

2015 Maryland FMP Report (August 2016)

Section 11. Maryland Coastal Bays Hard Clam (*Mercenaria mercenaria*)

Hard clam stocks throughout the Coastal Bays either increased or were stable, but with the exception of the St. Martin River, remained below historic baseline levels. It will probably take several more years for these populations to reach benchmark densities. As a result of the relatively low population levels and the ban on mechanical harvesting, there has been little or no commercial activity for hard clams reported; the recreational harvest is unknown. A bill to reinstate mechanical harvesting except for hydraulic escalator dredging in the southern portion of the Coastal Bays was introduced during the 2016 legislative session but did not pass.

Coastal Bays FMP

Recognizing Maryland's Coastal Bays as a separate, unique ecosystem from the Chesapeake Bay, a Comprehensive Conservation Management Plan (CCMP) was adopted for Maryland's Coastal Bays in 1999. The plan recommended that the Maryland Department of Natural Resources (MDNR) address fishery issues specific to Maryland's Coastal Bays, including those related to hard clams, the primary molluscan shellfish resource in the region. In accordance with this plan, a Coastal Bays Hard Clam Fishery Management Plan (FMP) was adopted in 2002 to conserve the coastal stock, protect its ecological and socio-economic values, and optimize the long-term utilization of the resource. During 2010, the Coastal Bays Hard Clam Plan was reviewed by the Plan Review Team (PRT). The PRT recommended a revision of the plan because the majority of actions are no longer valid due to the ban on mechanical harvesting. A time line for revising the plan has not been developed yet.

Stock Status

Since 1993, the MDNR Shellfish Division has conducted fishery-independent hard clam surveys in the Maryland Coastal Bays. During the six years since the enactment of the dredging ban, trends in the survey findings have varied depending on geographic region. In 2015, hard clam densities in all five bays were either stable or have increased. The St. Martin River, which historically had very low hard clam densities, continued to improve and now exceeds the 1953 baseline (the first of the coastal components to do so). Recruitment has also been variable by region but overall appears to have increased slightly.

During the first two years following the elimination of hydraulic escalator dredging, the southern bays (Chincoteague and Newport) continued to experience declining hard clam densities. Hard clam densities in Chincoteague Bay fell to record low levels, a full order of magnitude below the 1952 benchmark. Since 2010 this trend has reversed, with Chincoteague Bay densities doubling to 1993 levels, where they

have remained for the past four years at 20% of historic densities (Figure 1). Likewise, the hard clam population has more than doubled in Sinepuxent Bay since 2012, and is now at about 72% of its 1953 level. Equally encouraging results have been seen in the northern bays (Assawoman and Isle of Wight), which have had relatively substantial increases since dredging was eliminated. Note that this population expansion actually began before the dredging ban went into effect with sizable recruitment to the population evidenced in 2008 that subsequently went unharvested. Particularly in Isle of Wight, which generally experiences good hard clam recruitment, the post-dredging ban average hard clam density has nearly tripled the pre-ban average (Figure 2). However, over the past five years Isle of Wight clam densities have leveled off below their historic highs, and recruitment has sharply dropped. The population in Assawoman Bay has increased seven-fold from critically low densities in 2006, with a 33% increase in the last year alone, but is still about 48% of the historic benchmark.

Despite the great improvement in Isle of Wight Bay, hard clam densities remain well below historic benchmarks in the remaining regions of the Coastal Bays. The causes of these generally poor densities have not been determined. Low population densities could result from recruitment failures due to unfavorable water quality conditions for hard clam survival¹ (such as brown tide blooms) and possible increased predation by blue crabs² and other predators such as cownose rays.

Current Management Measures

Hard clam minimum size limit is 1" in the transverse dimension and only hand-held harvesting devices are allowed in the Coastal Bays. In 2007, the Maryland state legislature passed a law prohibiting the harvesting of clams and oysters in the Coastal Bays by hydraulic escalator dredge, power dredging, or other mechanical means. This statute went into effect in September, 2008 and essentially eliminated the commercial fishery. The fishery may resume at some point in the future if stocks build to densities high enough to support manual means of harvesting. The minimum size for the recreational fishery is 1" (transverse measurement) with a 250/person/day limit; a license is not required.

The Historical Fishery

Commercial effort and harvest has varied over the years. Harvests in the mid-1990's were below 25,000 pounds per year. Successful recruitment during this period was followed by an increase in landings, which exceeded 100,000 pounds in 1999 and peaked at 163,000 pounds in 2002. Since the prohibition of hydraulic dredging in 2008, commercial fishery landings have been non-existent or negligible. The statewide harvest was reported to be only 368 pounds in 2010,³ the last year for which landings are available. Information from the recreational fishery is largely unknown.

Aquaculture activities have been slowly expanding in recent years. In 2015, there were 19 active leases covering 181 acres. Both hard clams and oysters were being raised on these leases. Production figures were not available.

Issues and/or Concerns

Most of the strategies and actions in the 2002 Coastal Bays Hard Clam Fishery Management Plan were developed to address hydraulic dredging. Since the use of hydraulic dredges is prohibited, these strategies and actions are now obsolete. A revised plan is scheduled for development.

A bill introduced during the 2016 Maryland legislative session would have allowed mechanical harvesting in the southern Coastal Bays (below the Verrazano Bridge) but did not pass into law. This legislation would have substantially increased fishing mortality on a still depleted hard clam population. The clams in this region remain well below historic baseline densities and the population needs more time to recover.

User conflicts and stakeholder opposition, especially from shoreline property owners, continue to hinder the expansion of hard clam aquaculture in the Maryland Coastal Bays. One lease application initiated in 2009 was finally approved in 2016.

Non-native green crabs (*Carcinus maenas*) have been introduced, most likely as bait bucket introductions. This species has been recognized by the federal Aquatic Nuisance Species Task Force as an aquatic nuisance species. Green crabs are known clam predators and their impact on the hard clam population is uncertain. Although small pockets of green crabs may be established in the Coastal Bays, they are neither abundant nor widely distributed. The green crab is listed as a “species prohibited from transport” in MD (COMAR 08.02.19.04) and they may not be collected and used as bait in areas where they are not established.

Compliance with the National Shellfish Sanitation Program (NSSP) model ordinance is currently in place and affects the handling of hard clams intended for human consumption. Handlers are required to cool clams and deliver them to Department of Health and Mental Hygiene (DHMH) certified shellfish dealers within 12 hours after harvest (or cooled to specific temperatures within 12 hours).

Figure 1. Chincoteague Bay hard clam densities before and after the dredging ban and the historic benchmark density (red bar) (MDNR data)

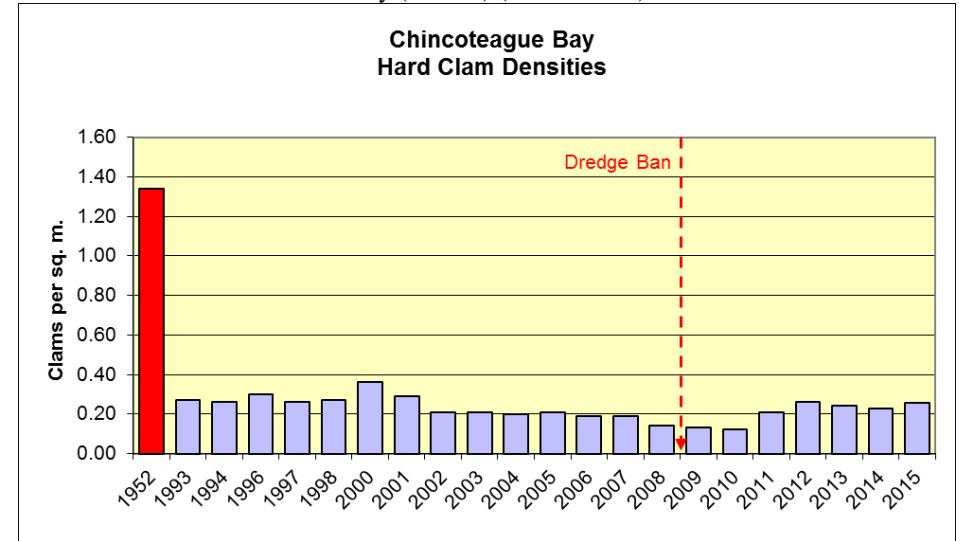
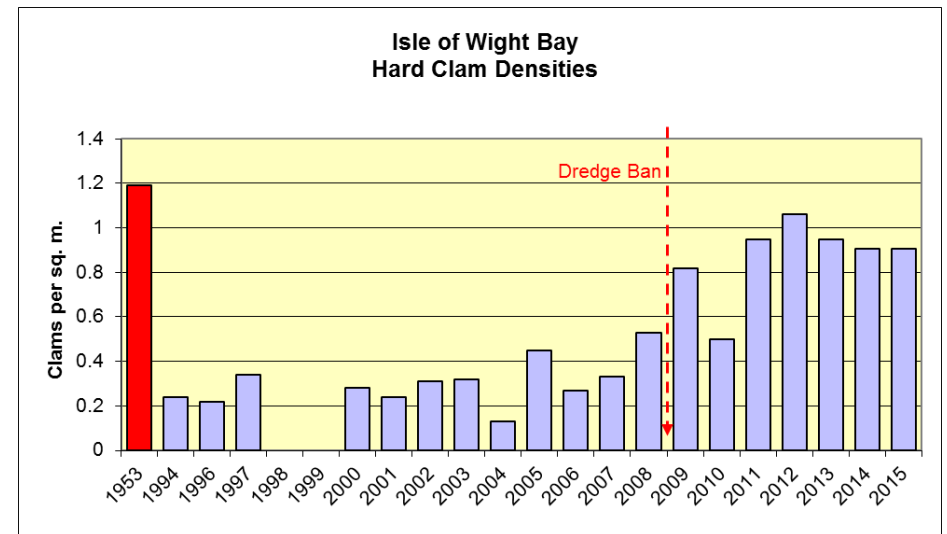


Figure 2. Isle of Wight Bay hard clam densities before and after the dredging ban and the historic benchmark density (red bar) (MDNR data).



References

1. University of Maryland Center for Environmental Science. Integration and Application Network. Indicators – Coastal Bays Health Index – Maryland Coastal Bays Report Card – EcoCheck. 2009. http://www.eco-check.org/reportcard/mcb/2009/indicators/coastal_bays_health_index/
2. Tarnowski, M. 2007. Hard-Shell Clam *Mercenaria mercenaria*. http://www.dnr.state.md.us/fisheries/fishfacts/hardshell_clam.asp
3. Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD.
4. Waterway Improvement Capital Program Benefits, Needs, and Opportunities. 2011. Legislative report prepared in response to the 2011 Joint Chairman's Report, Sept. 2011. 23p.

| 2002 Coastal Bays Hard Clam Fishery Management Plan (updated 09/16) | | |
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| Objective/Problem | Action | Implementation |
| Obj.1. Enhance and perpetuate hard clam stocks. Prob 1.1: Mortality of Small Clams | 1.1.1 Investigate the importance of habitat closures (MDE restricted areas, SAV closures, and shoreline setback areas) to recognize their benefits as hard clam broodstock protection areas. | Ongoing. Results to date have not shown significant improvement in clam densities within SAV beds. With the prohibition on mechanical harvesting there has been no commercial activity for the past 6 seasons. Limited recreation-only harvest areas and sanctuaries are preferred alternatives to closures and moratoriums. |
| | 1.1.2 Develop an action plan for improving hard bottom habitat (i.e., shell or other suitable substrate) to reduce predation on small clams. The action plan will include the identification of: a) Planting materials and sources; b) Enhancement areas; and c) Funding sources (i.e. improved reporting of commercial hard clam harvest will increase funding generated through the shellfish tax which could be used towards bottom enhancement activities). | Pilot studies on habitat improvement indicate that clam survivorship is enhanced but not sufficiently high enough to justify the expense and logistical difficulties associated with such activities. The absence of commercial harvesting resulted in no tax revenue for the past 6 years. |
| Obj.2. Manage for a viable commercial hard clam harvest to maintain an economically stable fishery. Prob. 2.1: Potential Economic Hardship to Commercial Clammers Caused by the “Boom and Bust” Nature of the Fishery | 2.1.1 DNR will limit the number of individuals into the commercial hard clam fishery by permit only based upon those individuals who have landed at least 100 bags of hard clams (as documented by DNR dealer reports) in Maryland’s coastal bays in at least 2 years between the 1990/91 and 2000/01 seasons. Using these criteria, a total of 22 individuals would qualify for this permit. This permit should be transferable with a license, or to an individual who purchases a clam rig from an individual who meets the criteria stated above, and relinquishes their permit to the new clam rig owner. DNR will evaluate this action within 3 years to determine if the desired outcomes are being achieved. This action is consistent with actions 5.1.2 and 6.1.3. | Completed. However, lawyers determined that this was legally inadvisable. This objective and action needs further investigation and discussion given the absence of commercial harvest. Limited entry and IFQs continue to be discussed. |
| | 2.1.2 DNR will develop a plan (i.e. reporting requirement from commercial clammers) to improve the collection of catch, effort and economic data from the commercial hard clam fishery to assist managers in evaluating the impacts of future management decisions. | There are gaps in the hard clam harvest data but harvest can be estimated from buy tickets (if the hard copies are still available). There has been no commercial harvesting during the past 6 seasons. Commercial clam harvesters are required to report their daily catch of all clam species starting September 2011. |
| Obj. 3. Evaluate the feasibility of hard clam aquaculture opportunities. Prob 3.1: Establishing Hard Clam Aquaculture | 3.1.1 Evaluate the legal, institutional and economic incentives and barriers to private aquaculture at the local, state, and federal level in Maryland. | This was done as part of the Maryland Legislative Task Force on Seafood and Aquaculture. DNR will be lead agency as of July 1, 2011 in permit processing. An aquaculture training conference was hosted by UMD, in cooperation with MD DNR, NOAA CBO and the Oyster Recovery |

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| | | <p>Partnership. Three aquaculture open houses were held in 2010.</p> <p>An aquaculture financing loan program was announced by Gov. O'Malley. Representatives from the Maryland Oyster Aquaculture Financing Program discussed the loan program at the open houses and began the business planning and application processes.</p> <p>MD DNR and DHMH launched a commercial shellfish tagging program beginning in October, 2011 to meet the requirements of the National Shellfish Sanitation Program (NSSP). Hard clam tagging was implemented in the 2012-2013 license year. Other changes (such as taking and landing times, cooling, shading) needed to comply with NSSP changes have been implemented through regulation.</p> |
| | 3.1.2 Identify problems with the permitting process, and make recommendations to specific agencies to solve those problems. | <p>This was done through the above task force, reinforced with information from a range of states at the Maryland Aquaculture Development Conference held in Annapolis in August 2003. Permitting process has improved and will continue to address the myriad laws and regulations of the past 100 years which preserved wild harvest at the expense of aquaculture.</p> |
| | 3.1.3 Simplify the application process, and designate a single point contact at DNR to assist potential applicants with aquaculture permits, questions related to the regulatory requirement, guidance through the permitting process and fulfilling of regulatory obligations, tracking permit applications, and coordinating state agency permitting activities to aquaculture permits. | <p>The leasing laws were entirely revised in 2009, including the provision for pre-approved lease areas in the coastal bays to streamline the process. Two areas have since been pre-approved: South Point Shoal and Whale Gizzard Shoal. Because these areas have been pre-screened for leasing conflicts, the application process is shorter.</p> <p>MD DNR has been designated as the lead agency for coordinating all aquaculture permitting as of 7-01-11 (SB 847 & HB 1053). DNR will issue water column leases</p> |

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| | | <p>and staff the Aquaculture Coordinating Council and Aquaculture Review Board.</p> <p>The lease application was simplified in 2010. It is now a single joint application with the US Army Corps of Engineers, Baltimore Office and the MD DNR.</p> <p>One lease for hard clam aquaculture was approved in 2010. One additional applicant pursued a submerged land lease application in 2012.</p> <p>One older lease hard clam aquaculture operation began reporting harvest under new reporting requirements in effect since June, 2012.</p> |
| | <p>3.1.4 DNR will evaluate the feasibility of hard clam aquaculture in Maryland's coastal bays by:</p> <ul style="list-style-type: none"> a) Identifying potential areas and size of area for hard clam aquaculture; b) Initiating and providing funding for pilot hard clam aquaculture studies; c) Investigating the economic impact of hard clam aquaculture; and d) Assessing the ecological impacts associated with hard clam aquaculture | <ul style="list-style-type: none"> a) This was not meant to designate where shellfish farmers would be compelled to site their operations (already taken care of in MD law with regard to leasing). It should be used as a point of reference for the types of bottom most beneficial for the production of hard clams and oysters. Pre-approved leasing areas have been evaluated and proposed. b) This has been done through the development of a shellfish nursery at Gordon's Shellfish (supported by the MIPS program) and trials with several types of production methods. Information on what works best according to the bottom types and circulation patterns in the area, and the management objectives of the operator have been considered. c) Ongoing - but hard clam aquaculture has revolutionized the Florida fishing industry and kept many former fishermen in business when they had few other options. It is a multi-million dollar industry in VA where the production of high quality shellfish runs ahead of MD. d) A study of the incidence of the clam |

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| | | disease QPX (MDNR/VIMS) was completed. Continue to monitor mortality in farmed clams for disease (none reported). MDNR conducted a study of hard clam growth in the presence of brown tide. Proposals were submitted to fund a two-year study on commercial hard clam aquaculture and SAVs but because of budget problems, neither has been funded. A literature review was presented to the Coastal Bays STAC. |
| Obj 4. Enhance and promote the recreational hard clam fishery. Prob. 4.1: Limited Access and Knowledge of Recreational Clamming Opportunities in Maryland's Coastal Bays | 4.1.1 DNR will develop and distribute a public outreach brochure illustrating recreational clamming areas, access points, methods and harvest restrictions. | This is a low priority and has not been initiated. Increased education on recreational harvest should include the responsibility and mechanism to report harvest. This may be an opportunity for Coastal Baykeeper input. |
| | 4.1.2 DNR will work with the Town of Ocean City and Worcester County to improve access to recreational clamming areas | Boat ramps and associated facilities continue to be constructed and renovated with funding provided in full or in part by the DNR Waterway Improvement Fund, funded by boat taxes. Most recently, the West Ocean City Harbor ramp, built in 1988, was renovated over four months and re-opened, June, 2011. Due to decreased revenues (50% since FY2006), DNR was able to fund only 19% of the state and local boating access and dredging projects ⁴ . |
| | 4.1.3 DNR will investigate the feasibility of planting seed to establish and/or enhance areas for recreational clamming, and if feasible, develop a seeding strategy. | Low priority and most likely will not be implemented. |
| | 4.2.1 DNR will reduce the recreational catch limit for hard clams from 1 bushel to 250 hard clams per person per day. | Effected in 2002. |
| Obj.5. Minimize conflicts between coastal bay user groups and commercial hard clam fishermen. | 5.1.1 DNR will prohibit commercial clamming in the area between the Ocean City Airport at Marker 13 northward to the Rt. 90 Bridge on Saturdays (Sundays currently closed) between September 15 through October 15, and April 15 through May 31. | Effected in 2002. Action item to be moved to history/background in new FMP which will be totally revised to include aquaculture. |

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| Prob. 5.1: Conflict Between Recreational Fishermen and Commercial Clammers. | | |
| | 5.1.2 DNR will limit the number of individuals into the commercial hard clam fishery by permit only based upon those individuals who have landed at least 100 bags of hard clams (as documented by DNR dealer reports) in Maryland's coastal bays in at least 2 years between the 1990/91 and 2000/01 seasons. Using these criteria, a total of 22 individuals would qualify for this permit. This permit should be transferable with a license, or to an individual who purchases a clam rig from an individual who meets the criteria stated above, and relinquishes their permit to the new clam rig owner. DNR will evaluate this action within 3 years to determine if the desired outcomes are being achieved. This action is consistent with actions 2.1.2 and 6.1.3 | Legally inadvisable (see Sec. 2.1.1). Action item to be addressed in 2.1.1. |
| | 5.1.3 DNR will reduce the bycatch allowance of hard clams for recreational purposes in the hydraulic dredge fishery from 1 bushel to 250 hard clams per person per day. | Effectuated in 2002. Action item is no longer needed. |
| Prob. 5.2: Conflict Between Shoreline Property Owners and Commercial Clammers. | 5.2.1 DNR will establish a maximum noise level limit for commercial vessels consistent with the recreational limit | Regulation clarified to reference existing reg. (COMAR 08.18.03.03) establishing maximum noise levels all for vessels in Maryland. This action item may be addressed in aquaculture permitting. |
| Obsolete – Mechanical harvesting now prohibited. | 5.2.2 DNR will increase the shoreline setback distance for which a person may not catch hard clams with a hydraulic dredge in front of federal or state-owned property from 150 to 300 feet | Effectuated in 2002. |
| | 5.2.3 DNR's Natural Resource Police will monitor the causes of reported noise complaints to facilitate future management decisions related to this issue. | Study conducted by NRP of 5 clam boats found that all were in compliance with muffler and noise level regulations. |
| | 5.2.4 DNR will investigate the impacts of prohibiting or restricting the written permission provision that allows an individual to catch hard shell clams with a hydraulic dredge within the shoreline setback of 300 feet. | Written permission provision eliminated in 2002. |
| Obj. 6. Minimize ecological impacts associated with the commercial and recreational hard clam fisheries. Prob. 6.1: Community Concern on the Ecological Effects of Commercial Hydraulic Clam Dredging. | 6.1.1 DNR and Maryland's Coastal Bays Program will educate the public on the ecological effects of hydraulic clam dredging and the importance of the commercial hard clam fishery to the coastal bays community. | A literature review was compiled documenting the impact of hydraulic escalator dredging and other harvesting and natural disturbances on marine ecosystems. A new FMP will discuss ecosystem based recommendations and habitat improvement. |
| Obsolete – hydraulic escalator dredges now prohibited. | 6.1.2 DNR will encourage studies to evaluate the ecological impacts of hydraulic clam dredging in Maryland coastal bays. | Action is obsolete. |

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| | 6.1.3 DNR will limit the number of individuals into the commercial hard clam fishery by permit only based upon those individuals who have landed at least 100 bags of hard clams (as documented by DNR dealer reports) in Maryland's coastal bays in at least 2 years between the 1990/91 and 2000/01 seasons. Using these criteria, a total of 22 individuals would qualify for this permit. This permit should be transferable with a license, or to an individual who purchases a clam rig from an individual who meets the criteria stated above, and relinquishes their permit to the new clam rig owner. DNR will evaluate this action within 3 years to determine if the desired outcomes are being achieved. This action is consistent with actions 2.1.2 and 5.1.2. | Legally inadvisable (see Sec. 2.1.1). Action is addressed in 2.1.1. |
| Prob. 6.2: Direct Impact to Submerged Aquatic Vegetation (SAV) by Commercial Hydraulic Clam Dredging | 6.2.1 DNR will continue to prohibit the use of hydraulic clam dredges in SAV beds, and delineate existing SAV beds as necessary to maintain this protection over time. | Obsolete – hydraulic escalator dredges now prohibited. |
| Obsolete – hydraulic escalator dredges now prohibited. | 6.2.1a The Maryland Coastal Bays Fishery Advisory Committee shall become the local group to develop and provide recommendations to DNR regarding the delineation of SAV closure areas to harvest from hydraulic clam dredging. | Obsolete – hydraulic escalator dredges now prohibited. |
| | 6.2.1b DNR will continue to foster the support among legislators to make recommended changes in the SAV law which would benefit all stakeholder groups by making the delineation and enforcement process more manageable, and the closure areas consistent over a longer period of time | Ongoing. |
| | 6.2.2 DNR and the National Park Service will investigate the feasibility and funding options for using Global Positioning System (GPS) units to improve the ability for clambers to comply with SAV closure areas and offset the maintenance cost associated with using buoys to identify SAV closure areas. | There has been no commercial activity for the past 4 years. No action to date. |
| Prob. 6.3: Potential Impact to Overwintering Blue Crabs by Commercial Hydraulic Clam Dredging. Obsolete – hydraulic escalator dredges prohibited. | 6.3.1 DNR will evaluate the need to restrict hydraulic dredging in important female blue crab overwintering areas by: a) Delineating female blue crab overwintering areas; b) <i>Determining the significance or contribution of these overwintering crabs to the coastal bays blue crab population;</i> c) Determining the magnitude of overwintering blue crab bycatch in the hydraulic clam dredge fishery; and d) Assessing the impact of dredging activity on overwintering female blue crabs. | Preliminary study was conducted by the MDNR Coastal Fisheries Program. Obsolete – hydraulic escalator dredges now prohibited. |
| Obj. 7. Protect, maintain and enhance important hard clam habitats. Prob. 7.1: Water Quality | 7.1.1 Develop strategies to restore water quality in areas closed to harvesting hard clams because of pollution | Ongoing. |
| Prob. 7.2: Hard Bottom Habitat | 7.2.1 Develop an action plan for improving hard bottom habitat (i.e. shell or other suitable substrate) to reduce predation on small clams. The action plan will include the identification of: | Studies on habitat improvement indicate that clam survivorship is enhanced but not sufficiently high enough to justify the |

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| | a) Planting materials and sources; b) Enhancement areas; and c) Funding sources. | expense and logistical difficulties associated with such activities. |
| Prob. 7.3: Navigational Channel Dredging and Dredge Disposal. | 7.3.1 The MD Coastal Bays Navigation and Dredging Advisory Group (NADAG) will seek comments from DNR's Shellfish Program on the potential impacts of proposed dredging activities on hard clams. | MDNR is routinely consulted during the permitting process on projects that may impact hard clams. |
| Prob. 7.4: Growth of Noxious Algal Blooms. | 7.4.1 DNR and MCBP will identify potential funding sources to support the following research and monitoring activities: 1) Assess the potential impact that noxious algal blooms have on hard clam populations; and 2) Identify factors which might contribute to noxious algal blooms. | MDNR conducted a study on the impact of brown tide on clams in culture. Sampling for harmful algal blooms and analyses of causes is ongoing at MDNR. |
| Obj. 8: Minimize the impacts of non-indigenous invasive species. Prob. 8.1: Green Crabs. | 8.1.1 DNR with the advice of Maryland's Coastal Bays Fishery Advisory Committee will implement measures to minimize the impact of green crabs and Japanese shore crab on the hard clam population in Maryland's coastal bays, and coordinate this effort with Delaware and Virginia. | Not yet initiated |
| | 8.1.2 DNR will continue to work with Maryland's Non-indigenous Species Task Force to examine invasive species issues, and develop an Aquatic Nuisance Species plan to become eligible for Federal funding | A draft Maryland Aquatic Nuisance Species Management Plan is under review. |
| Obj. 9. Implement fisheries dependent and independent monitoring programs to obtain sufficient and accurate data for managing hard clams Prob. 9.1: Stock Assessment | 9.1.1 DNR will continue to survey the hard clam resource on annual basis in Maryland's coastal bays to facilitate management decisions. | Ongoing. This action will be included in stock assessment discussion in a revised FMP. |
| Prob. 9.2: Assessment of Bottom Enhancement Activities. | 9.2.1 Design and implement a program to monitor the efficacy of bottom enhancement activities. | The results of pilot studies suggest that such a program would not be cost-effective. See action 7.2.1 |
| Prob. 9.3. Commercial Catch, Effort and Economic Data. | 9.3.1 DNR will establish, implement and evaluate a commercial reporting program to obtain accurate catch, effort and economic data from anyone harvesting hard clams in Maryland's coastal bays. This action is consistent with action 2.1.2. | Not yet initiated. There has been no commercial harvesting during the past 6 seasons. |
| Prob. 9.4: Recreational Catch, Effort and Economic Data. | 9.4.1 DNR will facilitate the design and implementation of a recreational clamming survey in Maryland's coastal bays. | Questions on recreational clamming were included as part of a broader 2006 angler survey by UMES. |

Acronyms:

DHMH = Department of Health and Mental Hygiene

FMP = Fishery Management Plan

IFQs = Individual Fishing Quotas

MDNR = Maryland Department of Natural Resources

MIPS = Maryland Industrial Partnerships

NOAA CBO = National Oceanographic and Atmospheric Administration, Chesapeake Bay Office

NRP = Natural Resource Police

SAV = Submerged Aquatic Vegetation

STAC = Scientific & Technical Advisory Committee

UMD = University of Maryland

UMES = University of Maryland Eastern Shore

VIMS = Virginia Institute of Marine Science