



Diana Evans

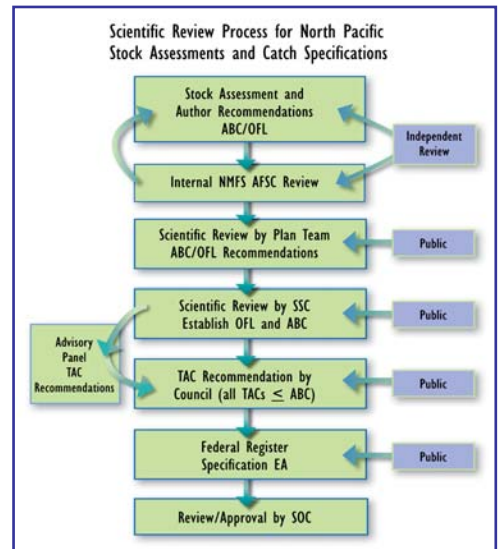
Groundfish Catch Limits

A CORNERSTONE FOR SUSTAINABILITY

Strict annual catch limits for every target fishery provide the most basic and effective management tool to ensure sustainable fisheries. In the North Pacific, a rigorous process in place for over 30 years ensures that annual quotas are set at conservative, sustainable levels.

SCIENTIFIC LIMITS

Three reference points are used for management of groundfish fisheries in the North Pacific. The **overfishing level (OFL)** is the harvest limit which should never be exceeded. It is based on the fishing mortality rate associated with producing the maximum sustainable yield on a continuing basis. The **acceptable biological catch (ABC)** is set lower than the OFL, as the annual sustainable harvest limit. The buffer between these reference points allows for uncertainty in single species stock assessments, ecosystem considerations, and operational management of the fishery. The **total allowable catch (TAC)** is the annual harvest limit that incorporates social and economic considerations. The FMP prescribes that TAC may equal but never exceed ABC, which is set lower than OFL. The sum of TACs for all groundfish stocks must also remain within the optimum yield range defined in the FMP. In the BSAI, the upper limit of the range is 2 million mt, which can be constraining. TAC may be set lower than ABC for a variety of reasons, such as to remain under the 2 million mt optimum yield limit; to increase a rebuilding rate or address other conservation issues; to limit incidental bycatch, for example of halibut; or to account for state water removals. Fisheries are managed in-season to achieve the TACs without exceeding the ABC or OFL.



Flow chart depicting the scientific review process for stock assessments and establishment of catch specifications, where $TAC \leq ABC < OFL$.

The reference points and catch limits are specified annually through an established process. The annual process of determining OFL and ABC specifications begins with the assignment of each stock to one of six “tiers” based on the availability of information about that stock. Stocks in Tier 1 have the most information, and those in Tier 6, the least. Application of a control rule for each tier prescribes the resulting OFL and ABC for each stock. For many groundfish stocks, the estimate of $F_{40\%}$ is used as a surrogate for F_{ABC} . $F_{40\%}$ is the fishing mortality rate at which the spawning biomass per recruit is reduced to 40% of its value in the equivalent unfished stock. The control rules for Tiers 1-3 also provide for automatic rebuilding, because if a stock falls below target biomass levels, ABC and OFL are drastically reduced.



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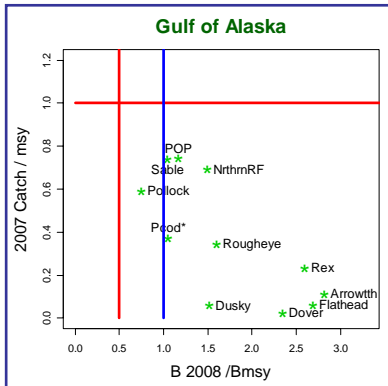
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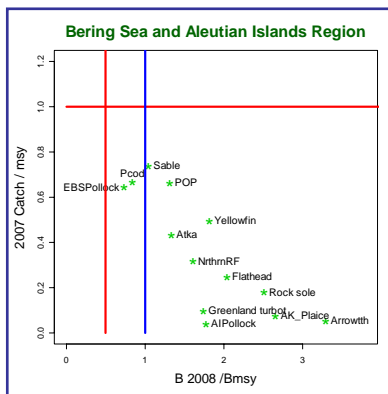
Goodman, D., Mangel, M., Parkes, G., Quinn, T., Restrepo, V., Smith, T., and K. Stokes. 2002. Scientific Review of the Harvest Strategy Currently Used in the BSAI and GOA Groundfish Fishery Management Plans. www.fakr.noaa.gov/npfmc/misc_pub/f40review1102.pdf

FMP References

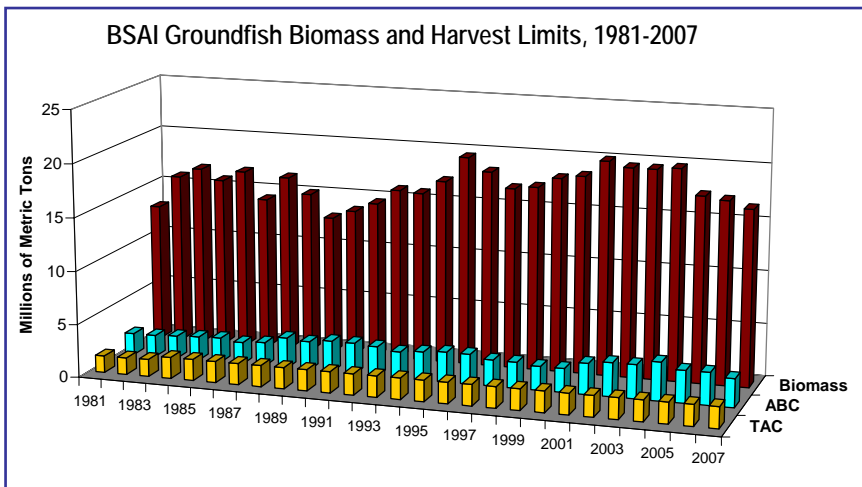
Forage fish category: BSAI Groundfish FMP Amendment 56, GOA Groundfish FMP Amendment 56; 64 FR 10952, implemented January 27, 1999.



Status of modeled GOA and BSAI groundfish stocks, relative to overfished and overfishing thresholds (indicated by red lines). The blue line indicates the target biomass, B_{MSY} .



Estimates of biomass, acceptable biological catch (ABC), and total allowable catch (TAC), in millions of tons, for groundfish in the BSAI from 1981-2007.



Scientists write an assessment of the status of each stock (or group of stocks), and include alternate model simulations and tier assignments to arrive at a recommendation for OFLs and ABCs. The Groundfish Plan Teams compile these assessments into a Stock Assessment and Fishery Evaluation (SAFE) report, develop their own recommendations (which may or may not agree with the stock assessment author), and present this information to the Council and its Scientific and Statistical Committee (SSC) and Advisory Panel (AP). The SSC is responsible for setting the Council's OFL and ABC limits, using the SAFE reports and Plan Team recommendations. The SSC retains the flexibility to adjust ABC and OFL values from the control rule, based on factors such as multispecies interactions and ecosystem considerations. The Council then sets the TAC levels at or below the ABC levels, incorporating recommendations from the Advisory Panel and public testimony.

POSITIVE RESULTS

In 2002, the Council commissioned an independent review of the basic exploitation strategies by a panel of internationally recognized scientists. The panel concluded that in a single-species/target-stock context, the TAC-setting process employed by the Council is a very conservative one, at least for Tiers 1 through 5 (no reliable estimates of biomass or natural mortality are available for stocks in Tier 6, and OFL and ABC are based on catch history), and the in-season monitoring and management system is adequate for implementing the TACs with little risk of exceeding them. In addition to this panel review, many of the groundfish stocks' harvest strategies have been independently reviewed by the Center for Independent Experts.

Annual catch limits have resulted in abundant fish stocks and sustainable fisheries. No groundfish stock is overfished or undergoing overfishing. Further, most stocks are well above target biomass levels (shown in the figure as B_{MSY} , the biomass level that produces maximum sustainable yield).

ON THE HORIZON

The Council and its SSC will review a pending proposed rule on national guidelines for annual catch limits, which is expected to be published in early 2008. Although the Magnuson-Stevens Act was reauthorized in 2007 to end overfishing by using the North Pacific annual catch limit specification process as a model, changes to the current specification process may be required.



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Stock Assessment and Fishery Evaluation Report for the King and Tanner Crab Fisheries, 2007, www.fakr.noaa.gov/npfmc/SAFE/2007/CRABSAFE07.pdf

Environmental Assessment for proposed Amendment 24, to revise overfishing definitions, 2007. NPFMC, www.fakr.noaa.gov/npfmc/current_issues/crab/KTC24907.pdf

FMP References

Fishery Management Plan for Bering Sea / Aleutian Islands King and Tanner Crabs, www.fakr.noaa.gov/npfmc/fmp/crab/CRABFMP2004.pdf

Revised overfishing definitions: proposed Amendment 24 to the BSAI Crab FMP.

FEDERAL AND STATE PARTNERSHIP

The BSAI King and Tanner Crab Fishery Management Plan (FMP) establishes a State and Federal cooperative management regime that largely defers crab fisheries management to the State of Alaska, with Federal oversight. The FMP defines three categories of management measures:

1. those that are fixed in the FMP and require a Federal FMP amendment to change;
2. those that are framework-type measures that the State can change following criteria set out in the FMP; and
3. those measures that are neither rigidly specified nor frameworked in the FMP and are at the discretion of the State.

In the GOA, crab fisheries are managed solely by the State of Alaska. For most regions in the GOA, actual abundance estimates are limited and commercial fishing has been closed.

CATCH SPECIFICATIONS FOR BSAI CRAB FISHERIES

Specifying **overfishing levels** (OFLs) for each fishery is a Federal responsibility. The Magnuson-Stevens Fishery Conservation and Management Act requires each FMP to specify criteria for determining when a fishery is overfished or when overfishing is occurring. The Council and NOAA Fisheries annually evaluate total catch levels relative to OFLs to determine if stocks are overfished or are approaching an overfished condition. If either of these occurs, the Council must immediately end overfishing and develop an FMP amendment to rebuild the stock within two years.

The State is responsible for setting allowable harvest levels for the crab fisheries, following guidelines in the crab FMP. Catch levels established by the State must be in compliance with OFLs established in the FMP to prevent overfishing. For those stocks included under the Crab Rationalization Program (see below), a **total allowable catch** (TAC), expressed in pounds of crab, is specified. For other stocks, a **guideline harvest level** (GHL) is the preseason estimated level of allowable harvest which will not jeopardize the sustained yield of the stock. The GHL is expressed as a range, to allow the State to make in-season management decisions based on current data obtained from the fishery.

ALLOCATION OF CATCH LIMITS

The Crab Rationalization Program allocates BSAI crab resources among harvesters, processors, and coastal communities. 100% of the TAC is allocated as harvest shares, and processor quota shares are also issued. Crab fishing under the program began on August 15, 2005. Several crab fisheries under the FMP are excluded from the Program, including the Norton Sound red king crab fishery, which is operated under a “superexclusive” permit program intended to protect the interests of local, small-vessel



participants. An LLP license is required to participate in the FMP crab fisheries excluded from the Program.

The Community Development Quota (CDQ) program receives 10% of the TAC for all fisheries in the crab rationalization program except Western Aleutian stocks, and 7.5% of the Norton Sound fishery. Sixty-five communities located along the Bering Sea are eligible for the CDQ program, and these communities are aligned into six CDQ groups. 10% of the Western Aleutian Island golden king crab fishery is allocated to an entity representing the community of Adak. This allocation is managed similar to allocations made under the CDQ program.

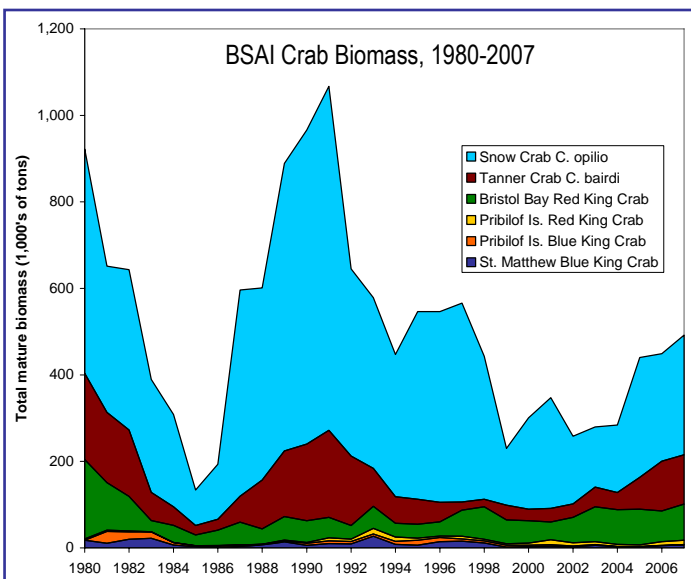
2007/2008 TACs for major crab fisheries

Bristol Bay red king crab:	20,383,000 lbs
Western Aleutian Islands (Adak) golden king crab (west of 174°W):	2,700,000 lbs
Eastern Aleutian Islands (Dutch Harbor) golden king crab (east of 174°W):	3,000,000 lbs
Bering Sea snow crab:	63,034,000 lbs
Bering Sea Tanner crab (east):	3,445,000 lbs
Bering Sea Tanner crab (west):	2,176,000 lbs

REVISED OVERFISHING DEFINITIONS

In December 2007, the Council took action under amendment 24 to revise the OFLs specified in the crab FMP. The amendment establishes a framework OFL tier system that provides a mechanism to continually improve the status determination criteria as new information becomes available. Revised OFLs use alternative biological reference points depending on the availability of and uncertainty about stock assessment data for each crab stock. Under the new procedure, the Council's Crab Plan Team and Scientific and Statistical Committee will review the stock assessments, including models and tier levels (which determine how OFL is calculated) for each stock. The Council will annually review crab stock OFLs. Overfishing is determined by calculating the total catch removals from all fishing sources compared to the calculated OFL for the same time period. Implementation of the amendment is awaiting approval from the Secretary of Commerce.

The amendment will also remove twelve state-managed stocks from the FMP, which will now be the sole responsibility of the State of Alaska. The stocks either have no directed fishery, a limited incidental or exploratory fishery, or the majority of catch occurs in State waters. With the removal of these stocks, all remaining crab stocks in the FMP will be subject either to the Crab Rationalization Program or the Norton Sound permit program.



ON THE HORIZON

The 2006 revision of the Magnuson-Stevens Act requires specification of annual catch limits for each Federal fishery. While the Council's recent crab catch specifications amendment should comply with annual catch limit requirements, there may be some technical revisions required once specific guidance is published.





A SMALL FISHERY

The Alaska weathervane scallop (*Patinopecten caurinus*) fishery started in 1967 when two vessels harvested weathervane scallops from fishing grounds east of Kodiak Island. From its inception through early 1993, the scallop fishery was managed in-season without a defined fishery management plan. Closed waters and seasons were established to protect crabs and crab habitat. When catches declined in one bed, the few vessels participating would move to new areas.

Catch has fluctuated somewhat since the inception of the fishery. Catches in the early years were high, reaching a peak of 1.8 million pounds of shucked scallop meats in 1969. More recent catches have been in the order of 500,000 pounds per year, with ex-vessel prices ranging from \$5.25/lb in 2002 to \$8.00/lb in 2006.



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For More Information

Scallop Stock Assessment and Fishery
Evaluation report,

www.fakr.noaa.gov/npfmc/SAFE/ScallopSAFE2008.pdf

FMP References

Fishery Management Plan for the
Scallop Fishery off Alaska,

www.fakr.noaa.gov/npfmc/SAFE/ScallopSAFE2007.pdf

FEDERAL MANAGEMENT NEEDED

In the early 1990s, the Alaska weathervane scallop fishery expanded rapidly, with an influx of boats from the East Coast of the United States. Concerns about overharvest of scallops and bycatch of other commercially important species, such as crabs, prompted the Commissioner of the Alaska Department of Fish and Game (ADF&G) to designate the weathervane scallop fishery a high-impact emerging fishery in 1993. This designation required ADF&G to close the fishery and implement an interim management plan prior to reopening. The interim management plan included a provision for 100% onboard observer coverage to monitor crab bycatch and to collect biological and fishery data.

From 1967 until early 1995, all vessels participating in the Alaska scallop fishery were registered under the laws of the State of Alaska. Scallop fishing in both State and Federal waters was managed under state jurisdiction. In January 1995, the captain of a scallop fishing vessel returned his 1995 scallop interim use permit card to the State of Alaska Commercial Fisheries Entry Commission in Juneau and the F/V Mr Big proceeded to fish scallops in Alaska Federal waters with total disregard to harvest limits, observer coverage, and other management measures and regulations. In response to this unanticipated event, Federal waters were closed to scallop fishing by emergency rule to control unregulated fishing until a fishery management plan (FMP) could be implemented to close the fishery.

The Alaska Scallop FMP, which was approved on July 26, 1995, established a 1-year interim closure of federal waters to scallop fishing to prevent uncontrolled fishing. The fishery was reopened with Amendment 1 on August 1, 1996.

The scallop fishery is jointly managed by the National Marine Fisheries Service and ADF&G under the FMP. Management measures in the FMP fall into two categories: Category 1 measures are those delegated to the State for implementation, while Category 2 measures are limited access management measures and other measures which are fixed in the FMP, implemented by Federal regulation, and require an FMP amendment to change.

Greg Rosenkranz



Greg Rosenkranz



LIMITED ENTRY

In 1997, the Council adopted Amendment 2, a vessel moratorium under which 18 vessels qualified for Federal moratorium permits to fish weathervane scallops in Federal waters off Alaska. In 1999 the Federal moratorium program was replaced by a more restrictive License Limitation Program (Amendment 4). The Council created a total of 9 licenses with no area endorsements; each vessel is permitted to fish statewide. However, vessels that fished exclusively in the Cook Inlet Registration Area, where a single 6-foot dredge was the legal gear type during the qualifying period, were limited to using the same gear when fishing outside Cook Inlet. In 2005, the gear restriction was later modified under Amendment 10 to allow these vessels to fish 2 dredges with a combined maximum width of 20 feet.

FLEET FORMS VOLUNTARY COOPERATIVE

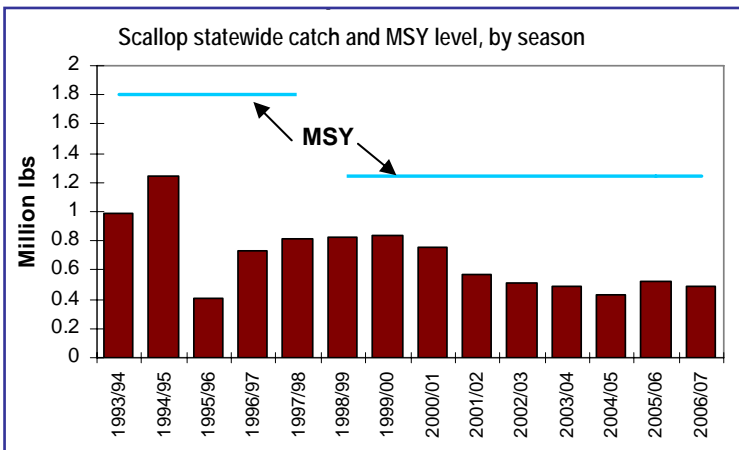
The License Limitation Program established a small closed class of license holders. In 2000, owners of 6 of the 9 licenses formed the North Pacific Scallop Cooperative under authority of the Fishermen's Cooperative Marketing Act. The cooperative regulates individual vessel allocations within the catch limits and crab bycatch caps, under the terms of their cooperative contract. Non-cooperative vessels are not bound by any contract provisions. The cooperative does not receive an exclusive allocation of the scallop harvest. Some owners opted to remove their boats from the fishery and arranged for their shares to be caught by other members of the cooperative.

OVERFISHING DEFINITIONS

The Magnuson-Stevens Act requires FMPs to establish an overfishing level for each stock. Overfishing is a level of fishing mortality that jeopardizes the capacity of a stock to produce maximum sustainable yield (MSY) on a continuing basis. Amendment 6 to the scallop FMP established the statewide MSY for weathervane scallops at 1.24 million lbs of shucked meats, based on the average catch from 1990-1997, excluding 1995. Optimum Yield was defined as 0-1.24 million lbs, and the overfishing control rule was defined as a fishing rate in excess of the natural mortality rate, which has been estimated at 12% per year statewide. The fishery is managed conservatively, with harvest levels well below MSY.

ON THE HORIZON

The Magnuson-Stevens Act was reauthorized in 2007 to require annual catch limits for all managed stocks. NMFS is preparing to issue a proposed rule of guidelines for annual catch limits, which is expected to be published in 2008. Because the scallop fishery is managed by ADF&G using guideline harvest ranges, rather than annual catch limits using a process involving peer review by the Council's Scientific and Statistical Committee, changes to the current specification process may be required.





Mark Fina

REBUILDING DEPLETED STOCKS

The Sustainable Fisheries Act of 1996 required that overfished stocks be rebuilt as soon as possible, but no longer than in ten years, except under special circumstances. If the Secretary of Commerce determines that a fishery is overfished or approaching an overfished condition, the responsible fishery management council must revise the management program to stop overfishing, if it is occurring, and rebuild the stocks. Since 1996, there have been four stocks in the North Pacific that were deemed 'overfished', and rebuilding plans were developed and implemented for each. All four stocks were Bering Sea/Aleutian Island crab stocks. Environmental conditions for these stocks have resulted in sequential years of poor recruitment and contributed, with other factors, to the decline in abundance.



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A stock under the BSAI King and Tanner Crab fishery management plan (FMP) is deemed overfished if the spawning biomass is below a minimum stock size threshold (MSST), which is defined as 50% of the target biomass level (B_{MSY}). Currently, the rebuilding program for each stock includes adjustments to the State of Alaska harvest strategy, bycatch controls, and habitat protection measures. Stocks are considered rebuilt if the estimate of biomass is above the B_{MSY} level for two consecutive years.

BSAI Tanner Crab. A rebuilding program for Tanner crab (*Chionocetes bairdi*) was adopted by the Council in October 1999. The rebuilding program established a very conservative harvest strategy (including low exploitation rates and threshold female biomass levels), and reduced crab bycatch limits for the trawl fisheries. It was projected that the stock had a 50% probability of rebuilding to the B_{MSY} level in 10 years. The stock has now met the B_{MSY} threshold (189.6 million pounds) and is considered fully rebuilt.

For More Information

Stock Assessment and Fishery Evaluation Report for the King and Tanner Crab Fisheries, 2007, www.fakr.noaa.gov/npfmc/SAFE/2007/CRABSAFE07.pdf

FMP References

BSAI Tanner Crab: BSAI Crab Amd 11; 65 FR 38216, implemented June 20, 2000.

BSAI Snow Crab: BSAI Crab Amd 14; 66 FR 742, implemented January 4, 2001.

St Matthew Blue King Crab: BSAI Crab Amd 15; 65 FR 76175, implemented December 6, 2000.

Pribilof Blue King Crab: BSAI Crab Amd 17; 69 FR 17651, implemented April 5, 2004.

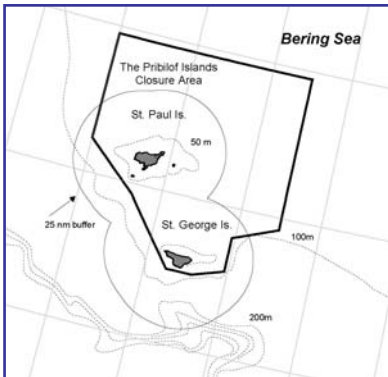
BSAI Snow Crab. A rebuilding program for snow crab (*C. opilio*) was adopted by the Council in June 2000. Rebuilding measures included very low exploitation rates, stair-stepped based on spawning biomass; minimum thresholds for establishing guideline harvest levels (GHLs); pot gear modifications to provide escapement of female and juvenile crabs; and a fishery closure when the stock falls below 50% MSST. Under the rebuilding plan, the stock had a 50% probability of rebuilding to the B_{MSY} level (921.6 million pounds) in 7 to 10 years. Estimated total mature biomass has been oscillating slightly above and below the MSST threshold since 1999. Mature biomass increased in 2007 relative to 2006 and remains above MSST for the third consecutive year but still remains below B_{MSY} .



Herman Savikko



All trawling is prohibited within the Pribilof Islands Habitat Conservation Area, to protect blue king crab habitat, as well as to reduce the bycatch of juvenile crab and halibut.



St. Matthew Blue King Crab. A rebuilding program for St. Matthew blue king crab was adopted by the Council in June 2000. The harvest strategy includes a conservative harvest rate based on biomass, a minimum stock threshold for fishery opening, minimum GHL requirements, and a maximum legal male harvest rate. The stock has not met the threshold measures included in the harvest strategy and has been closed to fishing since 1999. Rebuilding measures also included pot gear modifications to provide escapement of female and juvenile crabs, and closure of State waters around the island to all groundfish fishing to protect vulnerable egg-bearing female blue king crab that occupied these areas. Under the rebuilding plan, the stock had a 50% probability of rebuilding to the B_{MSY} level (22.0 million pounds) in 6 years. In 2007, total mature biomass was above the MSST for the second year in a row and trawl survey results indicated increased recruitment of smaller size classes of crabs. There continues to be uncertainty about the abundance of egg-bearing females for this stock as the trawl survey does not adequately measure inshore, rocky terrain, although a 2007 pot survey indicated an increase in these mature females from the previous 2004 survey.

Pribilof Blue King Crab. A rebuilding program for Pribilof blue king crab was adopted by the Council in October 2003. Bycatch controls and habitat protection measures for groundfish and crab fleets had already been implemented around the Pribilof Islands. Under the rebuilding plan, fishing is prohibited until the stock is completely rebuilt to B_{MSY} (13.2 million pounds). In addition, once rebuilt, the plan establishes an extremely conservative harvest strategy and a delayed opening for the second year the stock is above a minimum threshold. Under the rebuilding plan, the stock was projected to rebuild to the B_{MSY} level in 9-10 years, at a 50% probability. The stock continues to be at very low stock size, and little or no recruitment is apparent.

ON THE HORIZON

In December 2007, the Council took final action to revise overfishing definitions for all FMP crab stocks (Amendment 24). The Council's preferred alternative is a proposed tier system structured upon the availability of information for a given

stock. Once a stock is assigned to its appropriate tier, the tier determines how the OFL is calculated. The new OFL setting process is awaiting approval by the Secretary of Commerce, and may begin as soon as Spring 2008. Once the new overfishing definitions are in place, the rebuilding plans will need to be reconsidered in light of new information and criteria for stock recovery.

