

**Commercial Fishing License Restructuring
Implementation**

Crustacean Fishery Sector

DRAFT #2

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**Source Document for RI Marine Fisheries Council, Lobster
Advisory Panel, and Public Hearing Proceedings**

**Rhode Island Department of Environmental Management
Division of Fish and Wildlife
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Lobster

Stock Status- The lobster resource in Narragansett Bay and RI coastal waters is currently over exploited and at a medium level of abundance. A two-stage DeLury model is used by the Rhode Island Division of Fish and Wildlife (RIDFW) to assess the local stock (Gibson 1999, 2000). The local assessment was updated in 2002 to incorporate additional landings (though 2001) and survey data (through spring 2002) accumulated since the last assessment. An important refinement over past assessments is the inclusion of monitoring data on shell disease frequency to increase natural mortality rates for years 1996-2002. The new results indicate that fishing mortality rate (F) is above the F10% over fishing definition of the Atlantic States Marine Fisheries Commission (ASMFC). Average F calculated for the period 1999-2001 was 1.13 (Figure 1), well over the F10% limit of 0.84 applicable to the Cape Cod to Long Island Sound stock area (ASMFC 2000). Abundance of legal size lobster and recruit size lobster, or lobsters one molt away from the legal gauge, has declined in recent years (Figure 2). Average abundance for the period 1999-2001 was 0.80 million and 2.28 million for legal and recruit size lobsters respectively. These levels are comparable to that which existed in the late 1980's but well below the peak levels of the early 1990's. The decline in abundance of recruit and legal lobster from 1996 to 2001 was preceded by a decline in abundance of newly settled juveniles from 1990 to 1996 (Figure 3). This indicates that continuous over fishing of the resource was coincident with weakening recruitment to the stock at the youngest benthic life stage. It is not clear why recruitment has declined but over fishing of adults, an outbreak of shell disease, and increasing predation by finfish predators are likely responsible for the poor performance of the fishery in recent years (Figure 4). Very recent trawl survey data indicate that the abundance decline continues to present day and is most acute inshore. RIDFW surveys conducted in Narragansett Bay in the summer and fall of 2002 caught very few lobster of any size (Figure 5).

Although the new legislation does not allow for reductions in current participation through licensing, further restrictions on existing participants are possible. A projection scenario was run which reduced fishing mortality by 26% to the ASMFC $F_{10\%}$ level, i.e. no new licenses are issued and additional restrictions are placed on current participants beyond that required by ASMFC. This could be achieved for example by reducing RI area 2 traps from 186,579 to 139,580 or by closing the fishery from October through

January. Results indicate that the stock can increase in abundance and that landings can exceed 2001 levels if F is reduced to the reference point (Figure 6). Because both the assessment and management area cover multiple jurisdictions but the license restructuring legislation covers only RI state licenses, complications arise in projecting outcomes of various scenarios. For projections that reduce or add RI effort, one is assuming that comparable management actions are taken by other jurisdictions having fishers in area 2. Put another way, the projections pertain specifically to that share of the area 2 fishery and resource prosecuted by RI fishers. Unfortunately, that is not restricted to state waters making interpretation difficult.

Management Program- Lobsters are managed within state waters by the Department of Environmental Management with advice from the Rhode Island Marine Fisheries Council and RIDFW. Regional management of the lobster resource is the responsibility of the ASMFC. Amendment 3 to the fishery management plan (ASMFC 1997) and associated addenda govern the interstate management program and a peer reviewed coast wide stock assessment (ASMFC 2000) provides information on lobster biology and resource status. The Department complies with the local area plan through a set of management measures that includes minimum gauge and escape vent sizes, trap limits, and protection of egg-bearing females. The ASMFC management program is organized by area with Rhode Island part of inshore area 2. Both state (RI-MA) and federal waters are included in area 2 making cooperative management essential. The approved plan for area 2 requires a set of gauge and escape vent size increases during 2002-2005 to rebuild egg production to the F10% level. Future management under consideration for area 2 may include limits on participants and allowances for transfer of gear allocations between fishers.

Fishery Management Goals and Objectives -

Goal- The following goal is adapted from the coast wide goal of the Atlantic States Marine Fisheries Commission (ASMFC 1996).

Rhode Island will have a healthy American lobster 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 which minimize the risk of stock depletion and recruitment failure.
2. Extend size-age composition of the resource and increase yield per recruit in the fishery while maintaining harvest at a sustainable level.
3. Maintain existing social and cultural characteristics of the fishery wherever possible
4. Promote economic efficiency in harvesting and use of the resource
5. Increase understanding of American lobster biology and improve data collection, stock assessment models, and relationships between harvesters and scientists.

Licensing Options and Recommendations-

Current RI lobster fishers in state waters holding multipurpose or lobster fishing licenses are eligible for the new multipurpose or principal effort/shellfish endorsement licenses. These license holders would be entitled to fish consistent with existing regulations that are compliant with ASMFC Amendment 3. New entrants, eligible under the new basic harvest license, can be limited through the number of licenses issued and the harvest level authorized. Harvest level can be managed through seasons and trap limits. Various combinations of season length and trap limits for new basic licenses can be envisioned and translated into equivalent existing trap units using data on the distribution of landings by month and the average number of traps deployed by active fishers. Through the assessment-projection model, one can evaluate the impact of various new effort levels on future resource status and fishery performance. We assume that fishing mortality rate is proportional to the number of traps deployed although there is equivocal evidence on this (ASMFC 2000). More complicated relationships however, are beyond the scope of this demonstration. For closed season options, we assume that recoument, or more intense fishing during the remaining open period, does not occur. Depending on the fishing mortality rate objective (increased F , status quo F , or achieve $F10\%$), there may be impacts to existing fishers in terms of more restrictive regulations to offset the new effort. For example, if managers wanted to add new participants while simultaneously holding F at current levels or reducing it, existing fishers would need to give up traps. Closed seasons may substitute for trap reductions by closing periods with historic landings commensurate with the intended F reduction. Several examples are given below and many other permutations of licenses, seasons, and trap limits are possible. A final,

crucial assumption for all projections is that the inherent productivity of the stock in the future is similar to that of the past as embodied in the retrospective data. If factors such as shell disease and increased predation have impacted lobster productivity, the projections are overly optimistic.

Option One- Maintain current effort level with no new licenses and no change to current regulations. No reduction in fishing mortality rate is achieved and resource remains over fished. Abundance and landings remain at current levels (Figure 7).

Option Two- Maintain current effort level with no new licenses but follow approved ASMFC area 2 schedule of gauge and escape vent sizes. Abundance and landings increase as in Figure 6 but at a three lag due to phased in implementation of the gauge-escape vent increases during 2002-2005.

Option Two- Maintain current effort levels and follow the approved ASMFC area 2 schedule of gauge and escape vent sizes. In addition, issue 50 new 50-pot licenses -- i.e., 50 new Lobster endorsements for Commercial Fishing Licenses. In order to compensate for the resulting increase in effort and traps, reduce the trap allocations to current license holders by an equivalent amount -- i.e., by 2,500 traps.

Option Three- 10% addition of new effort over current levels. This amounts to 140 new licenses limited to a June through September season and a 200 trap limit. The same results can be expected with the addition of 50, full participation licenses. Fishing mortality rate rises without offset and abundance and landings remain at current levels (Figure 8). In order to maintain F at status quo levels or reduce to $F_{10\%}$, reductions in existing traps of 10% and 35% are required respectively.

Option Four- 25% addition of new effort over current levels. This amounts to 350 new licenses limited to a June through September season and a 200 trap limit. The same results can be expected with the addition of 120, full participation licenses. Fishing mortality rate rises without offset, landings remain near 2001 levels over the long term, and abundance is reduced over option 2 (Figure 9). In order to maintain F at status quo levels or reduce to $F_{10\%}$, reductions in existing traps of 25% and 50% are required respectively.

Option Five- 50% addition of new effort over current levels. This amounts to 700 new licenses limited to a June through September season and a 200 trap limit. The same results can be expected with the addition of 240, full participation licenses. Fishing mortality rate rises without offset, landings decline below 2001 levels over the long term, and abundance of both legal size and recruit lobster is substantially reduced over the status quo option (Figure 10). In order to maintain F at status quo levels or reduce to F10%, reductions in existing traps of 50% and 75% are required respectively.

In addition to overall stock status and landings impacts, effort inflation has implications for fishery performance at the individual licensee level. As new effort is added above current levels, landings per pot deployed in the fishery are reduced (Figure 11). The reduction is fairly small at low levels of effort inflation but becomes significant when effort is increased beyond 10%.

Recommendations- It is clear from the above that the lobster resource is over fished and undergoing a decline in abundance and fishery performance. The egg production rebuilding schedule of the ASMFC plan has not yet been met. Addition of new fishing effort from new participants will exacerbate these problems unless compensating restrictions are placed on current fishers. Accordingly, it is recommended that no new lobster licenses be issued and that the state continue to work within the ASMFC process to reduce fishing mortality and to rebuild the lobster resource throughout the region.

Since the recent abundance decline was not anticipated by the ASMFC plan, there may be a need for more stringent measures than those in place and currently contemplated by the plan. The ASMFC lobster board has tasked their technical committee with review of the situation. Depending on the committee's advice the board may need to revisit the adequacy of Amendment 3 and consider a new amendment or emergency actions. RIDFW will keep industry advised of ASMFC deliberations and will begin developing possible conservation measures to counteract the abundance decline and rebuild stock egg production. Industry will also be tasked with developing entrance/exit and license upgrade criteria for long term management of effort in the Rhode Island lobster fishery in anticipation of stock rebuilding.

The following specific regulations governing licensing for the commercial lobster fishery are recommended:

Regulation 1: All Rhode Island residents who possess a valid multi-purpose license as of December 31, 2002 shall be eligible to obtain a new Multi-Purpose License for 2003 and fish for lobsters at Full Harvest and Gear Levels, provided that all applicable application requirements are met.

Regulation 2: All Rhode Island residents who possess a valid commercial lobster license as of December 31, 2002 shall be eligible to obtain a new Principal Effort License with a lobster endorsement for 2003 and fish for lobsters at Full Harvest and Gear Levels, provided that all applicable application requirements are met.

Regulation 3: The Full Harvest and Gear Levels for lobsters shall be the same harvest and gear restrictions in effect as of January 1, 2003, subject to modification, by rule, during the 2003 license year in accordance with the state's existing fisheries management program.

Regulation 4: No new Multi-Purpose Licenses, Principal Effort Licenses with Lobster endorsements, or Commercial Fishing Licenses with Lobster endorsements shall be available for 2003, except pursuant to sections 6.7-6 and 6.7-7 of the *Rule and Regulations Governing the Management of Marine Fisheries*.

Current Regulations Pertaining to Effort Limitations- R.I. Marine Fisheries Statutes and Regulations

15.11 Minimum Size of Lobsters Taken -- Egg Bearing Females

(a) Unless otherwise specified by regulations adopted by the Marine Fisheries Council, no person shall catch or take from any of the waters within the jurisdiction of this State or have in his or her possession within this State any lobster or parts thereof, cooked, or uncooked, which is less than the size specified in the minimum gauge increase schedule described below, and as measured from the rear of the eye socket along a line parallel to the center line of the body shell to the rear end of the carapace.

6/1/2000	3-9/32" (83.34mm)	That is a 1/32" increase in minimum gauge size [up from 3-1/4" (82.55mm)]
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(b) No person shall have in his or her possession within this State any female lobster bearing eggs or from which the eggs have been brushed or removed.

(c) In addition to any penalties specified in other Sections of this Chapter, every person violating any of the provisions of this Section shall be fined not less than fifty

dollars (\$50) nor more than five hundred dollars (\$500) for each lobster in violation of this regulation or be imprisoned not exceeding thirty (30) days, or both. Any person, licensed under this Chapter, catching and taking any lobster as described in subsections (a) or (b), and immediately returning the lobster alive to the water from which it was taken shall not be subject to these fines or penalties. The possession of any lobster as described in subsection (a) or (b), cooked or uncooked, shall be prima facie evidence that the lobster was caught and taken in violation of this Section. Any person convicted a second time of a violation of this Section shall be fined five hundred dollars (\$500) and be deprived of the privilege of fishing for lobsters within the State for three (3) years after conviction under a penalty of sixty (60) days' imprisonment or a fine of five hundred dollars (\$500) or both for each offense. (ref RIGL 20-7-10) (Revocation of license under RIGL. 20-7-7 - Part 15.7)

15.12.2 Maximum Trap Size -- It shall be unlawful to place, set, keep, maintain, supervise, lift, raise, or draw in from any of the waters in the jurisdiction of this state, or cause to be placed, set, kept, maintained, supervised, lifted, raised, or drawn in from any of those waters any pot or other fixed gear contrivance designed or adapted for the catching or taking of lobsters, with a volume greater than 22,950 cubic inches.

15.12.3 Trap Limit/Reduction Schedule - Effective June 1, 1999, it shall be unlawful for any person licensed under this chapter to place, set, keep, maintain, supervise, lift, raise, or draw in from any of the waters in the jurisdiction of this state any pot or other fixed gear contrivance designed or adapted for the catching or taking of lobsters which exceeds the trap limits allowed by the following schedule:

6/1/1999	1200 traps per vessel
6/1/2000	1000 traps per vessel
6/1/2001	800 traps per vessel

RIMFC REGULATION [Penalty - Part 3.3 (RIGL 20-3-3)]

15.13 Escape Vent Sizes - Penalty -- Effective June 1, 1999, it shall be unlawful to fish for or take lobsters by use of any lobster trap within the territorial waters of the State of Rhode Island unless the trap is equipped with:

15.13.1 Subsection I

15.13.1-1 A rectangular escape vent with an unobstructed opening not less than 1 - 15/16 inches (49.2mm) by 5-3/4 inches (146mm); or

15.13.1-2 Two circular escape vents, each with an unobstructed opening not less than 2 - 7/16 inches (61.9mm) in diameter; or

15.13.1-3 An unobstructed gap caused by raising both ends of a bottom lath in the parlor section 1 - 15/16 inches (49.2mm) from the bottom; or

15.13.1-4 An unobstructed gap caused by separating both ends of 2 vertical laths on the end of the parlor section by 1 - 15/16 inches (49.2mm); or

15.13.1-5 An unobstructed gap created by cutting wires in a wire trap in such a manner as to meet the minimum size and number of vents required under Paragraphs 15.12.2-1 and 15.12.1-1.

15.13.1-6 Lobster traps not constructed entirely of wood must contain a ghost panel with the following specifications:

(a) The opening to be covered by the ghost panel must be rectangular and shall not be less than 3-3/4 inches (9.53 cm) by 3-3/4 inches (9.53 cm).

(b) The panel must be constructed of, or fastened to the trap with one of the following untreated materials: wood lath, cotton, hemp, sisal, or jute twine not greater than 3/16 inch (0.48 cm) in diameter, or non-stainless, uncoated ferrous metal not greater than 3/32 inch (0.24 cm) in diameter.

(c) The door of the trap may serve as the ghost panel if fastened with a material specified in previous paragraph.

(d) The ghost panel must be located in the outer parlor(s) of the trap and not the bottom of the trap.

15.13.2 Subsection II -- The vent or gap shall be: installed or made in the parlor section on the sides or end panel. No horizontal rectangular vent or gap or circular vent shall be located more than three (3) inches from the sill of the trap. Traps equipped with multiple parlor sections must adhere to the escape vent requirements specified above in each parlor section. Any fisherman not complying with the provisions of Section 1 or Section 2 shall be fined not more than twenty dollars (\$20) for each trap not conformed to the specifications.

(RIMFC REGULATION) (Penalty 20-1-16 - Part 1.16 and 15.12)

15.14.1-12 - Trap Limits and Trap Tag Allotments – The following table describes the trap limits, schedule of trap reductions, and maximum allotment of trap tags for Rhode Island state waters of ASMFC Lobster Management Area 2. The maximum trap tag allotment includes a 10% over-allotment for routine losses.

Lobster Management Area	License Type	Effective Date	Trap Limit	Trap Tag Allotment
2	State only	6/1/2000	1,000	0 - 1,100
2	State only	6/1/2001	800	0 - 880

15.14.1-13 - In state waters, no vessel shall deploy, place, set, keep, maintain, supervise, lift, raise, or draw in or from any waters in the jurisdiction of this state any lobster trap gear (1.3 Definition) that has not been affixed with a valid lobster trap tag pursuant to RIMFC regulation 15.14.1 issued to the owner/operator of the vessel.

RIMFC REGULATION [Penalty 3.3 (RIGL 20-3-3)]

15.17 Raising Pots at Night -- No person shall raise or unduly disturb any lobster pot or trap within the territorial waters of this State between the hours of one (1) hour after sundown and one (1) hour before sunrise. Every person violating this Section shall, upon conviction, be fined not less than one thousand dollars (\$1,000) nor more than five thousand dollars (\$5,000), or be imprisoned not exceeding one (1) year, or both. However, in situations of emergency upon application being made, the owner of the lobster pots or traps may be authorized to remove the pots or traps by the Director of Environmental Management or the Director's designee during the prohibited hours. All boats, pots, or other equipment used in violation of this Section shall be seized and forfeited to the State. (RIGL 20-7-13)

15.18 Landings of lobsters taken by gear or methods other than trap – Limits

Landings by fishermen using gear or methods other than traps (non-trap fishermen) will be limited to not more than 100 lobsters per day (based on a 24-hour period) up to a maximum of 500 lobsters per trip, for trips of five (5) days or longer. RIMFC REGULATION [Penalty - Part 3.3 (RIGL 20-3-3)]

15.21 Blue Crabs – Harvest Restrictions -- No person shall possess, take or attempt to take more than twenty-five (25) blue crabs from any of the waters in this State except when taken by a scoop or crab net, trot, or hand line. Taking of blue crabs shall be restricted to residents of this State. No person shall take blue crabs from the waters of the State between the hours of sunset and sunrise. RIMFC REGULATION [Penalty - Part 3.3 (RIGL 20-3-3) ref (RIGL 20-7-15)]

15.24 Horseshoe Crabs – It is illegal for any person to harvest horseshoe crabs, Limulus polyphemus, in Rhode Island for commercial purposes without a multi-purpose commercial marine license and a Horseshoe Crab Harvest Permit; or to harvest horseshoe crabs for recreational purposes without a Horseshoe Crab Harvest Permit.

15.24.1 Harvest Permit – Persons harvesting horseshoe crabs from the shoreline or waters in the State of Rhode Island must apply for a Horseshoe Crab Harvest Permit from the Division of Fish and Wildlife. A Horseshoe Crab Harvest Permit

is required for all harvesters of horseshoe crabs. Horseshoe Crab Harvest Permits shall be valid only for the calendar year of issuance. The conditions of the permit requires a weekly report of landings either by telephone or in writing. In addition, a monthly report in writing is required on forms furnished by the Division of Fish and Wildlife. The report must include the number of crabs taken, locations of harvest, and use (bait, biomedical purposes, or other reasons). These reports shall not be made public and shall be kept only for statistical purposes. Failure to report will result in forfeiture of the Harvest Permit and/or revocation of license and permit as provided for in RIGL 20-4-5.

15.24.2 Quota – A total allowable harvest (quota) of horseshoe crabs for the bait fishery and biomedical industry will be established annually. The quota will be the amount allocated to the State of Rhode Island by the Atlantic States Marine Fisheries Commission (ASMFC) or as determined by the R.I. Division of Fish and Wildlife based on the current stock status. The quota may only be harvested by licensed, permitted commercial fishermen in accordance with all rules and regulations promulgated by the Rhode Island Marine Fisheries Council or the Rhode Island Department of Environmental Management.

15.24.3 Possession

- A. Commercial – Bait and biomedical fishery – Any person issued a multi-purpose commercial marine license and Horseshoe Crab Harvest Permit may possess horseshoe crabs in numbers not to exceed the established annual quota. Horseshoe crabs employed in the biomedical industry for purposes of extracting bodily fluids shall be returned to the waters from which they came within 72 hours following the completion of the intended biomedical procedure. For the year 2001 the Department has established a quota of 14,655 crabs for the bait fishery and 34,194 crabs for the biomedical industry.
- B. Recreational – Any R.I. resident with a Horseshoe Crab Harvest Permit may possess not more than five (5) horseshoe crabs in any calendar day.

15.24.4 Harvesting Restrictions

- A. No person shall harvest horseshoe crabs for commercial or recreational purposes on or within 100 feet seaward of Patience and Prudence Islands in Narragansett Bay.
- B. No person shall harvest horseshoe crabs from waters or shoreline of the state during the period 48-hours preceding and 48-hours following the new and full moons during the months of May, June, and July, annually.

(DEM - Director REGULATIONS)

Suggested Regulatory Changes

- o Change statutory language to reflect new licensing bill

- Specify basic harvest level (trap limit)
- Specify basic harvest license season
- Harvest limits and season for principal effort and multipurpose license holders would be those currently in place
- Specify eligibility requirements for license upgrade
 - Commercial license holder must demonstrate a minimum of ? during previous two years

Other Crustaceans

Stock Status- The commercial crab fishery in state waters is relatively small with landings of Jonah, rock, and blue crabs being made. Horseshoe crabs, although not a true crab, are also harvested. Total Rhode Island landings of these species are currently about 3 million pounds, worth 2 million dollars. However, only a small amount of this is taken from state waters. Landings of deep sea red crabs are also made but these come strictly from federal waters and participation is limited by federal permit. The various crab stocks are not routinely assessed by the RIDFW but increasing survey abundance and landings trends suggest a healthy resource (Figure 12).

Horseshoe crabs in Rhode Island were found to be over fished and at low abundance (Gibson and Olszewski 2001). A quota system with additional seasonal harvest restrictions has been instituted and landings have been reduced to low levels (Figure 13).

Management Program- Crustaceans other than lobster and horseshoe crabs are managed in state waters by the Department of Environmental Management with advice from the Rhode Island Marine Fisheries Council. The Department uses minimum sizes, seasons, quotas, and possession limits to manage the state waters fishery.

Fishery Management and Licensing Recommendations- No changes are recommended to the management program for other crustaceans and horseshoe crabs. Crab landings and abundance are following increasing trends and no new restrictions are needed. The spawning period closures have greatly restricted the horseshoe crab fishery and no additional limits are needed. New commercial licenses need not be limited and can have harvest levels equal to current licensees.

The following specific regulations governing commercial licensing for crustacean fisheries other than lobster are proposed:

Regulation 1: All Rhode Island residents who possess a valid multi-purpose license as of December 31, 2002 shall be eligible to obtain a new Multi-Purpose License for 2003 and fish for all crustacean species available for commercial harvest at Full Harvest and Gear Levels.

Regulation 2: All Rhode Island residents who possess a valid commercial lobster license as of December 31, 2002 shall be eligible to obtain a new Principal Effort License with a Non-Lobster Crustacean endorsement for 2003 and fish for all non-lobster crustacean species available for commercial harvest at Full Harvest and Gear Levels, provided that all applicable application requirements are met.

Regulation 3: New Commercial Fishing Licenses with Non-Lobster Crustacean endorsements will be available for 2003. Any Rhode Island resident shall be eligible to obtain said license and endorsement and fish for all crustacean species available for commercial harvest, except lobster, at Basic Harvest and Gear Levels, provided that all applicable application requirements are met.

Regulation 4: Basic and Full Harvest and Gear Levels for all crustacean species commercially available under the Non-Lobster Crustacean endorsement shall be the same harvest and gear restrictions in effect for such species as of January 1, 2003, subject to modification during the 2003 license year in accordance with the state's existing fisheries management program. There will be no difference between Basic and Full Harvest and Gear Levels for crustacean species subject to the Non-Lobster Crustacean endorsement.

Current Regulations Pertaining to Effort Limitations- R.I. Marine Fisheries Statutes and Regulations-See lobster regulation section above.

Suggested Regulatory Changes

- No changes needed for open fishery other than to specify license type required for this endorsed sector

Literature Cited

Atlantic States Marine Fisheries Commission (ASMFC). 2000. American lobster stock assessment report for peer review. Stock assessment report No.

00-01 (Supplement) of the Atlantic States Marine Fisheries Commission.
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Gibson, M.R. 1999. Assessment of the American lobster in the Rhode Island inshore area. RI Division of Fish and Wildlife. Res. Ref. Doc. 99/1.

Gibson, M.R. 2000. Alternative assessment and biological reference points for the Rhode Island inshore lobster stock with estimations of unfished stock size. Report to the Atlantic States Marine Fisheries Commission and lobster assessment peer review panel.

Gibson, M.R., and S. Olszewski. 2001. Stock Status of Horseshoe Crabs in Rhode Island in 2000 with Recommendations for Management. RI Division of Fish and Wildlife. Research Reference Document 01/01.

Fig.1- RI Inshore Lobster Fishing Mortality Rate From DeLury Assessment Model Compared to ASMFC Overfishing Definition for SCCLIS Area

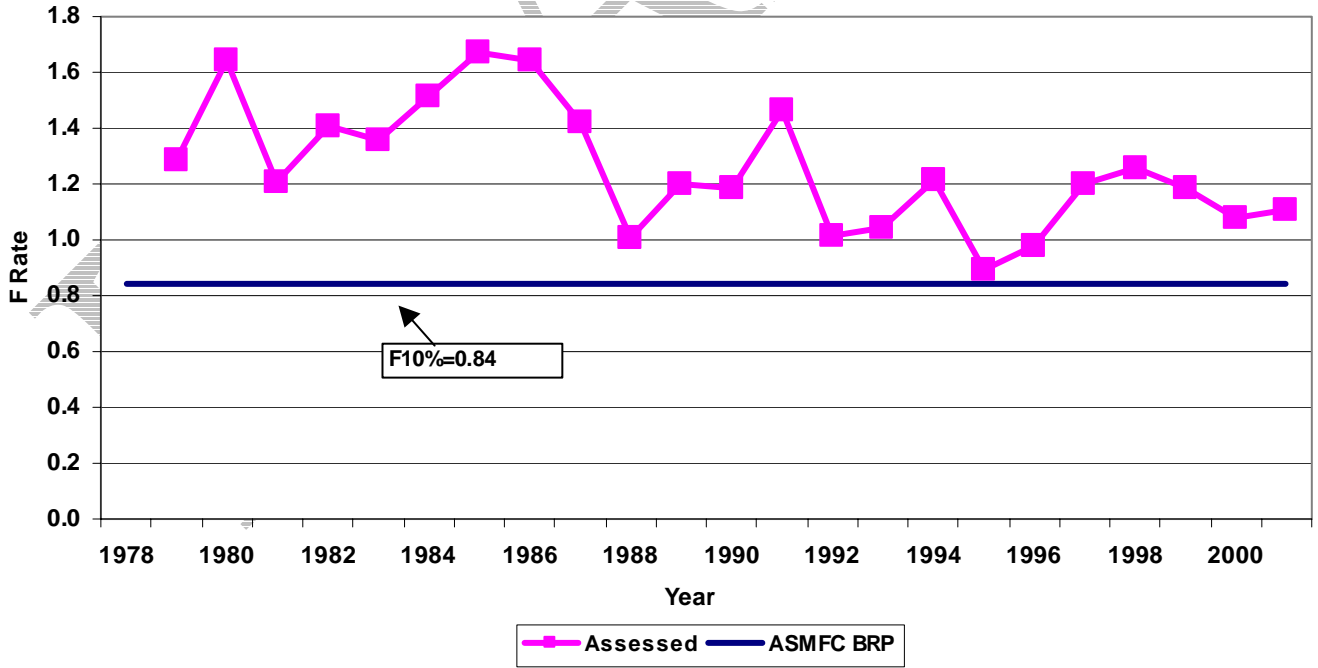


Fig. 2- RI Inshore Lobster Abundance From DeLury Assessment Model

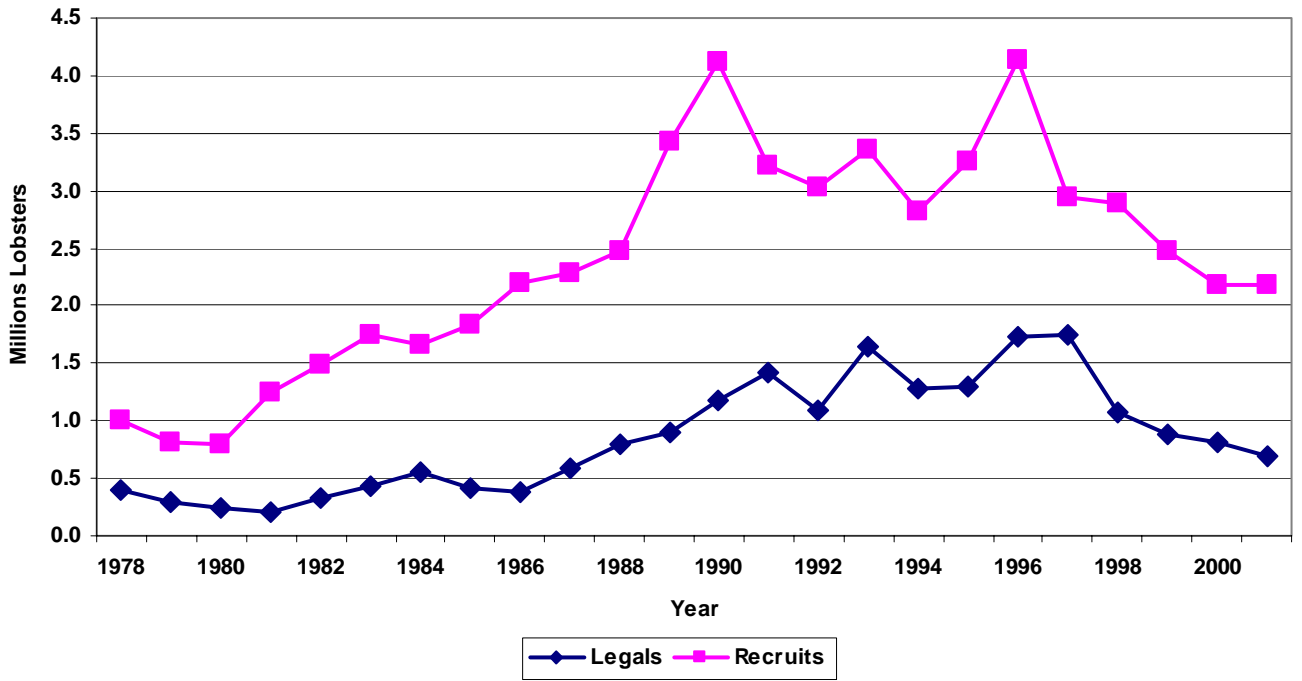


Figure 3- RI Lobster YOY Settlement Index from Wahle Suction Sampler Survey

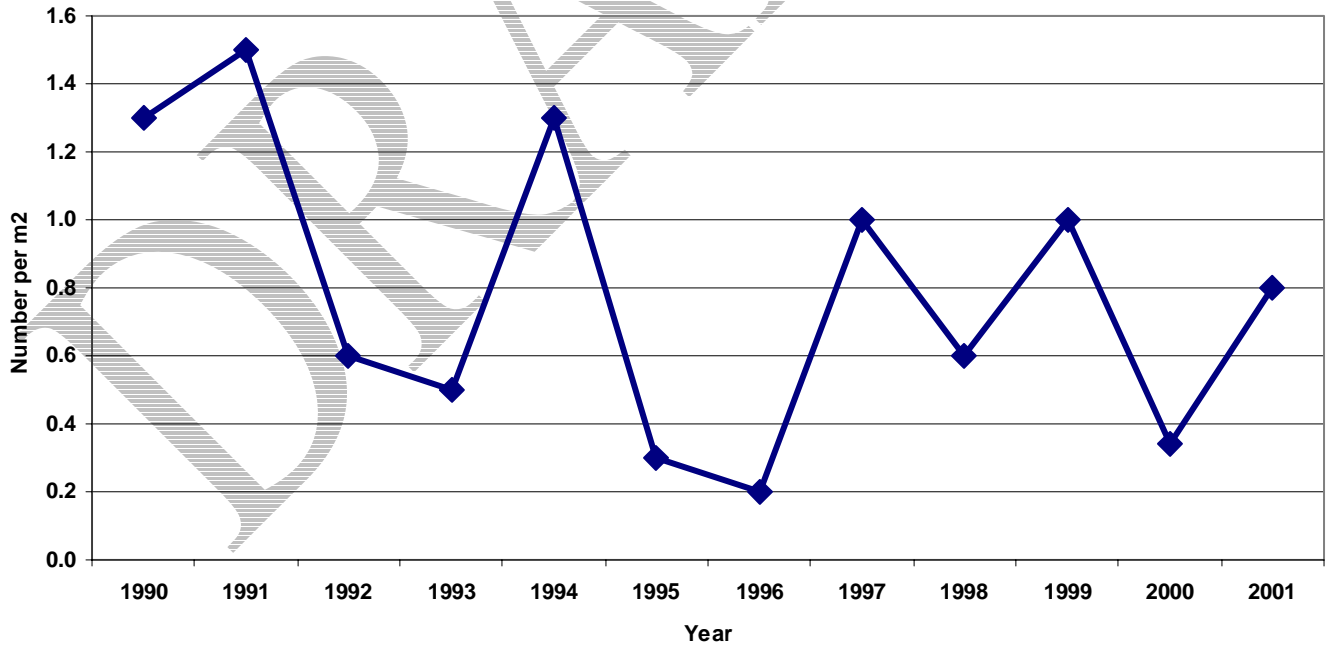


Figure 4- RI Inshore Lobster Landings in Number and Fishery Catch per Unit Effort

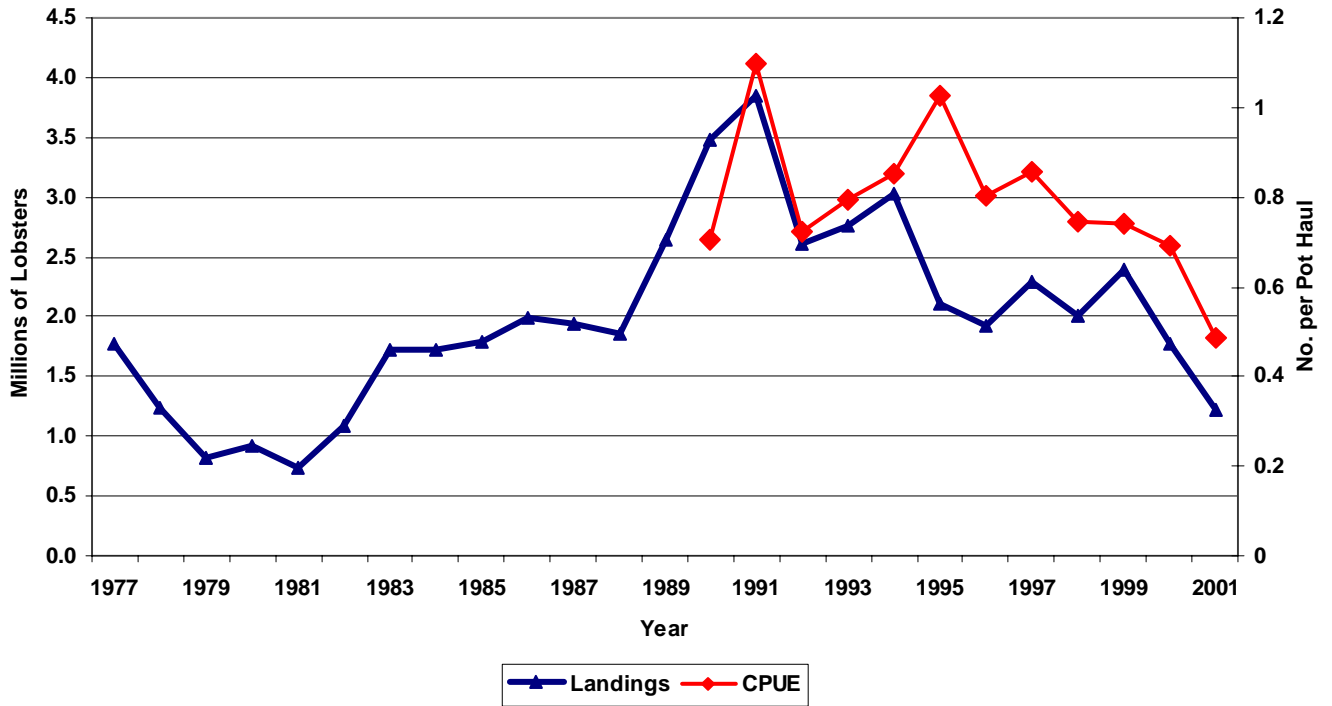


Fig.5- Lobster Abundance Indices by Size Class from the RIDFW Monthly Trawl Survey in Narragansett Bay, June-September Data

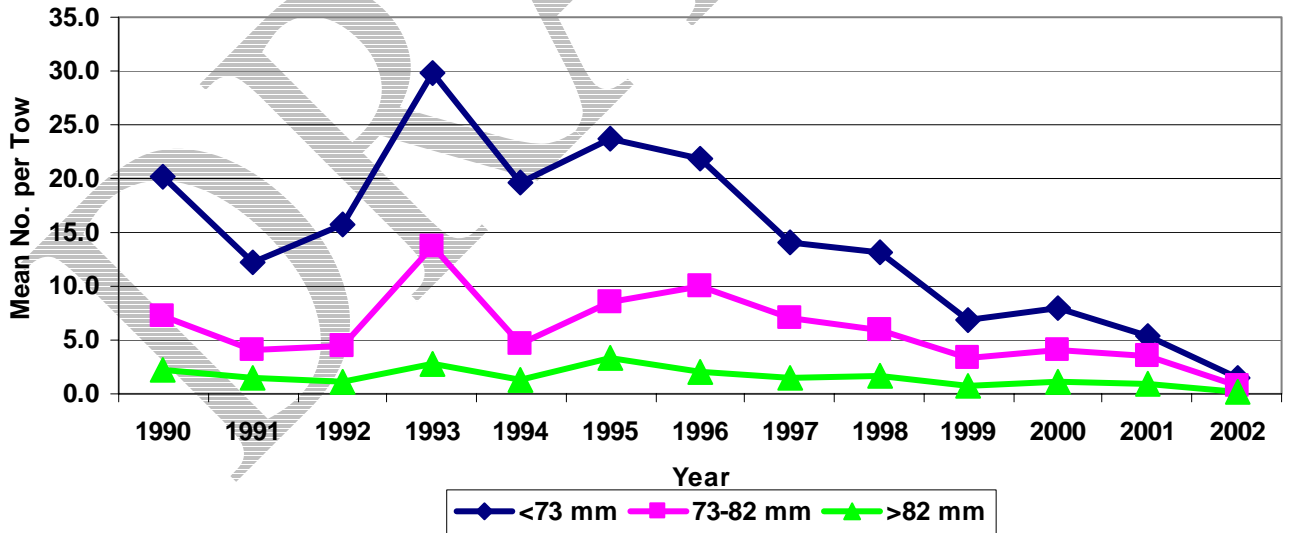
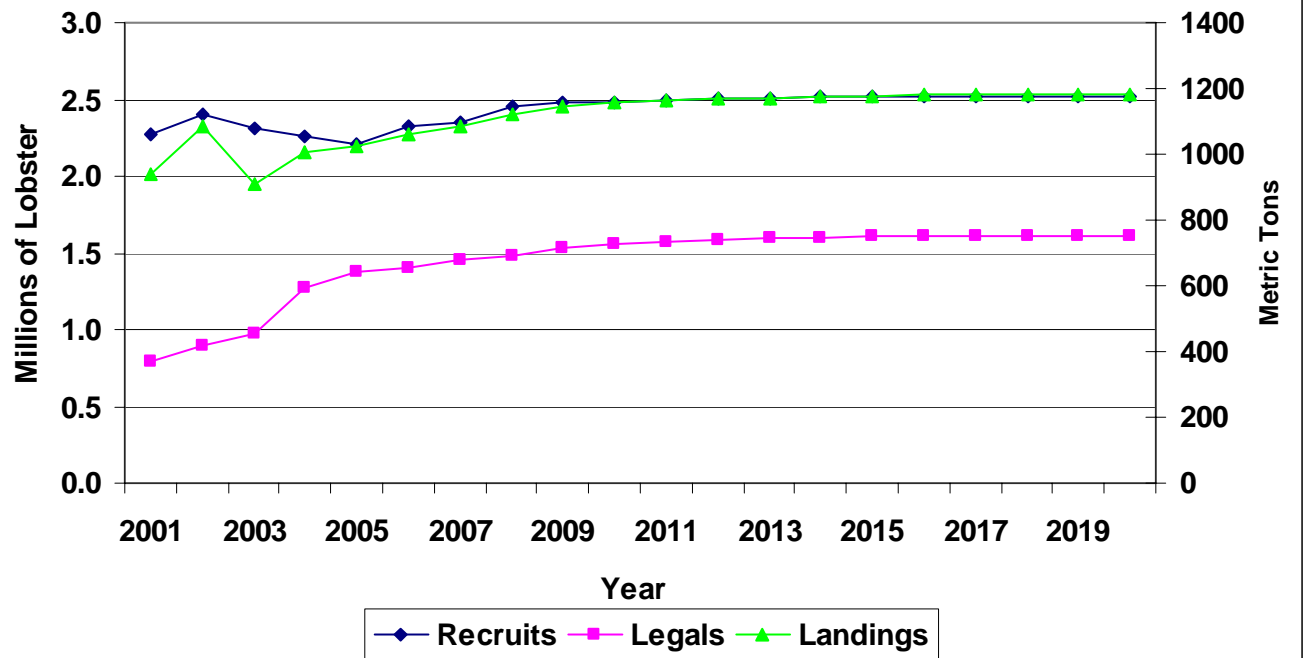


Fig.6 - RI Inshore Lobster Stock Abundance and Landings Projection With Effort Reduced to ASMFC 10% Level



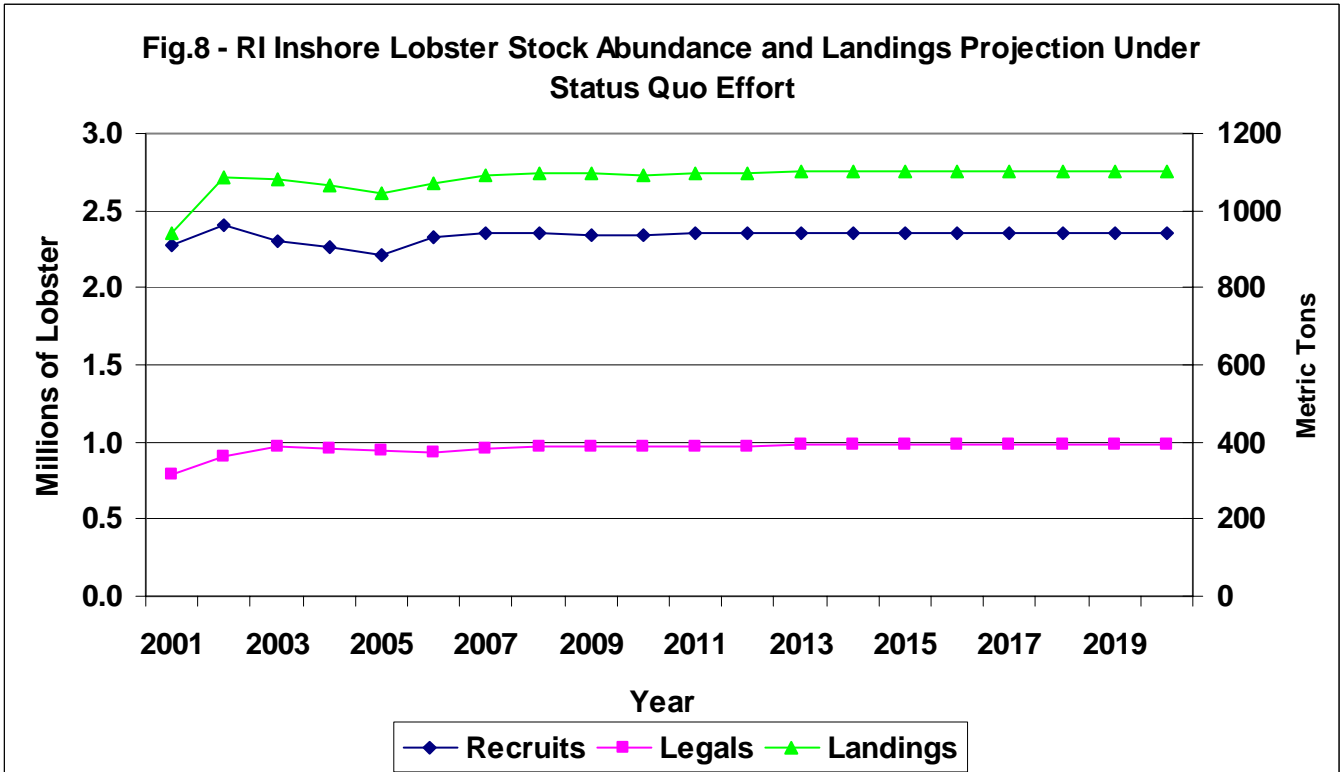
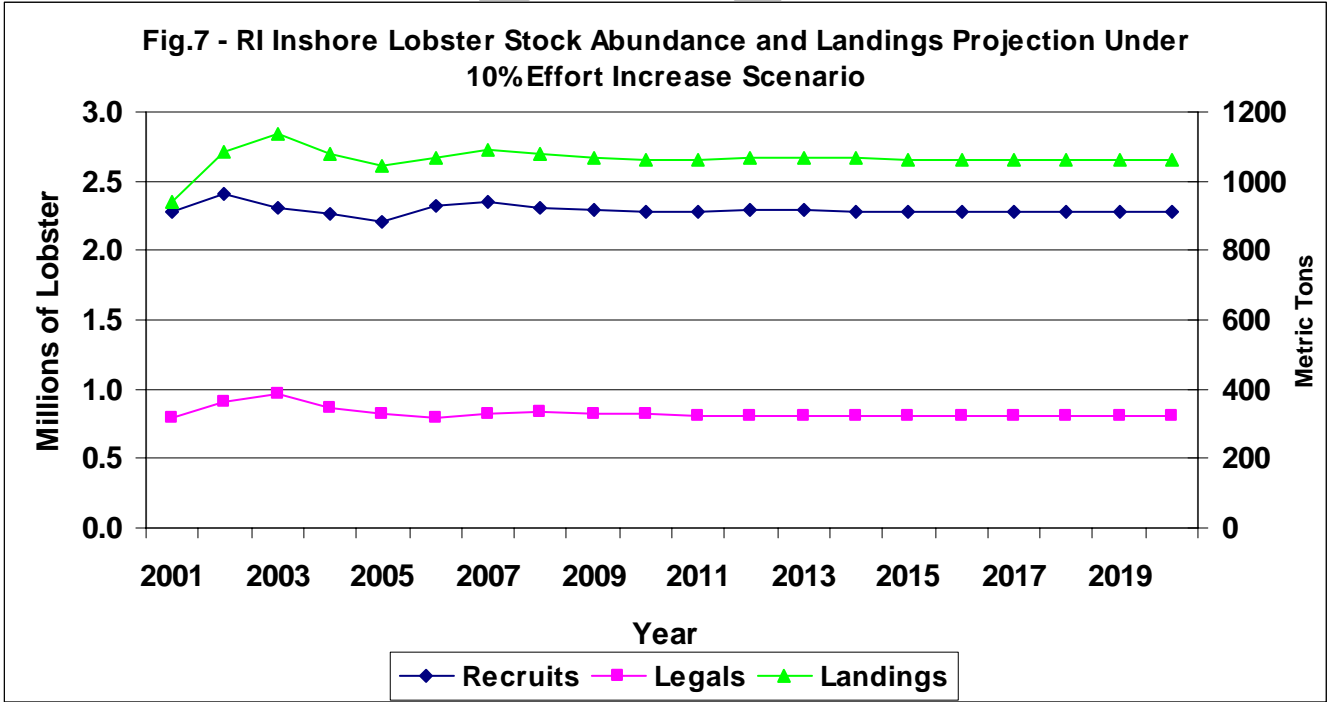


Fig.9 - RI Inshore Lobster Stock Abundance and Landings Projection Under 25% Effort Increase Scenario

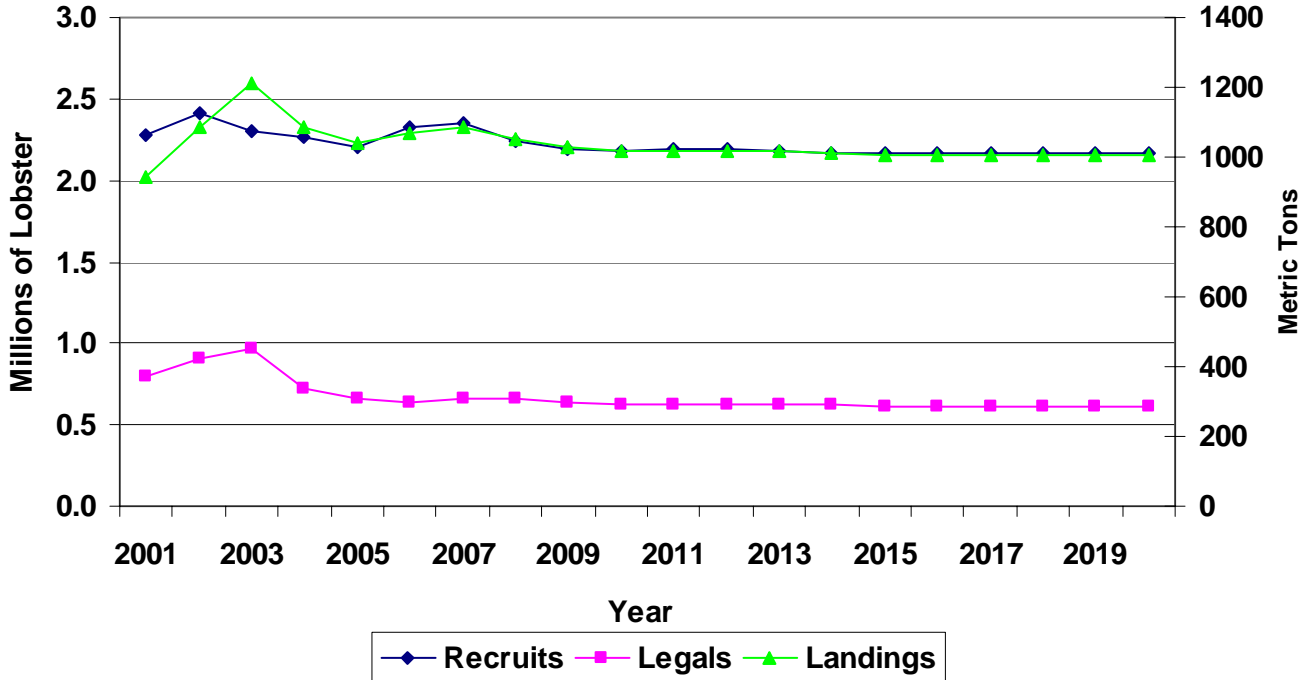


Fig.10- RI Inshore Lobster Stock Abundance and Landings Projection Under 50% Effort Increase Scenario

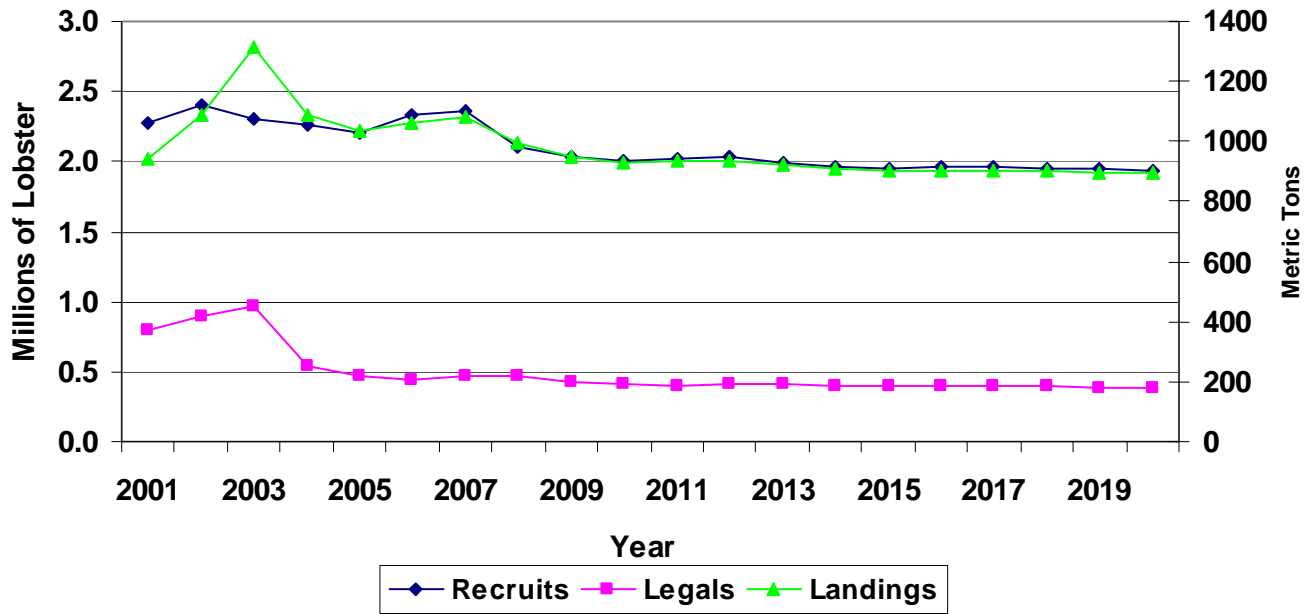


Fig. 11- Average Future Lobster Landings per Pot in the RI Inshore Fishery vs. Effort Inflation Level from New Licenses

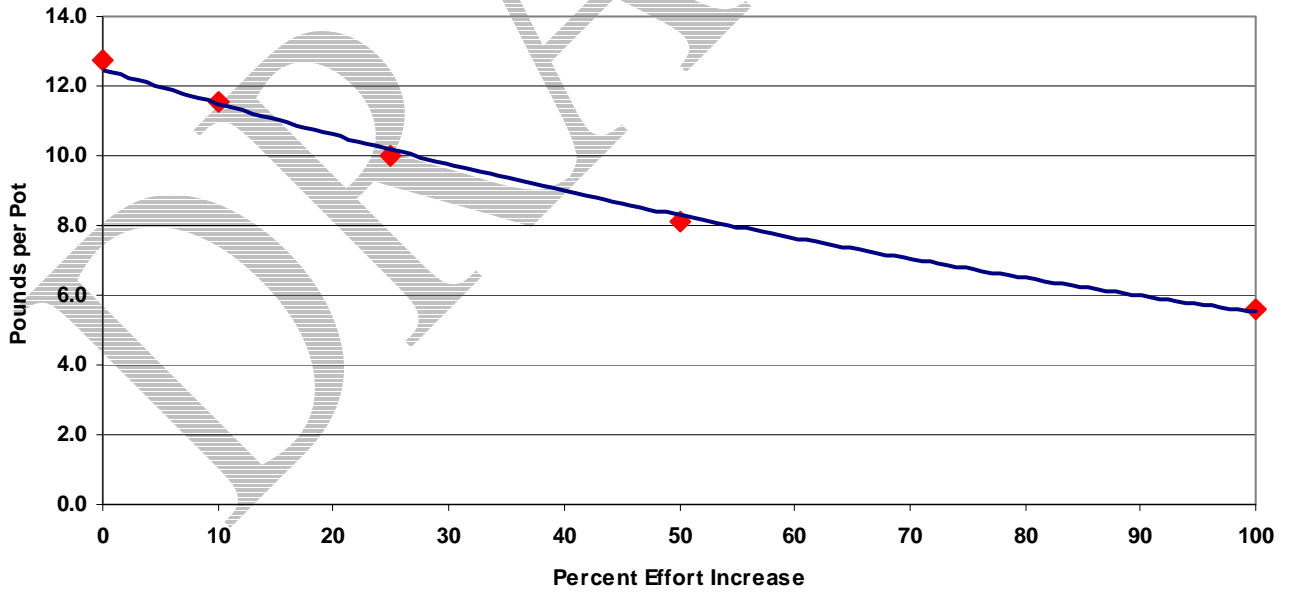


Fig.12 - RI Landings of Cancer Crabs and Abundance in the URIGSO Trawl Survey in Narragansett Bay

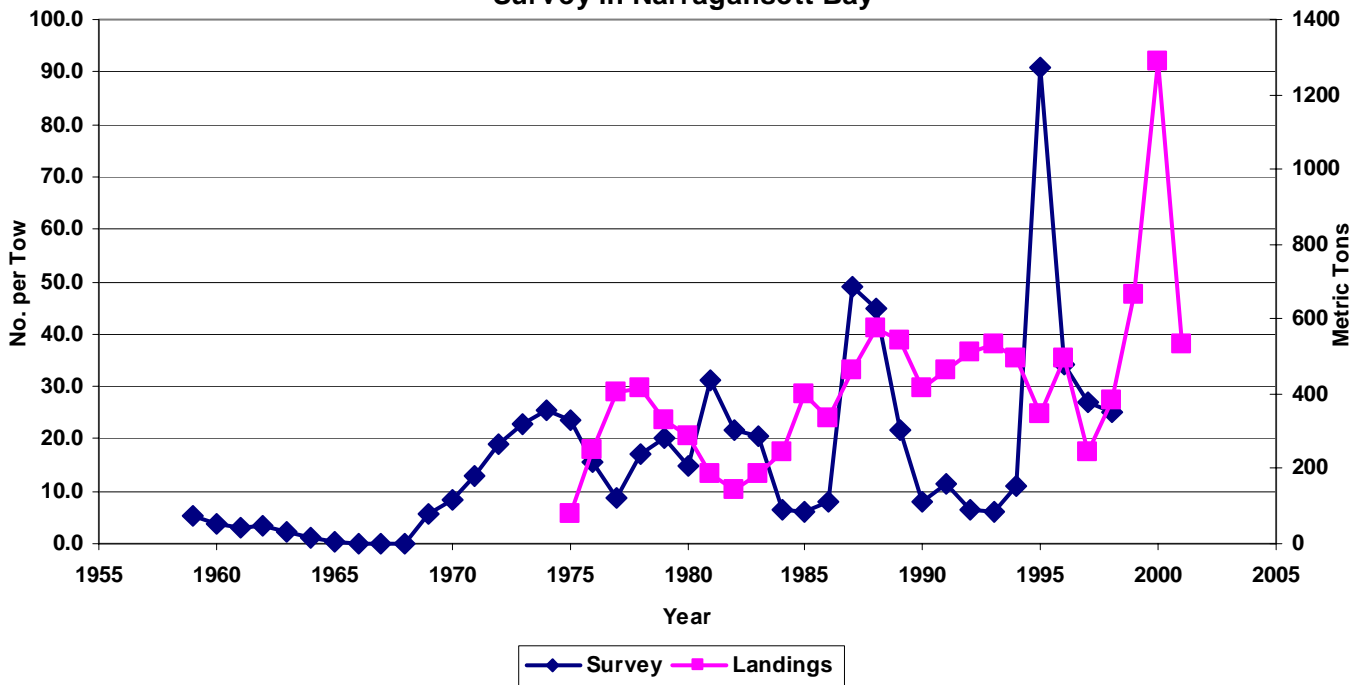


Fig.13- RI Horseshoe Crab Estimated Absolute Abundance and Landings

