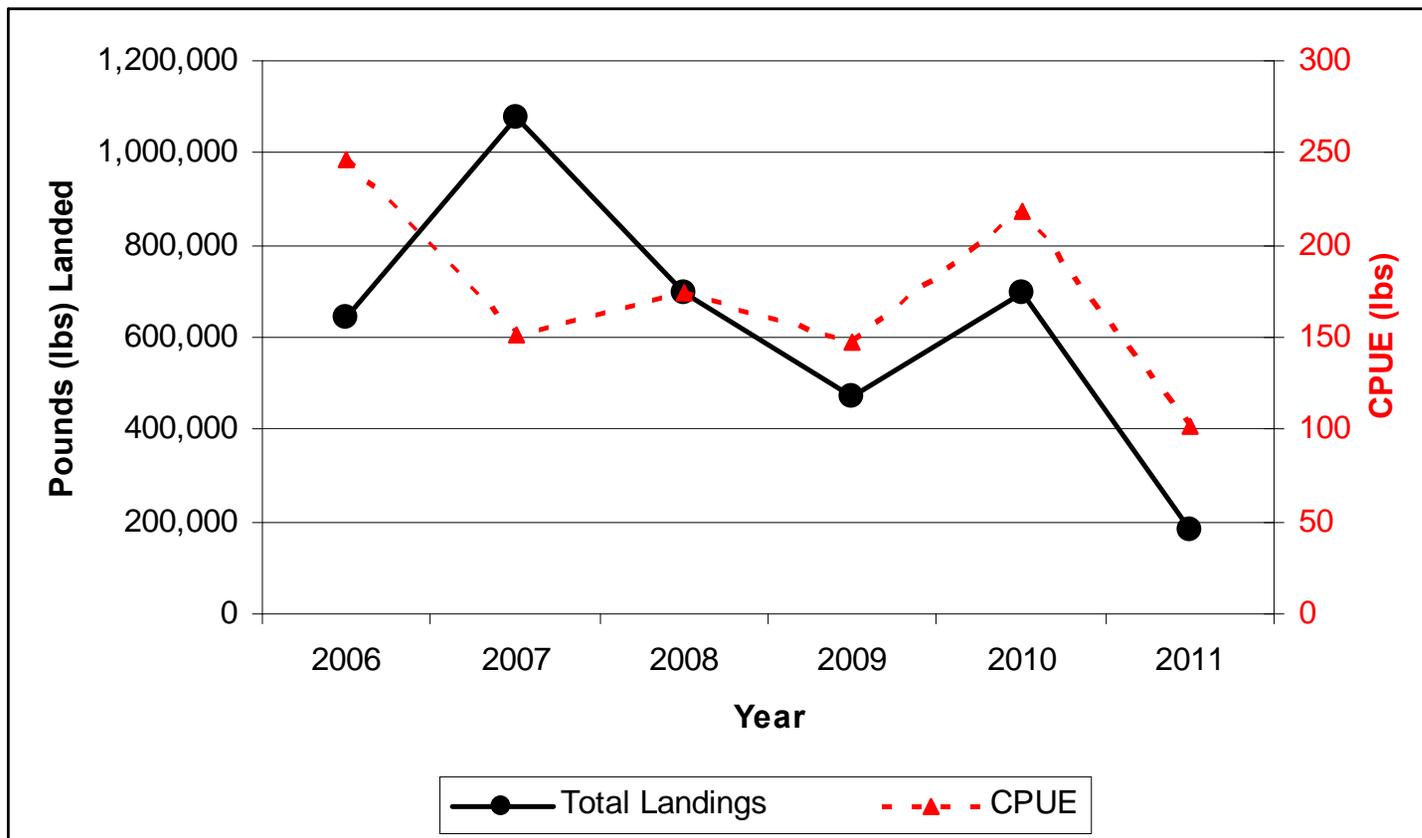
**Figure 3.** Mean density of quahaugs (number / m<sup>2</sup>) in Narragansett Bay as measured by RI DEM Fish and Wildlife’s hydraulic dredge survey (1994-2009)



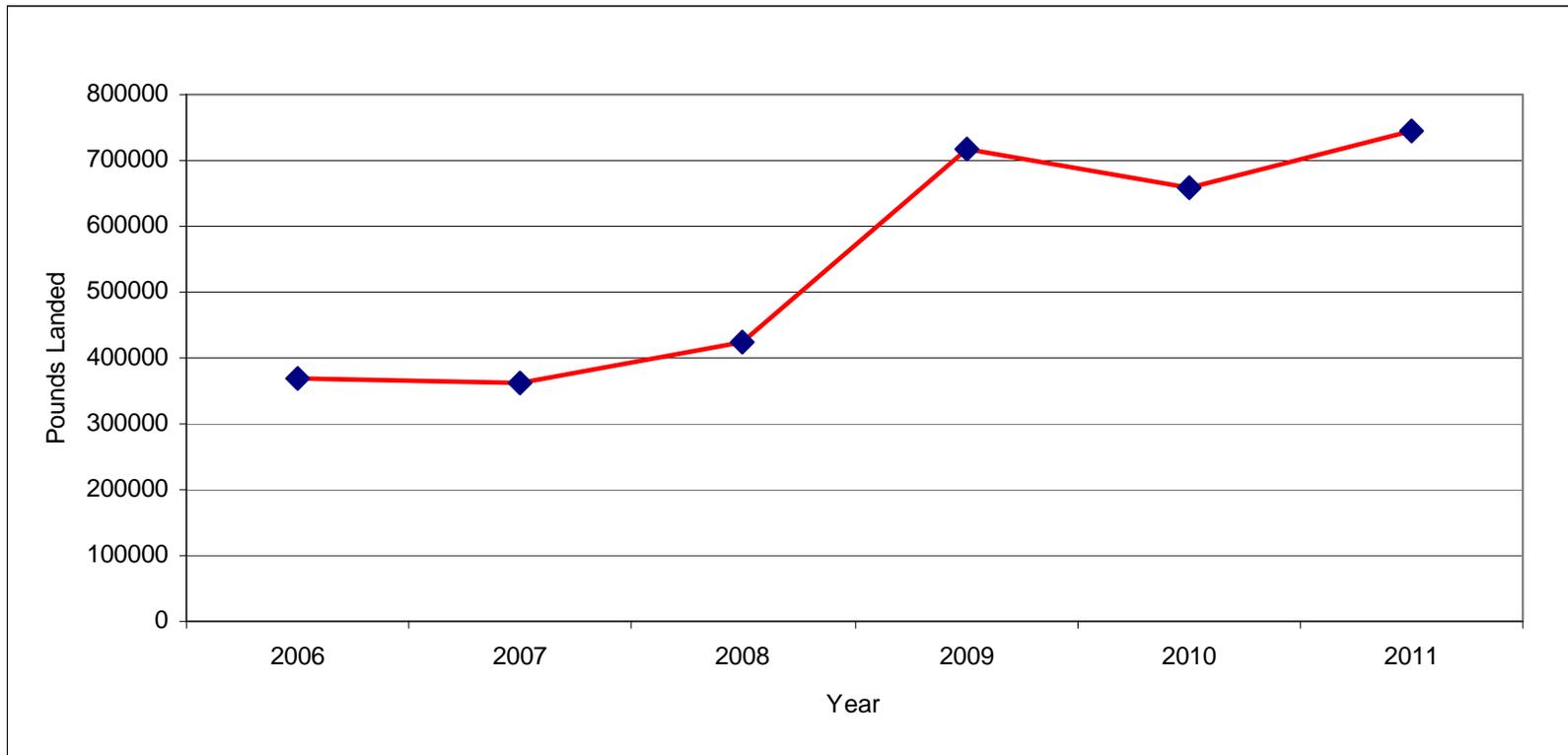
**Figure 4.** RI commercial soft-shell clam landings (meat weight, metric tons) from 1945-2011.



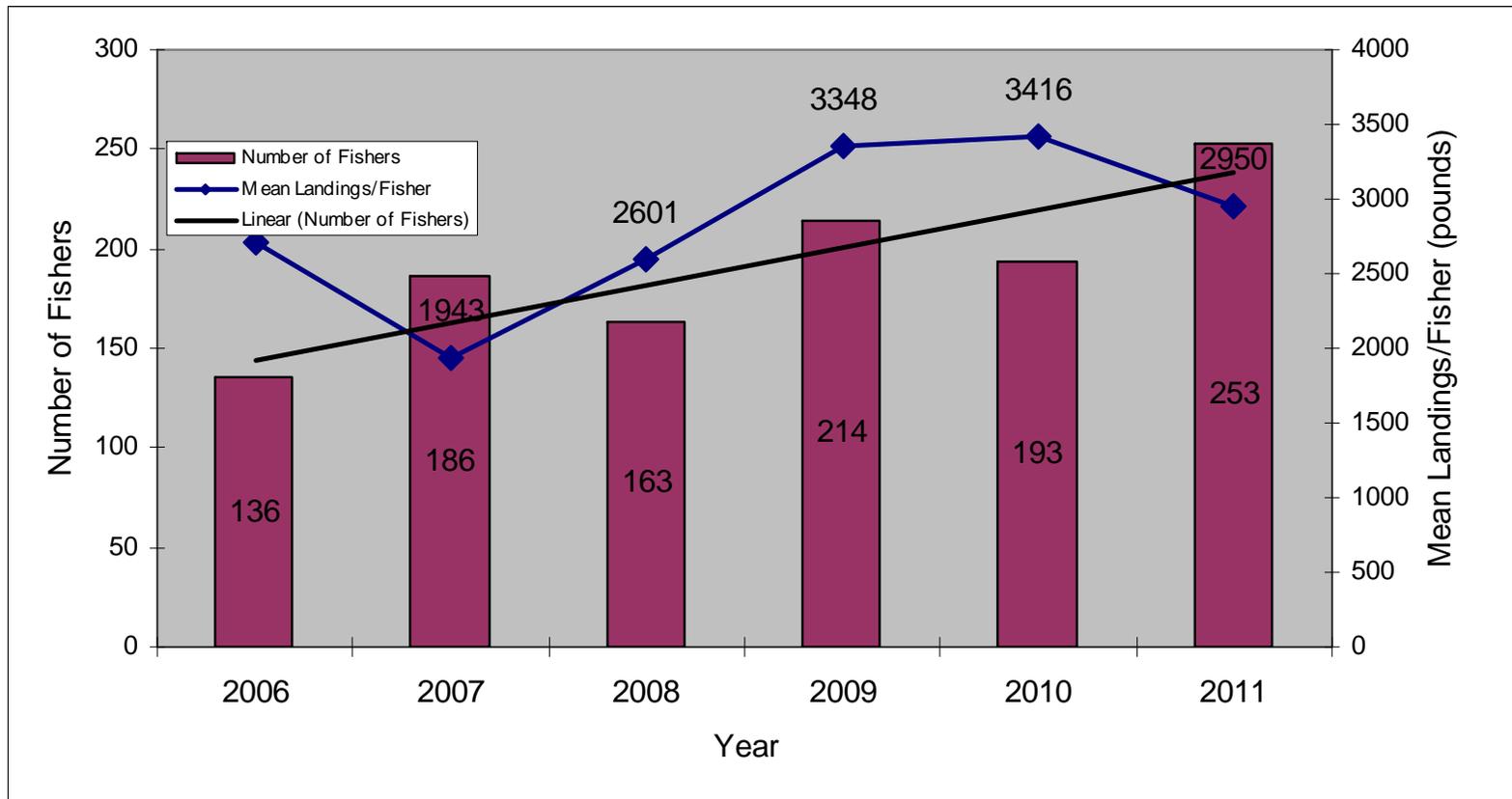
**Figure 5.** RI commercial soft-shell clam landings and catch per unit effort (CPUE) from 2006-2011. CPUE was calculated as the total number of SAFIS trips divided by total pounds landed per year.



**Figure 6.** RI commercial whelk landings (species combined) for 2006-2011.



**Figure 7.** Number of reported fishers active in the fishery, mean landing per fisher, and linear trend for number of fishers active in the RI commercial whelk fishery from 2006-2011.



**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 **8<sup>th</sup> day of November, 2012** 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, Section 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.

---

Janet L. Coit, Director  
Department of Environmental Management

Notice Given: 08/09/2012  
Public Hearing: 09/12/2012

Filing date: 11/08/2012  
Effective date: 11/28/2011

ERLID# 7038