A report by the
Bi-State Blue Crab
Advisory Committee

Taking Action For The Blue Crab

Managing and Protecting the Stock and its Fisheries

Chesapeake Bay Commission
Policy for the Bay

Chesapeake 2000 commits the Bay states to *"establish harvest targets for the blue crab fishery by 2001"* and to *"begin implementing complementary state fisheries management strategies Baywide."* This report characterizes the state of the Bay's blue crab population and its fisheries, and charts a course to restore the stock to a healthy condition.

CHESAPEAKE BAY COMMISSION

BI-STATE BLUE CRAB

ADVISORY COMMITTEE

Taking Action for the Blue Crab: *Managing and Protecting the Stock and its Fisheries*

JANUARY 2001

Overview

In 1999, the governors and legislatures of Maryland and Virginia each allocated $150,000 to fund a two-year analysis of the blue crab and how it is managed. This study was undertaken by the Chesapeake Bay Commission's Bi-State Blue Crab Advisory Committee (hereafter "the Bi-state Committee" or BBCAC). As a result of this two-year effort, the Bi-state Committee came to consensus on a series of statements that characterize the crab population and its fishery. It also recommended an action agenda for managing the Chesapeake Bay's valuable blue crab resource. These key findings and recommendations, described in full on page 10 of this report, include the following:

- Blue crab stocks are near the lowest point measured since fisheries-independent surveys began.
- There is a limit to fishing pressure that blue crab stocks can stand at any given level of abundance. As the stocks rise, fishing level can also rise. As stocks fall, fishing pressure must also decrease.
- The Bi-state Committee recommends a fishing threshold that would preserve 10 percent of the Chesapeake blue crab's spawning potential. Fishing pressure above that ten percent line could threaten the viability of the stock.
- The committee further recommends a minimum stock size threshold set at the lowest stock biomass measured to date (which occurred in 1968).
- To allow for cautionary management responses, the committee recommends the establishment of a precautionary zone on the safe side of the low-stock threshold. That precautionary zone should widen as the over-fishing threshold is approached, to help managers avoid nearing or crossing the threshold.
- In addition to the fishing (knows as "over-fishing") and low-stock (known as "overfished") thresholds, the committee recommends that management agencies adopt as a target a fishing level that would leave 20 percent of the crab's spawning potential to assure future health of the stock. At current fishing levels, it is estimated that a 15 percent decrease in harvest (based upon 1997–1999 landings averages) may be needed.
- Studies of the impact of predation on blue crab stocks, supported by the committee, are still ongoing, and will require considerable careful analysis. As these research efforts continue, the committee recommends that management agencies work toward multi-species approaches that will incorporate predation effects and other important ecological interactions.
- Because of the importance of both the commercial and recreational fisheries, the committee recommends aggressive actions to improve data gathering in both sectors of the fishery, and notes that the licensing of recreational crabbers may be necessary to help bring this about.
- There are various critical habitats in the life history of the blue crab, such as critical nursery grounds in seagrass beds. These essential habitats should be further investigated, restored and protected through improved water quality and other measures.
- Given both the complexity and the importance, economically and historically, of the Chesapeake Bay's blue crab fishery, the committee recommends the exploring of new management regimes through a focused stakeholder-driven process in the three jurisdictions of Maryland, Virginia and the Potomac River Fisheries Commission.

SECTION I

Introduction

REALIZING THAT THE BLUE CRAB IS OF enormous importance to the citizens of the Chesapeake Bay region — whether watermen, seafood processors, restaurateurs or recreational crabbers — the states of Maryland and Virginia in 1999 tasked the Chesapeake Bay Commission's Bi-State Blue Crab Advisory Committee with conducting a two-year analysis of crab stocks in the Bay and of current conditions in the fishery. This report details the results of that work.

The Bi-State Blue Crab Advisory Committee, established by the Commission in 1996 to help promote cooperation and coordination across state lines, focused simultaneously on several key areas:

- An analysis of commercial crabbers, including an extensive survey of gear type, equipment, overhead costs and estimated profits needed to sustain their businesses, an enhanced characterization of the industry, and commercial crabbers' comments and suggestions for managing the fishery.
- A study of the viability of crab sanctuaries and corridors, especially in Virginia, where a 665-square-mile spawning sanctuary was established in June 2000.
- Research into the impact of predation by fish — specifically striped bass (rockfish), red drum and croaker — on juvenile crabs in Bay grass beds. Because grass beds serve as important nursery grounds for blue crabs, resource managers and others are particularly interested in predation effects in these areas.
- A recommendation for reasonable thresholds and targets for the blue crab fishery that would help delineate how many crabs can be taken from the Chesapeake Bay without threatening the stock. These thresholds and targets are based upon the best available blue crab science and harvest and population data.
- A stakeholder process that would provide a number of venues for those engaged or interested in the Chesapeake Bay blue crab fishery, both commercial and recreational, to offer their comments, criticisms and suggestions. This effort included a stakeholder meeting in Solomons Island, Md., in February 2000; numerous indi-

vidual meetings and consultations; and a series of ten public forums held in October and November 2000 throughout Maryland and Virginia.

A Difficult Challenge

Throughout this process the challenges have remained abundantly clear. The blue crab is part of a complex ecosystem, and many aspects of the crab's life history and behavior remain a mystery. No one — whether researcher, naturalist or waterman — claims to know everything there is to know about the blue crab. Members of the Bi-state Committee agreed, however, that the issue is far too important to leave to chance, and that some very genuine and sound foundations exist for making management decisions. These include harvest data over many years, research and monitoring information dating back to the 1950s and beyond, and examples of management from other fisheries throughout the nation and the world.

The Bi-state Committee established a Technical Work Group (hereafter "the Work Group") of researchers, resource managers, resource economists and other experts to help advise them on a number of these complex technical issues, including blue crab population dynamics and changing economic factors in the fishery. While a number of uncertainties persist — and will likely remain for some time as scientists work on a range of difficult biological issues — the Work Group was able to reach consensus on several important topics, basing their decisions on available research results, observations and experience. Repeatedly researchers noted the importance of drawing not only on the results of scientific studies, but also on the observations and experiences of watermen and others who work in the fishery, and on historical commercial harvest and other records.

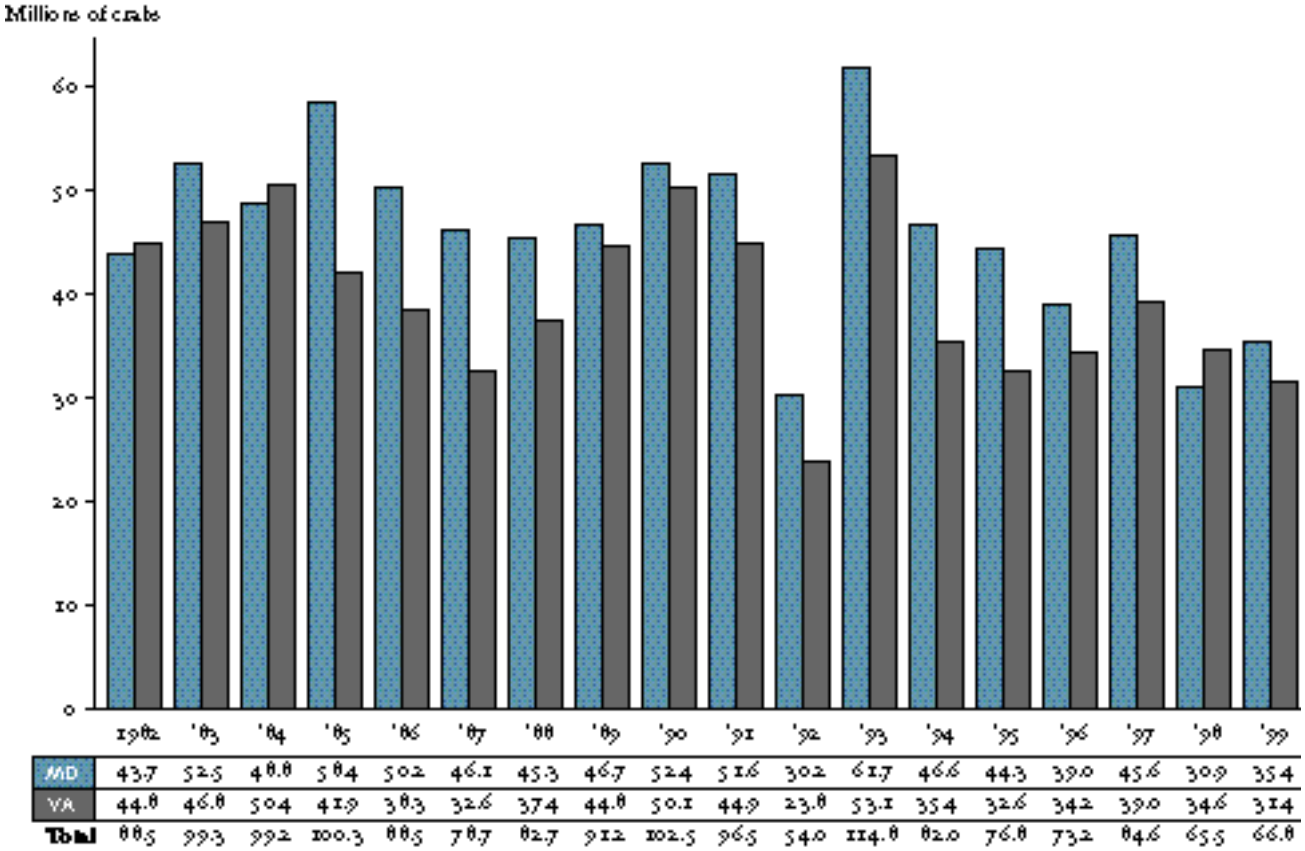
The Bi-state Committee focused its efforts not only on the biology of the blue crab, but also on the complexity of the fishery itself. The commercial blue crab fishery depends on a number of harvest methods, including potting, scraping, dredging and trotlining. Further, the fishery is divided into the harvest of hard crabs and soft crabs, with differing methods for each, such as baited wire pots for hard crabs, and peeler pots, which use male crabs to attract female crabs preparing to molt and mate ("peelers"). Soft crabs, which bring a much higher price than hard crabs, have grown in importance in the Bay's commercial seafood sector, and the percent of peelers and soft crabs have increased Baywide over the past 10 years, with uncertain effects.

In addition to the complexity of varying harvest methods and their catch, the Bi-state Committee also considered the ways in which management implications differ among the jurisdictions of Maryland, Virginia and the Potomac River. They noted that the crab's biology and behavior tend to place more male crabs in Maryland and more female crabs in Virginia. This division makes perfect sense biologically, since male crabs roam far up the Bay and its tributaries searching for food, while females, especially in the spring and fall, migrate toward the lower Bay to spawn, and then bed down in deeper waters to overwinter. This migration pattern means that the Maryland blue crab fishery largely depends on male crabs, while the Virginia fishery largely depends on female crabs. Protecting female crabs ranked high on the list of concerns expressed by many during this two-year analysis, but it was also noted that mating cannot occur without a sufficient number of males crabs, and a trend toward smaller and fewer male crabs also serves as grounds for concern about the spawning stock.

In addition to these jurisdictional differences, the Bi-state Committee considered the current relation between the commercial and recreational sectors of the fishery. A repeated concern expressed during public forums was the largely undocumented and uncontrolled recreational crab fishery in the Chesapeake Bay. The study concluded that data on recreational crabbing is sparse, and studies now underway are attempting to determine the best means for gathering accurate information on a fishery that often takes place from a private dock or boat, or from a bridge or bulkhead.

It is known that recreational crabbing is a significant component of the fishery. In 1999 in Maryland alone, 29,000 recreational crabbers paid for a license that would allow them to run 1,200 feet of trotline or as many as 30 pots to catch crabs for personal use. Many more sport crabbers, who dangle lines with inexpensive baits such as chicken necks (hence the name "chicken neckers"), are not required to have a license, and though their catch per person may be quite small, with a burgeoning population in the Bay region the pressure put on crab stocks by recreational, as well as commercial, crabbers is likely significant

Chesapeake Bay Blue Crab Harvest, 1982–99



	1982	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99
MD	43.7	52.5	48.8	58.4	50.2	46.1	45.3	46.7	52.4	51.6	30.2	61.7	46.6	44.3	39.0	45.6	30.9	35.4
VA	44.8	46.8	50.4	41.9	38.3	32.6	37.4	44.8	50.1	44.9	23.8	53.1	35.4	32.6	34.2	39.0	34.6	31.4
Total	88.5	99.3	99.2	100.3	88.5	78.7	82.7	91.2	102.5	96.5	54.0	114.8	82.0	76.8	73.2	84.6	65.5	66.8

and has the potential to grow. A variety of stakeholders suggested to the Bi-state Committee that the time may be right for adults to buy recreational licenses that would help support the management of the fishery and provide valuable data on sport crabbing.

At the same time, it was made quite clear that data on commercial effort also needs significant improvement. While research agencies post limits for the amount of gear commercial crabbers can use — the number of pots, for example, or the length of trotline — less is known about precisely how much gear is actually used at any one time. Repeated interviews and comments from a range of stakeholders, including watermen and seafood processors, indicate that crabbers may not be adhering to gear limits, and that future estimates of gear use will likely be inaccurate without substantial additional monitoring and enforcement.

Working Toward Consensus

Recognizing a range of issues surrounding the crab's biology, the extent of overfishing, the current state of the industry and the markets that drive it, and possible management solutions, the Bi-state Committee from the very beginning built its efforts on the concept of consensus. The consensus-building process has at its core the conviction that considerable communication, discussion and deliberation are essential in order to put forward plans that are workable and acceptable to a range of stakeholders.

The recommendations included in this report benefited from, and resulted from, this painstaking deliberative process. The consensus-building process was used specifically by the Work Group to reach agreement on a number of technical issues, and the consensus statements and action agenda presented in Section II of this report represent the unanimous endorsement of all members of the Bi-state Committee.

The consensus building process worked in the following way. Throughout the two-year period the Bi-state Committee met regularly to discuss progress, and to debate the central issues before it. At the same time, the Work Group addressed specific charges given it by the Bi-state Committee. As noted earlier, these included:

- A survey and analysis of commercial crabbers
- A study of crab habitat and sanctuaries
- Research into predation on juvenile crabs in grass beds
- Economic analysis of potential management actions
- An analysis of crabbing and thresholds and targets

The Work Group gathered data and information and reported to the Bi-state Committee, which then deliberated upon the results. In addition, a facilitation team (comprised of staff from the Chesapeake Bay Commission, Maryland Sea Grant and the University of Virginia Institute for Environmental Negotiation) reviewed the information and simultaneously gathered outside input from a range of stakeholders.

The commercial crabber survey and analysis included some 1,400 crabbers in Maryland and Virginia. It set the stage for the Bi-state Committee's consensus-building deliberations by providing a considerable characterization of the fishery. This information included the average age of respondents (about 50), average years of experience (25), and identified a number of areas where watermen in both states agreed. Significantly, most commercial crabbers surveyed (77 percent) agreed with the statement that they were "worried about the future of the Bay's blue crab resource," and an even greater percentage (83 percent) agreed that they had "little or no influence" on setting policy for blue crab management.

This consensus building process included the scientists themselves. In the face of numerous differences of opinion about crab biology and the nature of the data currently available, key researchers came together to draw, to the very best of their ability, the basic outlines of what we know about the Bay's crab stock. During July 2000, researchers from Maryland, Virginia and the National Marine Fisheries Service came together at the Virginia Institute of Marine Science to hold a "charrette," an intense two-and-a-half day meeting focused squarely on the concept of thresholds and targets for the Chesapeake's crab fisheries. After much give and take, the researchers came to a series of conclusions, primary among them that a threshold should be set, both in terms of fishing pressure and in terms of how low we can afford to let crab stocks drop.

Baywide resource economists convened a similar meeting to consider the implications of potential management options proposed by the jurisdictions, and their conclusions are also reflected in the action plan and consensus statement found in Section II of this report.

As noted in the conclusion of this report, the researchers did not suggest that we know everything we need to know about the blue crab. Questions concerning the crab's life span, the true extent of fishing pressure, the nature of the soft crab fishery and its regulation, the constantly changing food web (including the predation of fish on crabs), the role of water quality and habitat (such as vital underwater grasses) remain to be clarified. The researchers felt strongly, however, as did other members of the Bi-state Committee, that enough information exists — for example, from four fishery-independent surveys — to make intelligent judgments about a range of fishing pressure that is acceptable if we are to preserve the Bay's blue crab stock. Their conclusions are presented in Section II.

A final consensus effort took the form of public meetings to gather insights and information from a range of stakeholders. Considerable stakeholder input resulted, for example, from a meeting held in Solomons Island, Md., in February 2000. Watermen, seafood processors, conservationists and others came together at this meeting to discuss possible approaches to blue crab management. Experts from the region and beyond described approaches used in other fisheries in other places around the world, including a range of "rights-based" approaches, such as transferable quotas or transferable effort regimes.

Overwhelmingly, those in attendance stated that while there could be some obvious advantages to such approaches, such as improved income for a smaller number of commercial crabbers, maintaining the current nature of the Chesapeake crab fishery, with its many small operators and the unique way of life they pursue, should remain a guiding principle of any management regime.

To inform and receive input from as broad a population as possible, the Bi-state Committee sponsored ten public listening sessions around the Bay in October and November. The public forums presented the proposed thresholds, targets and potential management options to stakeholders and the public at large. Those public forums were held in the following locations:

- Virginia Eastern Shore: Onley and Tangier Island
- Virginia Western Shore: Gloucester County and Newport News (VMRC)
- Maryland Eastern Shore: Wye Mills and Princess Anne
- Maryland Western Shore: Bel Air and Mechanicsville
- Potomac River: La Plata, Md.

In addition, the same information was presented by Bi-state Committee staff at a briefing of the Maryland General Assembly's House Environmental Matters Committee.

Citizens at these forums raised a number of points, often expressing powerful frustrations and anxieties about the future of the fishery and its regulation. These observations were taken under careful consideration by the Bi-state Committee, and guided their deliberations and their plans for future actions and recommendations. Those who spoke at the forums, for example, called for a clearer understanding of the impact of one species on another, and most especially the effects of a currently large striped bass population on blue crabs stocks. Others argued passionately for stronger controls on nutrients and contaminants that have killed grass beds throughout the Bay. A list of common concerns gleaned from these public forums (summarized in the appendices to this report) would notably include these statements:

- Water quality issues, especially controls on nutrients, sediments and contaminants entering the Bay, are not being aggressively addressed by the jurisdictions.
- Pursuing the restoration of one species — e.g., striped bass — in isolation may have unintended impacts on other species, and a multi-species approach to Bay management is essential.
- Commercial fisheries too often bear the brunt of management actions, since it is the easiest sector to control.
- Recreational crabbers and anglers should also share in the responsibility for protecting and maintaining blue crab stocks.
- Any management actions should take into careful account effects on the industry, whether on watermen who catch crabs or processors who pick and distribute them, or on those in the tourist trade who depend on the economic draw of recreational crabbing.

Emphasis on these points shifted, perhaps predictably, depending on location and composition of the audience. In seven of the public sessions (not counting the Maryland legislative briefing), members of the seafood industry and their families presented a majority of the public comment. In those sessions, concerns about causes of a possible decline in crab stocks centered on issues not connected to commercial crabbing — such as predation by striped bass, declining water quality, and the role of recreational crabbers.

In two of the sessions conservationists and sport fishing interests presented a majority of the comments, and in those sessions the panel was advised not to discount the importance of commercial fishing. Recreational crabbing interests generally stated that they favored more stringent controls (including licensing) on both commercial and recreational crabbing. At many meetings, a number of both commercial and recreational crabbers testified that better enforcement of laws currently on the books should be a top priority. It is well recognized that enforcement of many crab regulations, such as limiting the number of pots fished, presents a daunting challenge to the limited resources of the states' fisheries management agencies.

Most of the responses expressed by industry stakeholders did not center on proposed management alternatives — which would have revised the manner and perhaps the context in which commercial fishing takes place — but rather on other factors that affect the resource. The nature of these responses, which are both understandable and valid, led the Bi-state Committee to recommend additional investigation and research related to water quality, the effects of predation and vital habitat restoration as they relate to the continued health and sustainability of the blue crab population and fishery.

SECTION II

Major Consensus Points and Recommendations

This section contains the major recommendations and points of consensus reached by the Bi-state Committee during its two-year analysis. As previously noted, these recommendations and findings were adopted through a process of deliberation and consensus, building on analyses prepared by the Work Group and the facilitation team. These preliminary recommendations flowed from directed research results, fishery surveys, stakeholder workshops, consensus-building processes internal to the Technical Work Group and the facilitation team, and information from public forums, e-mails and letters or statements sent to the Chesapeake Bay Commission.

Reaching a Consensus

The consensus-building process began with the adoption of statements that detail the current status of the blue crab fishery in the Chesapeake Bay.

These statements serve to clarify the conclusions of the committee after considerable deliberation, and to discern a clear starting point for the action agenda which follows. The statements are:

- The Chesapeake blue crab knows no state boundaries during its complex life cycle. Though it is a highly resilient species, changes in management Baywide are needed to ensure a vibrant blue crab population and a sustainable fishery far into the future.
- Overall abundance for all age groups of blue crabs is down.
- Fishing mortality has increased Baywide since the mid-1980s.
- Spawning stock biomass is below the long-term average.
- The fishery independent surveys show a decreasing percentage of legal-size crabs.
- The average size of crabs has decreased. It is likely that once crabs molt to above 5 inches, most are harvested and do not have a chance to get above 6 inches.
- The reproductive potential of crabs may be compromised due to the smaller size and lower abundance of mature males and females.
- Fishing effort has been at record levels Baywide, while the catch-per-unit effort has declined.

- There is potential for fishing effort and fishing mortality to increase, both in the commercial and recreational fishery.
- The crab fishery is overcapitalized, resulting in higher than necessary costs to commercial fishermen.
- Improvements in crab stocks and market conditions will bring forth more intensive use of fishing gear and the activation of idle licenses. In the long run, this latent effort may undermine the effectiveness of short-term management actions, and jurisdictions must work to better document and address latent effort.
- Long-run management actions should be enforceable, achieve the target fishing mortality, allow individual fishing businesses to adjust to market and biological conditions, result in a net increase in industry income and equitably divide the harvest among recreational and part-time crabbers and full-time watermen.
- Over the last ten years, effort and Baywide landings in the peeler/soft crab fishery have increased, yet the consequences remain unknown.
- Fishing mortality must be reduced and fishing effort must be controlled in all sectors of the fishery to ensure long-term sustainability of the crab stock and increase income in the fishery. Management programs to control effort that distribute impact equitably, protect crabbers from the risks of reducing effort, and facilitate entry into and exit from the fishery should be developed.
- A strategy for building and marketing the distinctive benefits of domestic crab in relation to foreign crabmeat is needed.
- A protected spawning sanctuary-corridor complex is an appropriate means of protecting a portion of the blue crab spawning stock and other life stages in the lower Chesapeake Bay.
- Important habitats for the blue crab such as seagrass beds in the Chesapeake Bay should be further investigated, restored and protected through improved water quality and other measures.
- The full impact of predation remains unknown and more study of the impacts is required. Predation studies not linked to specific habitats indicate that 4 to 7 percent of striped bass consume blue crabs. Based upon studies in sea grass nursery habitats, striped bass appear to have more impact than croaker or red drum preying on blue crabs. Fish in these habitats tend to feed on crabs two inches in carapace width and under, with an average of 5.2 (striped bass) to 1.0 (croaker) crabs found in their stomachs.
- The fishery-independent surveys (Maryland and Virginia trawl surveys, winter dredge survey and the Calvert Cliffs survey) are important, long-term data sets essential in management.
- Funding for blue crab management, especially the fishery independent surveys, is a high priority and needs to be maintained and expanded.

Recommending Action

Once the committee reached consensus on the statements listed above, they moved to outline an action plan that would help guide the jurisdictions as they address the important issues that confront those with an interest in the Chesapeake Bay blue crab and its fishery. As with the consensus statements, this action agenda resulted from significant discussion and was unanimously adopted by the Bi-state Committee. The recommended action plan is as follows:

1.
Adopt a threshold.

The fisheries management agencies (DNR, PRFC, VMRC) should adopt a fishing threshold that preserves a minimum of 10 percent of the blue crab's spawning potential (F10 percent), and a minimum stock size threshold set at the lowest stock estimate that can be shown to have subsequently sustained a fishery as recorded by fisheries-independent surveys (which occurred in 1968).

2.
Adopt a target.

In addition to adopted thresholds, the fisheries management agencies should adopt a target of F20 percent. Achieving this target should double the blue crab's spawning potential from recent levels of

approximately 10 percent to 20 percent of an unfished stock. This target equates to a fishing mortality rate of F = 0.7. Harvests can therefore rise and fall depending on stock size and still meet the target. At current fishing levels, it is estimated that a 15 percent decrease in harvest (based on the 1997–1999 landings average) may be needed.

3.
In the short term (2001-2003), Maryland, Virginia and the Potomac River Fisheries Commission should reduce fishing effort through a phased approach to reach the desired targets.

Maryland, Virginia and the Potomac River Fisheries Commission should immediately implement steps to reduce fishing effort by working to lower annual fishing mortality toward the target level during the 2001 fishing season. If necessary, the jurisdictions should further design management measures by the end of 2002 to bring effort within range of the fishing mortality target. Verification of progress in meeting the target should begin in 2003. In doing so, the jurisdictions should include consideration of various management options. Further, all of the jurisdictions should coordinate actions according to a shared time frame.

4.
Address latent effort.

Continue to monitor latent commercial and recreational effort and put better systems in place to track use of licenses as well as entry into and exit from the fishery.

5.
Ensure fairness among user groups and jurisdictions in implementing short-term effort reductions.

The jurisdictions should implement management measures fairly across all segments of the fishery by including equitable reductions in all components of the recreational and commercial sectors. The jurisdictions should further achieve equitable reductions across jurisdictional boundaries and monitor progress through annual comparisons of harvest data and research findings.

6.
Increase understanding of effort and harvest activities.

The management agencies should continue to implement and initiate additional activities that improve long-term understanding of fishing effort, both commercial and recreational. This should involve a complete and accurate assessment that will quantify fishing effort across all gear types, whether commercial or recreational. In addition, the quantification of recreational activity may require initiation of new licensing procedures to accurately measure participation. The BBCAC, as appropriate, will provide support, guidance and assistance to help the agencies achieve these goals.

7.
In the short term, establish a process through the BBCAC for continuing coordination of each jurisdiction's efforts and for tracking progress.

The BBCAC should convene a follow-up meeting in Spring 2001 to review, compare and coordinate proposed 2001 management plans from each jurisdiction and help establish a proposed timetable for the jurisdictions to use for implementation, progress assessment and adjustments.

8.
In the long term, pursue alternative management regimes to meet harvest targets and improve economic vitality of the fishery through a stakeholder-driven process.

Because of the current high degree of inefficiency in the fishery, alternative management options are necessary to achieve the desired level of fishing mortality resulting in an increase in benefit for those involved in the commercial and recreational sectors of the fishery. There will clearly be distributional issues related to income changes and other social disruptions, and the BBCAC therefore recommends the long-term implementation of a flexible management program that reduces fishing mortality over a relatively long period and allows for adjustments based on both industry input and biological response.

The BBCAC will continue to explore alternative management approaches well suited for the Bay

region. Once identified, the jurisdictions, working with the BBCAC, should each launch a stakeholder-inclusive process to consider alternative management approaches that will achieve the desired decline in fishing effort while addressing the economic needs of the fishery. This process will require time and should follow more immediate short-term interventions.

9.

The BBCAC should initiate a long-term plan to help the jurisdictions coordinate activities related to ecosystem, habitat and multi-species based interactions.

In coordination with the Chesapeake Bay Program and the Chesapeake Bay Stock Assessment Committee, the BBCAC should help to prioritize and fund efforts to analyze the relative effects of a variety of ecosystem-based interactions affecting blue crabs. These efforts should, at a minimum, analyze multi-species interactions such as the predation of fish on blue crabs, as well as the role of water quality, submerged aquatic vegetation and shallow water areas such as blue crab spawning grounds, nurseries and migration routes, and the effect of environmental conditions on the recruitment and health of crab populations.

10.

Help procure adequate funding.

The BBCAC should assist the jurisdictions in identifying and procuring appropriate funding levels to carry out management actions, as well as strategic research and stakeholder involvement programs. The fishery-independent surveys (i.e., VIMS and Maryland DNR trawl and dredge surveys) require long-term funding and should be set as top funding priorities within each state. In order to track economic conditions as blue crab stocks change and markets fluctuate, the effort should also procure funding to allow the integration of regular economic surveys into state routine data collections for both the commercial and recreational fisheries. Central to this effort will be the funding of the BBCAC itself, a fact recognized by the Chesapeake Bay Commission, which has adopted a plan to seek BBCAC funding for two additional years (fiscal 2002 budget request).

As noted by the Bi-state Committee, this report captures a key moment within a "work in progress." The continuing goal that underlies these consensus statements and the elements of the action plan is to develop a sustainable blue crab fishery that will protect the crab resource and provide the greatest and most stable social and economic returns to the public. It is the public, and especially those in the public who have significant stakeholder interests in the resource, who must take responsibility for a sustainable future for the blue crab fishery. To this end, the Chesapeake Bay Commission unanimously adopted a recommendation for the future role of the Bi-state Committee at the Commission's meeting of Sept. 8, 2000. This recommendation is found in the appendices to this report.

Explaining Thresholds and Targets

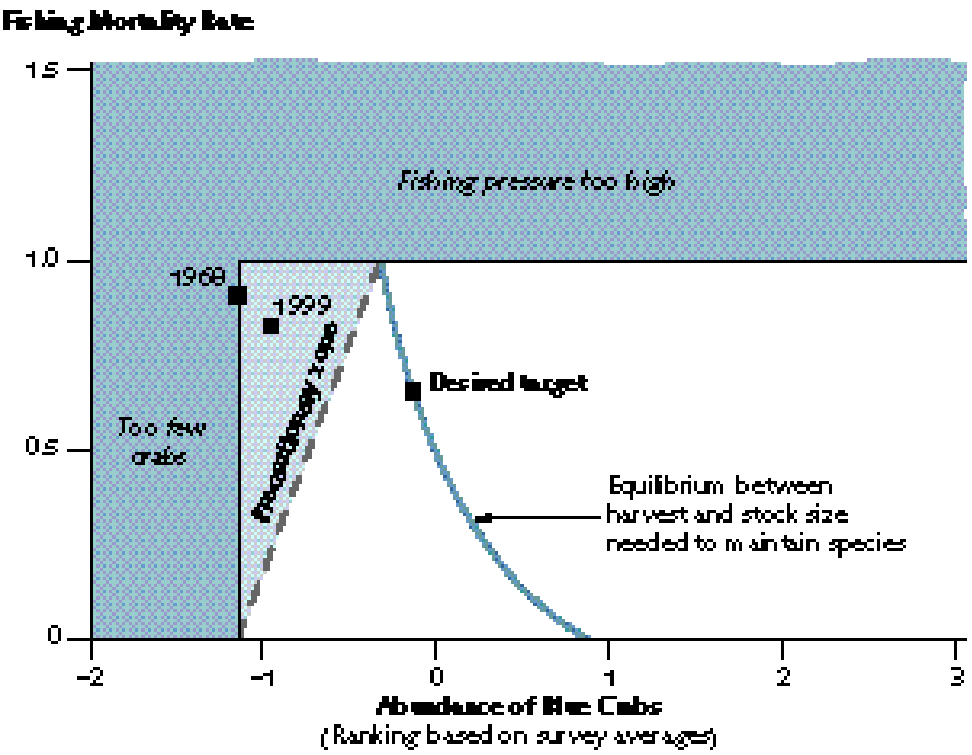
Central to the action agenda outlined by the Bi-state Committee are the concepts of thresholds and targets. The word threshold, as used in fishery science, relies on a creative analogy. It represents a theoretical place where one crosses into an area where the basic sustainability of the species is threatened. On the safe side of this threshold, stocks or harvests can reasonably be expected to maintain a healthy, reproductive fishery; on the other side lies the risk of stock collapse.

Another analogy used to explain the threshold concept is that of a highway guardrail. If a driver approaches a guardrail, or actually collides with it, this is clear indication of being off course, and heading for greater danger. The establishment of thresholds for the crab fishery similarly attempts to define where the danger zone — in this case, of overfishing — lies.

The word target in fishery science relies on an analogy as well: the attempt to hit the bull's-eye of desired fish populations or fish catch. To continue the highway analogy, targets represent where one wants to be — on the road, and not up against the guardrail. Targets therefore differ from thresholds. Specifically, targets:

- Provide a precautionary safeguard against exceeding the threshold
- Provide desired levels of harvest or stock size that provide the greatest potential benefits to those who harvest the crab

Fishing Pressure on the Blue Crab



To help resource managers better protect Chesapeake blue crab stocks from overharvesting, researchers have calculated a two-part threshold regime, based on fisheries-independent monitoring (particularly the winter dredge survey) and levels of fishing effort. As this graph indicates, there would be a desired target to aim for each year — which would likely fall along the curved line that shows where researchers expect to find the equilibrium between fishing pressure and the stock size needed to sustain the population. Depending on the results of monitoring data, managers could adjust levels of fishing effort (e.g., numbers of pots) to approach that target. If the data indicates low stocks, fishing effort would be reduced to stay out of the "precautionary zone," an area that signals that the fishery could be in trouble. The low-stock threshold is marked by the 1968 level, the lowest observed by independent surveys. The 1999 level lies very close to that line.

- Provide a common level or percentage of harvest or stock that can be attained by different management options

Both the thresholds and targets, once established, provide a standard by which to evaluate management options and their effectiveness.

How were the thresholds and targets for the Chesapeake blue crab established? The lowest stock recorded, in 1968, according to fisheries-independent surveys, was identified as the definitive low point from which we have documented evidence that the crab population recovered to support a fishery. Scientists refer to this number as B_{low}. If the stock should drop below that level, the target scientists concluded, there is no historical experience to demonstrate its capacity to recover, and further stock decline constitutes a real risk.

In other words, this "overfished" threshold assumes that the crab stock could drop as low as the 1968 level and still recover reasonably quickly. Beyond that level (B_{low}) we have no historical, data-based assurance that the stock will recover in a reasonable time.

While thresholds represent barriers that should not be crossed, targets represent goals or levels that are to be achieved. There were two types of targets considered in this analysis: yield-based targets, which aim to

maximize a certain output from the fishery; and stock-based targets, which aim to maintain a certain aspect of the fishery, e.g., a minimum blue crab biomass.

The target lies along an equilibrium line that balances exploitation (fishing pressure) and existing stock size. Though the Technical Work Group has identified a range of different possibilities, the Bi-state Committee has adopted a stock-based target (as opposed to a yield-based target). Scientists express these target values as '*F*' values, which represent fishing mortality rates, derived using an equation which factors in fishing pressure and natural mortality. Currently the fishery mortality rate hovers around $F = 0.9$.

The Work Group and Bi-state Committee have recommended that this value be lowered to $F = 0.7$ to reduce mortality and thereby increase spawning stock biomass by harvesting fewer crabs. The degree to which harvest must be decreased each year will vary based on the total stock. In years when crab biomass is high, more crabs can be harvested because the minimum spawning potential of 10 percent can still be maintained. At current fishing levels, based on averages of 1997–99 landings data, it is estimated that crab catches need to be reduced by approximately 15 percent to meet the target of $F = 0.7$.

The recommendations for thresholds and targets are especially significant because they rely upon and demonstrate the continued importance of increasing links between fishery science and the development of fishery management regimes. In the past, the public and perhaps even some resource managers at times assumed that estimated limits of fishing pressure (i.e., thresholds) essentially served as targets. This use of thresholds as de facto targets resulted in a higher than desirable risk to the crab population. When the action plan with its thresholds and targets is implemented, it will provide an enduring, reliable and replicable basis of information for evolving management alternatives.

While this approach is widely regarded as sound, and in line with fisheries management regimes in many other parts of the world, there exists in the minds of some a question about whether researchers and managers have enough data to accurately predict the recommended thresholds and desired targets. This question represents some legitimate concerns that the scientists had to assess during this intense two-year effort. In the final analysis, the threshold and targets proposed here represent the best reliable information now available, and existing data was sufficient to persuade the scientists who established it. In the future, more and better information will certainly be available, and the thresholds and targets should be re-assessed over time.

The current threshold was compiled from various fishery-independent surveys. Those fishery-independent surveys include:

- VIMS Trawl Survey — Virginia portion of the Bay, since 1955
- Calvert Cliffs Survey — Calvert Cliffs area, since 1968
- Maryland Trawl Survey — Eastern Shore and Patuxent River (limited), since 1978
- Winter Dredge Survey — sole Baywide survey, since 1990

To construct a Baywide picture of stock abundance based on available data from each state, fisheries experts decided to average the results of all the above surveys, standardizing them to the past ten years — the decade of the 1990s — when all four surveys, including the important winter dredge survey, were in effect.

Researchers found that averaging data from all surveys reveals the following picture:

- As previously noted, the lowest recorded level of the blue crab spawning stock occurred in 1968.
- Stock measurements in 1999 and 2000 hovered just above that historical low.
- The highest rates of fishing mortality — when harvesting pressure on the crab stock became dangerously high — occurred in the 1970s and again in the 1990s.

Again, this snapshot of the fishery will change over time, as the fishery changes, and as Baywide data, including stock and fisheries information, grow more comprehensive and complete in response to the recommended actions contained in this report.

SECTION III

Baywide Fisheries Management Considerations

The previous section focused on those aspects of the action plan that flowed principally from the biology and population dynamics of the blue crab.

This section will focus more directly on human factors as they interact with the blue crab and its fishery, and will provide additional definitions and context for the Bi-state Committee's development of the management recommendations contained in Section II of this report.

The blue crab fishery includes — in addition to the resource — individuals, households and other stakeholder interests, as well as social, economic and political institutions. Devising management options that preserve the fishery requires not only the very best science described in previous sections, but also wise political leadership and a clear understanding of how interwoven the crab industry is into the social and economic fabric of Bay communities.

The jurisdictions must devise coordinated, clear goals — such as maximizing employment or cost per unit effort or sustaining local culture and crab-reliant communities — while devising and fairly implementing management steps in 2011 and the years ahead. Just as causes for the current status of the blue crab populations do not rest exclusively on the shoulders of men and women in the commercial and recreational fisheries, no resolution of the blue crab fishery problem is possible without a more thorough understanding of how these human actors economically and socially interact within the blue crab fishery in the Chesapeake Bay as a whole. Hence, the Bi-state Committee has strongly endorsed the development of a stakeholder inclusive process for the development of a long-term blue crab management regime.

As previously noted, the Bay "as a whole" includes the jurisdictions of Maryland and Virginia, as well as the Potomac River Fisheries Commission. While crossing these different political and governmental divisions often presents a significant challenge, during this two-year analysis the resource managers from the various jurisdictions worked harmoniously together to discuss and deliberate the central challenges facing the Bay's crab fisheries.

The following key terms may aid management agency and general public consideration of the Bi-state Committee's blue crab fishery recommendations found in Section II:

Management Options include possible management actions that could be taken by the appropriate jurisdictions to help achieve the targets and avoid the thresholds. The management agencies have provided estimates of the reduction in crab mortality that would result from the introduction and effective implementation of a number of possible management actions. The potential management options present a range of possible choices, and the list should be understood as neither exhausting the possibilities for action, nor implying that all jurisdictions should adopt the same options.

Current or Existing Fishing Effort is defined as the legally authorized and currently deployed capacity to capture blue crabs. The precise magnitude of this effort can only be estimated, and some components of existing effort have less information on which to base an estimate than others. Recreational effort in particular remains difficult to assess because of a lack of reporting, but information is sketchy in the commercial sector as well.

Latent Effort is defined as the legally authorized but unused or undeployed effort that could be activated under appropriate sets of conditions. For example, unused crab licenses could be activated if the crab population grows and promises a higher dollar return for effort expended.

Overcapitalization refers to the available capacity in the form of gear and equipment that exceeds the amount needed to efficiently capture a given crab population, ideally one that is sustainable over time. Overcapitalization is similar to latent effort in its impact on individual incentives to act; that is, the individual crabber's situation makes it "rational" to expend effort that is cumulatively inefficient, or worse, resource depleting.

Enforceability refers to the ability to sanction fishing effort which is not legally authorized. Observers, including the crabbers themselves, believe that some legal restrictions on fishing effort are not always complied with, and a number called for stronger enforcement to level the playing field. The issues of non-compliance and enforceability clearly influence the effectiveness of management options that might be adopted to reach targets and to avoid thresholds.

Equity refers to an always contestable notion of fairness in distributing fishing effort, among diverse individuals, gear types, recreational, commercial, geographically distinct locations, and governmental-jurisdictional sectors. The diverse views of what is equitable, or fair in distributing effort, requires political decision-making, based on the best information and science that can be gathered.

The types of values that a policy-maker might weigh in pursuing equity for crabbers could include those that favor full-time commercial watermen, or particular places, such as Tangier and Smith islands. Or a decision-maker could attempt to foster equality in dollar outcomes among differing sectors of the fishery, between peeler and hard-shell crabbers, for example. The profile of the fishery detailed during this two-year effort provides useful information on types of gear, income and other factors that may contribute to choosing management options in an equitable manner.

Marketing refers, of course, to the distribution and sale of crab products, but also specifically to processes for improving the economic return to Chesapeake Bay blue crabs and crab industries in the face of increasing competition from foreign crab imports and crabs from other locations in the United States. Quality of product, efficiency of harvesting and other factors, such as brand-identification, all affect the ability to market product and to profit from crabbing effort.

The Bi-state Committee agreed with representatives of the industry and most marine economists that reductions in harvest should be phased in over the next three years, and that the implementation of specific management actions should also consider this time frame.

Among the management options now being considered by the jurisdictions are:

- Shortened work days
- Standardized days off (e.g., Sunday)
- Sanctuaries (already in force in Virginia)
- Stricter licenses for recreational crabbers
- Other rules to limit effort or gear

For a complete matrix of management options considered by the Bi-state Committee, contact the Chesapeake Bay Commission at the address found on the outside rear cover of this report or visit www.mdsg.umd.edu/crabs on the internet.

SECTION IV

Conclusion

As detailed in this report, after careful analysis of the Chesapeake blue crab fishery — based not only on scientific data that reaches back many decades, but also on harvest records and the observations and experiences of watermen, seafood processors and others — the Bi-state Committee recommends a fishing threshold that will preserve ten percent of the crab stock's spawning potential, and a target that would preserve 20 percent of the crab's spawning potential. In addition, the Bi-state Committee recommends setting a low-stock threshold at the lowest crab biomass measured by surveys to date, which occurred in 1968.

By recommending thresholds and targets for the Chesapeake blue crab fishery, the Bi-state Committee is calling for management of the blue crab stock on a Baywide basis. These thresholds and targets are therefore intended to provide a safe zone for blue crab catches Baywide, whether recreational or commercial.

A Work in Progress

Many challenges remain in monitoring and managing the blue crab, and course corrections will become necessary as new information emerges. Wise management of the Bay's blue crab will continue to require common sense, clear-headed judgment and the very best scientific and monitoring information we have at our disposal. The Work Group, in cooperation with the Chesapeake Bay Stock Assessment Committee, is now assembling a comprehensive list of research needs. The researchers involved in this process have often indicated numerous areas where information and knowledge remain incomplete at best. Chief among these areas of uncertainty are the following:

- **Questions concerning the crab's growth and life span.** While most crabs may only live two to three years, the question of how long a crab would live in an unfished, unpolluted environment remains open to debate. Studies currently underway — using lipofusion techniques, for example — should help us better answer this question.
- **The true extent of fishing pressure.** While all three jurisdictions that manage crabbing in the Chesapeake Bay have limits on fishing seasons and gear, little accurate information exists about precisely how much gear is being deployed at any given time. The question of fishing pressure

applies to both the commercial and recreational effort.

- **The role of latent effort.** Resource managers are well aware that current fishing pressure, even if high, is nowhere near what it would be if everyone who has a crabbing license used it, or if everyone currently active in the fishery used their gear to full capacity. While fishing pressure is arguably somewhat self-regulating, with crabbers entering and exiting the fishery according to economic factors and the perceived state of the stock, little is known about how well this tracks with actual stock abundance, and whether economic and other pressures can drive fishing effort even at times when stocks are in decline.
- **The changing character of the crab fishery, especially the soft crab fishery and its regulation.** There is wide agreement that the exact extent and nature of the Chesapeake soft crab industry is poorly documented. For example, what are the mortality rates from scrape or peeler pot to shedding tray to final product? How many crabs are taken, and how many actually sold to market? What effect does the taking of young molting crabs have on the population, especially if those crabs have not yet had a chance to spawn?
- **Uncertainties about the Bay's constantly changing food web, including the predation of fish on crabs.** With each passing year it becomes more apparent that the management of any one species can impact other species. Striped bass feed on juvenile crabs, but also on menhaden, worms and other forage food. What are the factors that determine changes in the food chain, and how do these interactions shift over time? What impacts do these changes have on populations of important commercial species?
- **The role of water quality and habitat.** Although considerable research has been done on the importance of underwater grasses for juvenile blue crabs, much remains to be learned. What are the ultimate effects of grasses having disappeared from many reaches of the Bay and its tributaries? What role does impaired water quality play in the health of the Bay's blue crab stocks? Are there factors of particular significance — such as low dissolved oxygen levels or the presence of specific contaminants, such as pesticides used to kill mosquitoes and other pests? What is the value and importance of protecting essential habitats, in addition to seagrass beds, which larger juvenile crabs and adults use for feeding, migration, mating and spawning?

Despite ongoing scientific uncertainties, the researchers felt strongly, as did other members of the Bi-state Committee, that enough information exists to make intelligent judgments about a range of fishing pressure that is acceptable if we are to preserve the Bay's blue crab stock. At the same time, support of ongoing investigations into these unanswered questions is critical to the credibility of evolving management efforts.

A stakeholder Process for Long-Term Blue Crab Management

The term "stakeholders" is admittedly an abstract one. It is meant to refer to the watermen and their families who are affected by commercial crabbing regulations. It refers as well to seafood processors and distributors who form the backbone of the region's seafood market. It refers to the restaurant owners and operators who serve Chesapeake Bay blue crabs, whether as softshells or hardshells, whether in crab cakes, soups or just steamed and heaped on a table. Finally, it refers to the citizens of the region who care about crabs as part of the Chesapeake's ecosystem and its heritage. Whether they "chicken neck" for crabs, or simply enjoy crabs as an integral part of the region, these Bay dwellers are also stakeholders who deserve a voice at the table.

Through discussions at the public forums and elsewhere, it became clear that any actions taken to manage the crab will have varying impacts on different stakeholder groups. For example, a shorter workday might not present a hardship for some who fish for the crab, but for part-time crabbers who count on going out after they come home from a day job, restricting crabbing at a certain time of day will likely mean the end of their part-time crabbing career.

Also, by restricting days of the week, or times of the year, regulations can inadvertently cause watermen and their crews to take unnecessary risks. Watermen, like all who work the water, gauge their activities according to winds, waves and weather. If, for example, watermen are precluded from fishing on,

say, a Friday, they may feel forced to go out on a Thursday, in order to make ends meet, even if the weather is kicking up. Members of the Work Group recommended that such factors be taken into consideration when choosing management strategies.

Flexibility emerged from many discussions with stakeholders as a key ingredient of any workable plan. During public forums, for example, watermen voiced the concern that once fishing restrictions are put on they are never made less restrictive or entirely removed. This need for flexibility in fact lies at the foundation of the Bi-state Committee's approach. Specifically, the Committee avoided recommending fishing quotas that would set the crab catch at a particular level. Instead, the new threshold and target strategy is meant to be dynamic, allowing the crab harvest to move up and down as crab stocks move up and down. In this way the fishing rate can remain the same, even though the landings will rise and fall — as they always do rise and fall — with the abundance of crabs in the Bay.

The Bi-state Committee's call for a management development process involving stakeholders is vital because there are many variables involved in crabbing, many of which may be known primarily by the crabbers themselves. This process would ideally be developed by jurisdiction and be coordinated across the Bay fisheries. Of course to a certain degree such processes are already in place, for example, crab advisory committees or tidal fish advisory committees in each state.

What the Bi-state Committee envisions, however, is a more inclusive roundtable, such as the Oyster Roundtable in Maryland, or similar blue ribbon groups employed for various fisheries in the past. The Bi-state Committee itself, with representatives from watermen's groups, seafood processors and others, plays such a stakeholder role, but in this next stage of the procedure it is important that the stakeholder process occur at the level of each jurisdiction, where laws and regulations will be passed and promulgated. Meanwhile, the Bi-state Committee can continue to play a helpful role, at least in the near term, of coordinating the various stakeholder efforts on a Baywide basis.

The Bi-state Committee's recommendation for an ongoing stakeholder process represents the hope that further effort will be made to move the relationship between government and the fishery toward one of mutual governance rather than of regulator and regulated. The term "co-management," for example, refers to a governance process where there is a shift of relationships between the government agencies and the fishery that goes beyond consultation to a sharing of the responsibility for introducing and enforcing rules that will protect the resource and provide social equity as well.

Baywide, coordinated blue crab management remains a "work in progress." Central to this dynamic approach is careful measurement of the stock through the best means possible. This will require adequate funding of fisheries independent surveys — such as the important winter dredge survey — and ongoing economic analyses to track changes in the fishery. In short, careful management of the Chesapeake blue crab will take a firm commitment and a substantial investment. When one considers the role of the blue crab as the last great fishery in the Bay — the one major species that currently supplies some two-thirds of fishing income and supports waterside communities throughout the region — the cost and considerable effort required are not too high a price to pay.

Appendices

Bi-State Blue Crab Advisory Committee

October 2000

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Virginia House of Delegates
Chesapeake Bay Commission

Honorable John F. Wood, Jr.
Maryland House of Delegates
Chesapeake Bay Commission

Honorable Bill Bolling
Senate of Virginia

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Honorable Michael H. Weir
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October 2000

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Summary of Public Comments, Blue Crab Public Forums

Maryland

Written and oral comments at four forums were provided by 83 people, comprising 23 watermen, 26 recreational crabbers and/or fishermen, five seafood processors, four county or state government representatives and 25 members of the general public. Key issues, ranked by order of consensus among commenters, include the following:

1. Recreational crab fishery restrictions. Close to 40 percent of commenters, representing both the commercial and recreational sectors, support mandatory licensing of recreational crabbers and/or adoption of more stringent harvest restrictions. These commenters express a general agreement that conservation efforts should be applied to both the commercial and recreational blue crab fisheries.

2. Environmental quality. It is the opinion of a broad representation of stakeholders that the degradation of water quality and the associated decline in

submerged aquatic vegetation (SAV) is a major, if not primary, cause of the blue crab decline. Commenters support: increased regulatory and enforcement measures to more effectively control nutrients and chemical contaminants from entering the Bay; restoration of Bay grasses; and efforts to control and mitigate land development across the Chesapeake Bay watershed.

3. Protection of female crabs. Widespread support was also voiced for female crab harvest limitations. Recommendations range from banning the taking of females to a moratorium or daily bushel limit on the fall season for females. Many commenters support eliminating the winter dredging of female crabs.

4. Commercial crab fishery restrictions. Management options in this category were addressed by over 60 percent of the oral and written comments. Among the general public (representing more than half of the comments received), there is agreement that additional commercial harvest limitations are needed to restore and maintain a robust blue crab population. Although clear consensus about specific regulations did not emerge among watermen and seafood processors, industry leaders encouraged them to articulate their input later in the process.

5. Predation. This issue generates the most divergent views among stakeholders. Among watermen and seafood processors, a majority believe that the predation of juvenile crabs by rockfish is a significant factor in the blue crab decline, and urge a lifting of the current catch limitations on the striper fishery. An equal number of commenters dispute the impact of predator fish on the blue crab population, and several others would direct management actions toward restoring menhaden stocks.

Virginia

Written and oral comments were provided by 37 people, comprising 13 watermen, seven seafood processors, two recreational crabbers/fishermen and 15 members of the general public. Key issues, ranked by order of consensus among commenters, include the following:

1. Predation. The major area of consensus was on the topic of predation. Seventeen commenters, primarily watermen and seafood processors, believe that the restored rockfish population is a major factor in the blue crab decline and support increased striped bass catch allowances. The importance of multispecies management plans was stressed by several speakers, who highlighted the need to include other predator fish, as well as menhaden, into analyses. Scientists warned against extrapolating individual studies to the whole striped bass population.

2. Commercial crab fishery restrictions. A majority of watermen and others in the commercial crab industry feel that existing regulations have not proven effective in protecting the blue crab population, and therefore are opposed to any new regulations that would impose additional economic burdens upon the commercial sector. They cite two recently enacted regulations — the Bay sanctuary and the 25 percent cut in peeler pot effort — and urge that these be given time to work. Other commenters voiced support for harvest and gear restrictions, sanctuaries, daily time limits, and the banning of sponge crabs.

3. Environmental quality. A diverse group representing one-quarter of those commenting addressed the decline of water quality and the loss of Bay grasses as a major concern. These stakeholders support increased efforts to control nutrients, chemical contaminants, sediment, and other pollutants from entering the Chesapeake Bay.

Potomac River

The meeting of the Potomac River Fisheries Commission (PRFC), held in LaPlata, Maryland, was attended by 40 people, including 11 members of the PRFC. Nine speakers provided comments at this public forum, raising the following issues:

1. Predation. Divergent opinions were expressed as to the impact of rockfish on the blue crab population. Several speakers emphasized the importance of a multispecies management plan which would treat predator fish as one part of the equation. Other speakers cautioned against expanding fishing quotas, and would steer management options toward conservation efforts and reduced harvests.

2. Environmental quality. The degradation of water quality is a major concern. Speakers focused upon the issues of waterfront development, chemical sprays, wastewater treatment effluent and spills, and the application of sludge on land.

3. Commercial crab fishery restrictions. Several speakers addressed the importance of conservation

and restoration efforts across all sectors. Recommendations include: postponing new restrictions until more information is available; development of thresholds and targets, including triggers for defined actions; and reductions in certain harvesting methods, such as scrapes, gill nets and dredges. Opposition to tighter pot limits and additional days off was also expressed.

The Future Role of BBCAC

Background

In 1996, the Chesapeake Bay Commission (CBC) created the Bi-State Blue Crab Advisory Committee (BBCAC) to facilitate dialogue and coordinate blue crab fishery management options among the three Bay jurisdictions — Maryland, Virginia and the Potomac River Fisheries Commission. Realizing the blue crab's importance to the region, in 1999 the governors and legislatures of Maryland and Virginia each allocated $150,000 to the BBCAC to conduct a two-year analysis of the blue crab and how it is managed.

The analysis has three principal components: an extensive stakeholder survey and outreach effort; habitat, predation and economic research; and the analysis and development of sustainable harvest targets and thresholds for the Chesapeake Bay blue crab fishery. Draft management and research recommendations will be refined by BBCAC's Technical Work Group (TWG) and presented to BBCAC on Sept. 27, 2000, and then to a variety of constituencies per a stakeholder outreach plan for the fall and early winter of 2000. The final recommendations will be presented by BBCAC for the CBC's consideration in January 2001 and subsequently submitted by CBC to the management jurisdictions.

Recommendations for BBCAC's Future Role

At its meeting in Hershey, Pa., on Sept. 8, 2000, the Chesapeake Bay Commission unanimously adopted the following recommendations for the continued role of BBCAC and its Technical Work Group following the January 2001 report delivery:

BBCAC members should continue for a term of two additional years from January 2002, or until January 2003. Current members may continue to serve at the pleasure of the chairmen, and management agency representatives shall serve as designated by their parent agency. The BBCAC shall meet at least once per year, and its Technical Work Group twice each year, with the following mission(s):

(a) for BBCAC, to track, assess and analyze blue crab management actions put into place by the management jurisdictions, and to issue an annual report each year that documents the status of the stock and progress made in implementing the BBCAC recommendations. It will also highlight emerging issues that require continued actions to benefit the blue crab resource, the industry and/or the regional economy;

(b) for the TWG, to provide ongoing guidance to BBCAC for future management recommendations, and to recommend and provide for research and assessment needs; and

(c) for the BBCAC and the TWG, (in partnership with Maryland and Virginia Sea Grant), to administer a competitive blue crab research grant program benefiting high-priority blue crab (i) research and (ii) industry development needs. BBCAC staff will work with Sea Grant to annually develop a Research Call for Proposals (RFP). Project review and selection will be performed by BBCAC and the TWG in coordination with the Chesapeake Bay Stock Assessment Committee (CBSAC) and other appropriate entities.

Funding Requirements

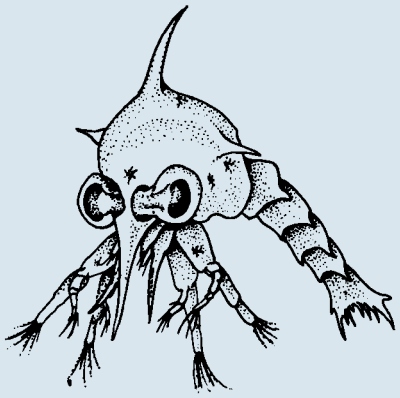
The BBCAC would request $200,000 each from Maryland and Virginia in FY 2002 in support of these envisioned activities for the biennium. Of this total, $75,000 is budgeted for annual meetings, for the annual progress assessment report, and for grant administration and review. The remaining $325,000 would support, at the BBCAC's discretion, blue crab (i) research and (ii) industry development projects. Research awards and subsequent progress summaries would be included in the annual report to the CBC and the management jurisdictions. The BBCAC shall issue its final report and sunset in January 2003, unless action is taken by the Chesapeake Bay Commission.

Adopted Sept. 8, 2000

Life Stages of the Blue Crab *(Callinextes sapidus)*

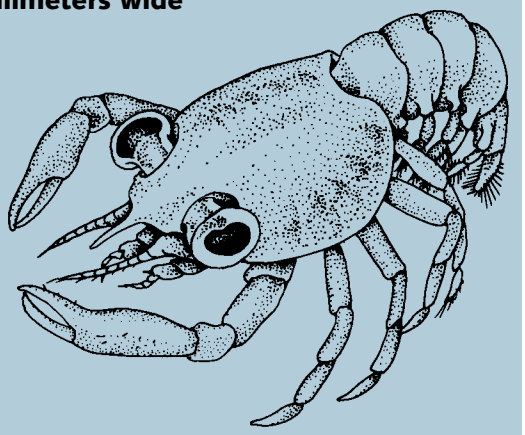
Zoea (first larval stage)

Approximately 0.3 to 1 millimeter wide



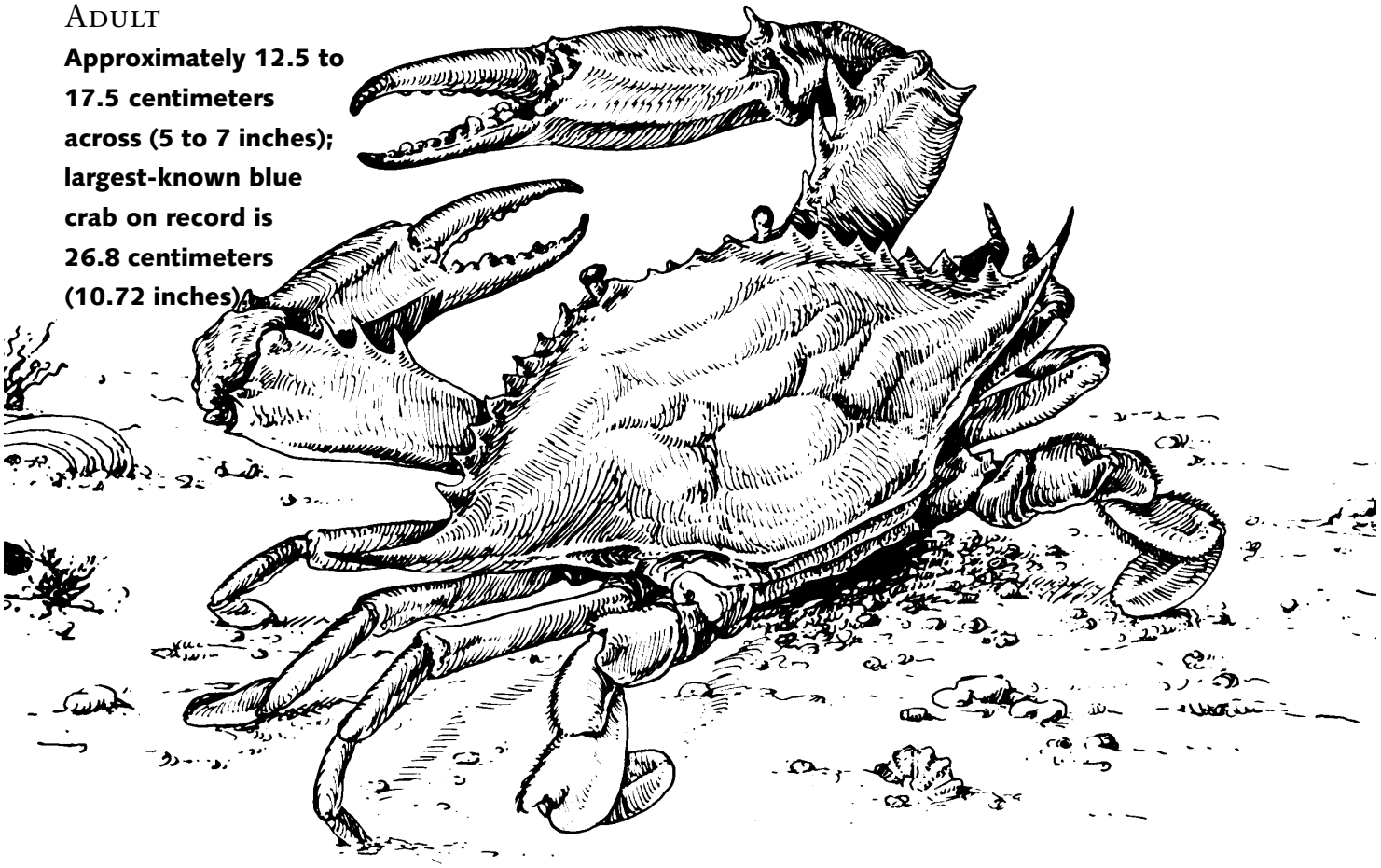
Megalopa (second larval stage)

Approximately 1.2 to 1.5 millimeters wide



Adult

Approximately 12.5 to 17.5 centimeters across (5 to 7 inches); largest-known blue crab on record is 26.8 centimeters (10.72 inches).



ILLUSTRATIONS BY ALICE JANE LIPPSONfrom *Life in the Chesapeake* by Lippson and Lippson.

Chesapeake Bay Commission

The Commission maintains offices in Maryland, Virginia and Pennsylvania. Commission staff are available to assist any member of the General Assembly of any signatory state on matters pertaining to the Chesapeake Bay and the Chesapeake Bay Program. Through its Bi-state Blue Crab Advisory Committee, the Commission has led the effort to coordinate the management of the Chesapeake Blue Crab among the three management jurisdictions — Maryland, The Potomac River Fisheries Commission and Virginia.

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