Five-Year Review
of the
Crab Rationalization Management Program
for
Bering Sea and Aleutian Islands Crab Fisheries

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1 INTRODUCTION

In 2001, Congress directed the Council to conduct an analysis of several different approaches to rationalizing the BSAI crab fisheries (see Consolidated Appropriations Act of 2001 (Pub. L. No. 106 554)). In response, the Council adopted the following purpose and need statement to guide it through the process of considering rationalization alternatives for the fisheries:

> *Vessel owners, processors and coastal communities have all made investments in the crab fisheries, and capacity in these fisheries far exceeds available resources. The BSAI crab stocks have also been highly variable and have suffered significant declines. Although three of these stocks are presently under rebuilding plans, the continuing race for fish frustrates conservation efforts. Additionally, the ability of crab harvesters and processors to diversify into other fisheries is severely limited and the economic viability of the crab industry is in jeopardy. Harvesting and processing capacity has expanded to accommodate highly abbreviated seasons, and presently, significant portions of that capacity operate in an economically inefficient manner or are idle between seasons. Many of the concerns identified by the NPFMC at the beginning of the comprehensive rationalization process in 1992 still exist for the BSAI crab fisheries. Problems facing the fishery include:*
>
> 1. *Resource conservation, utilization and management problems;*
> 2. *Bycatch and its' associated mortalities, and potential landing deadloss;*
> 3. *Excess harvesting and processing capacity, as well as low economic returns;*
> 4. *Lack of economic stability for harvesters, processors and coastal communities; and*
> 5. *High levels of occupational loss of life and injury.*
>
> *The problem facing the Council, in the continuing process of comprehensive rationalization, is to develop a management program which slows the race for fish, reduces bycatch and its associated mortalities, provides for conservation to increase the efficacy of crab rebuilding strategies, addresses the social and economic concerns of communities, maintains healthy harvesting and processing sectors and promotes efficiency and safety in the harvesting sector. Any such system should seek to achieve equity between the harvesting and processing sectors, including healthy, stable and competitive markets.*

In June of 2004, after deliberating at several meetings, the Council took final action adopting its preferred alternative for rationalizing the fisheries. As a part of that action, the Council requested a comprehensive review of the program five years after its implementation. At the October 2009 Council meeting, staff presented the Council with a workplan for the review. This paper (and its accompanying appendices) is the five-year review of the program. This paper examines most aspects of the management program and its effects, while separate appendices examine effects of the program social and community impacts (Appendix A) and safety (Appendix B).

The paper reviews the distribution of allocations to both harvesters and processors under the program and examines changes in those distributions to the extent feasible. The paper goes on to examine the participation patterns and distribution of activities of both sectors and changes in their operations. The paper also examines the effects of the program on crews in both sectors. Changes in ex vessel pricing brought on by the share structure of the program are also examined. Entry opportunities for both sectors are examined. Changes in management arising as a result of the change in management and changes in costs are also examined, as the effects of the program on the biological condition of crab stocks.

The analysis examines five years of fishing under the program. The change to any share-based management system requires participants to modify their behavior. Some changes evolve over time, as participants adapt to the program. For example, in the derby fisheries landings each participating vessel competed to achieve a share of the allowable catch. One of benefits expected to arise from the crab rationalization program is the organization of fishing in cooperatives to achieve harvesting efficiencies. Some aspects of this transition (such as fleet consolidation) occurred immediately on implementation of the program. Others, such as the joint fishing of allocations in cooperatives have occurred more gradually, as participants have developed stronger associations within the fleet. The program is a complex system that incorporates regulatory aspects intended to balance the interests of various stakeholders. As with any such system, participants are likely to develop a better understanding of the program over time. In addition, the operation of certain aspects of the program is likely to become more predictable as the program matures. Adequately assessing the performance of the program after only five seasons is difficult, since participants continue to learn to operate under the program and adapt to the changes it has brought on.

The paper does not attempt to be a comprehensive study of management of the crab fisheries. The paper is intended to address only changes brought on by the change in management to the rationalization program. For example, the paper examines changes in fishing behavior under the program that might affect stocks in the fisheries, but does not attempt to examine stock management in general.

The Fishery Management Plan (FMP) for the commercial king and Tanner crab fisheries in the Bering Sea/Aleutian Islands (BSAI) was approved by the Secretary of Commerce on June 2, 1989. The FMP establishes a State/Federal cooperative management regime that defers crab management to the State of Alaska with Federal oversight. State regulations are subject to the provisions of the FMP, including its goals and objectives, the Magnuson-Stevens Act national standards, and other applicable federal laws.

The FMP specifies three categories of management measures: (1) those that are fixed in the FMP under Council control, (2) those that are frameworked so that the State can change them according to criteria outlined in the FMP, and (3) those measures under complete discretion of the State (Table 1-1).

Table 1-1 Management measures used to manage king and Tanner crabs in the BSAI management unit by category

Category 1 (Fixed in the FMP)	**Category 2** (Frameworked in FMP)	**Category 3** (Discretion of State)
Legal Gear	Minimum Size Limits	Reporting Requirements
Permit Requirements	Guideline Harvest Levels/Total Allowable Catch	Gear Placement and Removal
Federal Observer Requirements	In-season Adjustments	Gear Storage
Limited Access	Districts, Subdistricts and Sections	Vessel Tank Inspections
Norton Sound Superexclusive Registration	Fishing Seasons	Gear Modifications
Essential fish habitat	Sex Restrictions	Bycatch Limits (in crab fisheries)
Status determination criteria	Pot Limits	State Observer Requirements
	Registration Areas	Other
	Closed Waters	

In large part, this review examines the change in limits on access established under the FMP. Where relevant, the paper does, however, examine changes in other aspects of management that have resulted from the change in management of access.

2 DESCRIPTION OF MANAGEMENT

2.1 Pre-rationalization management

Prior to the rationalization program, the eight major Bering Sea and Aleutian Islands crab fisheries were managed under the License Limitation Program, a limited entry program under which licenses were allocated to harvesters based on historic participation. Licenses were endorsed for one or more area and species and were issued by operation type, catcher vessel or catcher processor.

Individual harvests were determined in competitive race for fish. Since the seasons in most of the BSAI crab fisheries do not conflict, most participants were active in several of the fisheries, moving from one fishery to another. However, stock declines in the Bristol Bay red king crab and the Bering Sea *C. opilio* led to seasons lasting only a few days or weeks. Consequently, equipment was often idle for several months of the year.

A guideline harvest level (GHL) for each fishery set target catch for the fishery. Initially, these GHLs were ranges, but later they became fixed amounts. Managers monitored harvests by in-season reports and attempted to time the closure of a fishery with completion of the harvest of the GHL. Harvests exceeded the GHLs in some years, however, because in-season monitoring could not keep pace with harvests during the short seasons. Over time, managers improved in their abilities to monitor catch in season, limiting the extent of these GHL overages in the years immediately preceding the implementation of the rationalization program.

2.2 Description of rationalization program

The program rationalizes the large crab fisheries in the BSAI, specifically the following:

- Bristol Bay red king crab
- Bering Sea *C. opilio* (snow crab)
- Eastern Bering Sea *C. bairdi* (Tanner crab) – East of 166º W
- Western Bering Sea *C. bairdi* (Tanner crab) – West of 166º W
- Pribilof blue and red king crab
- St. Matthew Island blue king crab
- Western Aleutian Islands (Adak) golden king crab – West of 174º W
- Eastern Aleutian Islands (Dutch Harbor) golden king crab – East of 174º W
- Western Aleutian Islands (Adak) red king crab – West of 174º W

To address the concerns of various stakeholders in these fisheries, the Council developed a “voluntary three pie cooperative” program intended to protect the interests of the harvest sector, the processing sector and defined regions and communities. Allocations under the program are based on historic participation to protect investment in and reliance on the program fisheries.

The primary elements of the program are:

- Total allowable catch
- Harvesting shares
- Processing shares
- Regional share designations
- C share allocation to protect captain and crew interests
- Catcher processor shares
- Binding arbitration system
- Cooperatives
- Community Development Quota and Adak community allocations

- Crew loan program
- Annual economic data collection (or Economic data reports)

The remainder of this section describes each of these program elements and their intended purpose.

2.2.1 Total allowable catch

Each program fishery is managed with a total allowable catch (TAC), which sets a specific catch limit, instead of a GHL. Although the change to a TAC may be largely semantic, it signifies a change to more precise catch management. To discourage harvesters from exceeding the TAC in a program fishery, any overharvest of an allocation is a violation. Although penalties are at the discretion of NOAA Office of Law Enforcement and NOAA General Counsel, the Council has recommended that all overages be subject to forfeiture and that additional penalties be imposed only for overages in excess of 3 percent of a harvester's shares at the time of landing.

2.2.2 Harvesting shares

Harvesting quota shares (QS) were created in each program fishery. QS are a revocable privilege that allow the holder to harvest a specific percentage of the annual TAC in a program fishery. The annual allocations, which are expressed in pounds, are referred to as individual fishing quota (IFQ). The size of each annual IFQ allocation is based on the amount of QS held in relation to the QS pool in a program fishery—a person holding one percent of the QS pool receives IFQ to harvest one percent of the annual TAC in the fishery. IFQ TACs do not include pounds that have been set aside for the Community Development Quota program. All crab that is sold or kept for personal use and all deadloss is debited against the IFQ account of the allocation holder. Discards, however, are not counted against an IFQ holder's account.

QS are designated as either catcher vessel QS or catcher processor QS, depending on whether the vessel that created the privilege to the shares processed the qualifying harvests on board. Approximately 97 percent of the QS (referred to as "owner QS") in each program fishery were initially allocated to license holders based on their catch histories in the fishery. The remaining 3 percent of the QS (referred to as "C shares" or "crew QS") were initially allocated to captains based on their catch histories in the fishery. Under an amendment to the program that is awaiting Secretary of Commerce approval, C share QS may be held only by persons who either demonstrate active participation in a program fishery or are recipients of an initial allocation of C share QS who demonstrate active participation in State or Federal fisheries in or off Alaska.

Catcher vessel owner IFQ are issued in two classes, Class A IFQ and Class B IFQ. Class A IFQ are issued for 90 percent of the catcher vessel owner IFQ in a program fishery. Crab harvested using these IFQ must be delivered to a processor holding unused individual processing quota (IPQ). In addition, Class A IFQ are subject to regional share designations, whereby harvests are required to be delivered within an identified region. The delivery restrictions of Class A IFQ are intended to add stability to the processing sector by protecting processor investment in program fisheries and to preserve the historic distribution of landings and processing between regions.

Class B IFQ are issued for the remaining 10 percent of the catcher vessel owner QS in a program fishery. Crab harvested using these IFQ can be delivered to any processor (except a catcher processor) regardless of whether the processor holds unused IPQ. In addition, Class B IFQ are not regionally designated. The absence of delivery restrictions on a portion of the catch is intended to provide harvesters with additional market leverage for negotiating prices for landings of crab. Consequently, Class B IFQ are allocated to a harvester only to the extent that the QS held by the harvester exceeds the amount of PQS held by the

harvester and its affiliates. The absence of an affiliation with a holder of processing shares is established by a QS holder filing an annual affidavit identifying any PQS holdings or affiliations with PQS holders.

Implementation of the program required the initial allocation of QS to eligible harvesters. To be eligible for an allocation of owner QS in a program fishery a harvester must have held a valid, permanent, fully transferable LLP license endorsed for the fishery. A harvester's allocation of QS in a fishery was based on landings in that fishery (excluding landings of deadloss). Specifically, each allocation was the harvester's average annual portion of the total qualified catch during a specific qualifying period. Qualifying periods were selected to balance historical participation and recent participation. Different periods were selected for different program fisheries to accommodate fishery closures and other circumstances in the fisheries in recent years. The most recent seasons were excluded in part to limit the effectiveness of efforts by participants to obtain a larger allocation by increasing participation in recent seasons when it was apparent that allocations would be based on historic harvest levels.

QS and IFQ are transferrable under the program, subject to limits on the amount of shares a person may own or use. Transferability of shares among eligible purchasers of QS and IFQ may promote production efficiency in the harvest sector and provides a means for compensated removal of excess harvesting capacity in the program fisheries. In addition, transferability may be used to avoid overages, in the event a harvester exceeds its available IFQ. The use of transfers to avoid overages could increase under a new amendment adopted by the Council that allows transfers after delivery to remedy an overage.

Leasing of QS (or equivalently, the sale of owner IFQ) will be prohibited, except by cooperatives, after the first five years of the program. Leasing is defined as the use of IFQ on a vessel in which the owner of the underlying QS holds less than a 10 percent ownership interest and on which the underlying QS holder is not present. The prohibition on leasing of QS (or sale of IFQ) by persons not in cooperatives is intended to create an incentive for cooperative membership. The interim period in which leasing is not constrained is intended to allow a period of adjustment during which harvesters can coordinate fishing activities and build relationships necessary for cooperative membership.

To be eligible to purchase owner QS or IFQ an individual is required to be a US citizen and to have at least 150 days of sea time in US commercial fisheries in a harvest capacity. An entity is eligible to purchase shares only if it is at least 20 percent owned by a US citizen with at least 150 days of sea time in US commercial fisheries in a harvest capacity and is at least 75 percent U.S. owned, allowing it to document a vessel. Initial recipients of QS and CDQ groups are exempt from these eligibility criteria. Sea time requirements are intended to ensure that the harvest sector does not evolve into a fishery owned by persons with no fishing background.

"Individual use caps" are imposed on the use and holdings of harvest shares by any person in order to prevent excessive consolidation of shares under the program. Different caps apply to owner share holdings and C share holdings. In addition, a higher cap applies to CDQ group holdings of owner shares, as those entities represent the interests of several communities. Individual use caps vary across program fisheries because of different fleet characteristics and the differences in historic dependency of participants on the different fisheries. In addition, CDQ groups, who each represent the interests of one or more Bering Sea and Aleutian Island communities, are subject to higher caps (see Table 2-1). A "grandfather" provision exempted persons who received an initial allocation of QS in excess of the cap. Individual use caps are applied individually and collectively. Under this approach, all of a person's direct QS holdings are credited toward the cap. In addition, a person's indirect QS holdings are also credited toward the cap in proportion to the person's ownership interest. For example, if a person owns a 20 percent interest in a company that holds 100 shares, that person is credited with holding 20 shares for purposes of determining compliance with the cap. "Vessel use caps" limit the amount of owner IFQ that

may be harvested by a single vessel. Vessel use caps do not apply to cooperatives, thereby providing an additional incentive for cooperative participation.

To protect independent vessel owners and processors that are not vertically integrated, processor harvest share holdings are also limited by caps on vertical integration. A PQS holder's harvest share holdings are limited to 5 percent of the share pool on a fishery basis. These caps are applied using a threshold rule for determining whether the shares are held by a processor, and then the individual and collective rule for determining the extent of share ownership. Under the threshold rule, any entity with 10 percent or more common ownership with a processor is considered to be a part of that processor. Any direct holdings of those entities are fully credited to the processor's holdings. Indirect holdings of an entity are credited toward the processor's cap in proportion to the entity's ownership.

Table 2-1 Harvest share use caps as percent of the respective quota share pool.

Fishery	Owner share		C share use cap**	Vessel use cap*
	Individual use cap*	CDQ group use cap*		
Bristol Bay red king crab	1	5	2	2
Bering Sea *C. opilio*	1	5	2	2
Eastern Bering Sea *C. bairdi*	1	5	2	2
Western Bering Sea *C. bairdi*	1	5	2	2
Pribiolof red and blue king crab	2	10	4	4
St. Matthew Island blue king crab	2	10	4	4
Eastern Aleutian Islands golden king crab	10	20	20	20
Western Aleutian Islands golden king crab	10	20	20	20
Western Aleutian Islands red king crab	10	20	20	20

* as a percentage of the owner share pool.

** as a percentage of the C share pool.

2.2.3 Processing shares

The program also created processing quota shares (PQS), which are allocated to processors and are analogous to the QS allocated to harvesters. PQS are a revocable privilege to receive deliveries of a fixed percentage of the annual TAC from a program fishery. These annual allocations are referred to as individual processing quota (IPQ). IPQ is issued for 90 percent of the owner IFQ pool, corresponding to the 90 percent allocation of owner IFQ issued as Class A IFQ. As with owner QS and Class A IFQ, PQS and IPQ are designated for processing in a region. These processing shares are intended to protect processor investment in program fisheries and preserve regional interests in the fisheries.

IPQ landing requirements do not apply to the remaining 10 percent of the owner IFQ, corresponding to the 10 percent of the owner IFQ allocated as Class B IFQ, as these Class B IFQ are intended to provide harvesters with additional bargaining power. In addition, Class B IFQ may provide an opportunity for the entry of new processors in the program fisheries. Alternatively, new processors can enter a fishery by purchasing PQS or IPQ or by purchasing landings of CDQ crab. To ensure harvesters of the latitude to use their Class B IFQ to pursue the best markets, processors are not permitted to leverage their IPQ to acquire crab harvested using Class B IFQ; the penalty is forfeiture of all of the processor's IPQ.

As in the harvest sector, processors received initial allocations of PQS based on processing history during a specified qualifying period for each fishery. A processor's PQS allocation, as a percentage of the pool,

in a program fishery was equal to its share of all qualified processing in the qualifying period (i.e., pounds processed by the processor divided by pounds processed by all qualified processors).

Processing shares are transferable, including leasing of PQS (or equivalently, the sale of IPQ) subject to use caps. As with harvesting shares, transferability of processing shares is intended to promote efficiency and facilitate compensated reduction of excess capacity. In addition, IPQ transfers may aid in the coordination of deliveries from the fisheries. To provide a period of general stability for processors and communities to adjust to the program a two-year ''cooling off period'' was established during which processing shares could not be relocated from the community where the historical processing occurred that led to the allocation (the community of origin).[1] In addition, a right of first refusal was granted to community groups and CDQ groups from communities with significant crab processing history on the sale of any processing shares for use outside of the community of origin. Exceptions to the right allow a company to consolidate operations among several commonly owned plants to achieve intra-company efficiencies and the temporary lease of shares outside of the community of origin.

A processing share cap prevents any person from holding or using in excess of 30 percent of the outstanding processing shares in any program fishery. In general, all share holdings of an entity and any custom processing by a plant owned by an entity is counted toward that entities cap. An exception that exempts custom processing in certain fisheries and regions from the plant owners share cap was implemented recently. That exemption allows consolidation beyond the caps in fisheries and regions that pose particular economic challenges to processors.[2] As with vertical integration caps, processor share caps are applied using a threshold rule for determining whether the shares are held by a processor and then the individual and collective rule for determining the extent of share ownership. Under the threshold rule, any entity with 10 percent or more common ownership with a processor is considered to be a part of that processor. Any direct holdings of those entities are fully credited to the processor's holdings. Indirect holdings of those entities are credited toward the processor's cap in proportion to the entities ownership. A "grandfather" provision exempted initial allocations of PQS in excess of the cap. In the *C. opilio* fishery, in addition to the PQS ownership cap, no processor is permitted to use in excess of 60 percent of the IPQ issued in the North region.

2.2.4 Regional share designations

The allocation to regions is accomplished by regionally designating all Class A (delivery restricted) harvest shares and all corresponding processing shares. In most program fisheries, regionalized shares are either North or South, with North shares designated for delivery in areas on the Bering Sea north of 56º 20´ north latitude and South shares designated for any other areas, including Kodiak and other areas on the Gulf of Alaska. In the Western Aleutian Islands (Adak) golden king crab fishery, the designation is based on an east/west line to accommodate a different distribution of activity in that fishery. Share designations are based on the historic location of the landings and processing that gave rise to the shares.

[1] The 'cooling off' limitation applied to most processing shares, but shares allocated based on processing history in communities with minor amounts of crab were not subject to the provision. In addition, each processing share holder was permitted to move small amounts of IPQ out of the 'community of origin' during the cooling off period to allow for some coordination of landings and more complete use of Class A IFQ and IPQ allocations.

[2] The exemption applies to custom processing in the North region of the *C. opilio*, Pribilof red and blue king crab, the St. Matthew Island blue king crab, the Western Aleutian Islands red king crab, the Western Aleutian Islands golden king crab, and the Eastern Aleutian Islands golden king crab fisheries. The exemption is limited to processing that occurs in communities to protect community interests. Along with the exemption, a provision limits the processing in any facility to 60 percent of the IPQ in the Western Aleutian Islands red king crab and Eastern Aleutian Islands golden king crab fisheries.

A recent amendment allows for an exemption from the regional landing requirement in the West region of the Western Aleutian Islands golden king crab fishery on the agreement of all holders of more than 20 percent of the QS pool, all holders of more than 20 percent of the PQS pool, and the communities of Adak and Atka. The amendment is intended to allow for the movement of deliveries in the event that processing capacity is unavailable in the West region. In addition, the Council is considering an amendment to create a more general exemption from regional landing requirements, on the agreement of IFQ holders, IPQ holders, and certain affected regional or community interests. The specific amendment is under consideration at this meeting.

2.2.5 Catcher processor shares

Catcher processors participate in both the harvest and processing sectors and therefore have a unique position in the program. Catcher processors are allocated catcher processor QS and issued corresponding catcher processor IFQ. These shares carry both a harvest privilege and an accompanying onboard processing privilege. To be eligible for the initial allocation of catcher processor QS, a person must have been eligible for a harvest allocation by holding a permanent, fully transferable catcher processor LLP license. In addition, the catcher processor must have processed crab in either 1998 or 1999. These requirements parallel the harvester QS and processor PQS eligibility requirements, respectively. Persons meeting these eligibility requirements were allocated catcher processor QS in accordance with the allocation rules for harvest shares for all qualified catch that was processed onboard.

Since catcher processor IFQ provide both harvesting and on board processing privileges, a person holding those shares may harvest and process crab onboard under the allocation. In addition, holders of catcher processor IFQ may choose not to process harvested crab, instead delivering their catch to any other processor. Use of catcher processor IFQ in this manner is akin to the use of Class B IFQ, which do not require the receiving processor to hold unused IPQ. Catcher/processor shares do not have regional designations.

Holders of catcher processor QS may also sever the harvesting and processing privileges, thereby creating separate QS and PQS. These newly severed interests create a privilege to annual IFQ allocations and IPQ allocations, which can be held by different persons. When severed, the resulting QS and PQS must be designated for a region with both shares taking the same regional designation. Allowing the conversion of shares permits a catcher processor shareholder to realize the maximum value of shares and provides greater flexibility in using the privileges.

Some catcher processors historically accept delivery of crab from catcher vessels for processing. PQS are allocated based on this activity to the extent that processing vessels met processor eligibility requirements and had qualifying processing history. In addition, catcher processors are permitted to purchase and use additional IPQ. All processing of deliveries by catcher processors is required to take place within three miles of shore in the applicable region. The requirement of processing within three miles of shore is intended to ensure that the regional benefits of processing activity occur. Catcher processors may not purchase for processing crab harvested with Class B shares.

2.2.6 Crew shares

To protect captains' historical interests in the program fisheries, 3 percent of the initial allocation of QS were issued to eligible captains. These "C shares" are to be held only by active captains and crew and are intended to provide additional leverage to those captains and crew when negotiating contracts with vessel owners. The Council chose to exempt C shares from all IPQ and regional landing requirements, as it recognized the logistical complications that would likely arise under the program as a result of the

interaction of active participation requirements, fleet contraction, and the IPQ and regional landing requirements.[3]

To be eligible for the initial allocation of C share QS, a captain was required to demonstrate both historical dependence on a program fishery and recent participation. Allocations to captains were based on participation in landings during the same qualifying years applicable to owner QS allocations. To ensure C share holders are an integral part of the program, C share holders are permitted to join cooperatives. IFQ attributable to C share QS of cooperative members are allocated directly to the cooperative and are harvested in accordance with the applicable cooperative agreement.

To ensure that C shares benefit active participants in the program fisheries, C share QS and IFQ may be acquired by transfer only by persons who are active in one of the program fisheries in the 365 days prior to the application for transfer.[4] Under current rules, individuals who hold C share IFQ are required to be on board the vessel harvesting those IFQ. However, C share holders who choose to join a cooperative are effectively exempted from the 'owner on board' rule, since the IFQ are held by the cooperative.

Under the amendment recently adopted by the Council, which is pending Secretarial approval, annual C share IFQ are issued only to C share QS held by persons who meet an active participation requirement of being on board a vessel for one landing in the three years preceding the IFQ allocation. In addition, C share QS is revoked from persons who are not active in at least one of the fisheries for four consecutive years.[5] The Council also included a transition period for persons who would be deprived of IFQ or QS by these active participation requirements. Under this transition period, no IFQ would be withheld until 3 years after implementation of the amendment and no QS would be revoked until 5 years after the implementation of the amendment. Although the Council took this action in the spring of 2008, the action is pending approval by the Secretary of Commerce.

Individual C share holdings and use are capped at the same level as the vessel use caps applicable to owner IFQ (i.e., twice the owner QS cap level). A "grandfather" provision exempted initial allocations of Class C shares in excess of the cap. C share IFQ are not considered in determining a vessel's compliance with the vessel use caps applicable to owner IFQ.

Catcher processor captains are allocated catcher processor C share QS that include both a harvesting and onboard processing privilege. Harvests with catcher processor C share IFQ may also be delivered to shoreside or stationary floating processors. Harvests with catcher vessel C share IFQ must be delivered to shoreside or stationary floating processors (i.e., they cannot be delivered to catcher processors).

[3] The initial exemption from these requirements applied only for the first three years of the program. The Council extended this exemption indefinitely under an amendment to the program, which was implemented by NOAA Fisheries for the 2008-2009 season.

[4] The Council recently adopted a provision that would allow initial recipients of C share QS and persons who fished in Bering Sea and Aleutian Islands crab fisheries in 3 of the 5 seasons preceding implementation of the rationalization program to acquire C shares. This provision is intended to address concerns of crews displaced by fleet consolidation who are interested in acquiring C shares to maintain an interest in the fisheries.

[5] An alternative active participation requirement can be met by recipients of an initial allocation of C share QS. Initial recipients of C share QS allocations, who are active in a fishery in or off Alaska for a total of at least 30 days during three crab seasons preceding the annual IFQ allocation would receive that allocation (regardless of whether they are active in the crab fisheries. In addition, C share QS would not be revoked from initial recipients who have at least 30 days of participation in a fishery in or off Alaska.

2.2.7 Binding arbitration system

The arbitration system serves several important purposes in the program, including dissemination of market information to facilitate negotiations, the coordination of matching Class A IFQ held by harvesters to IPQ held by processors, and a binding arbitration process to resolve terms of delivery.

A "market analyst" and a "formula arbitrator," jointly selected by the harvesting and processing sectors, develop a market report and price formula, which specifies an ex vessel price as a portion of the first wholesale price, to be used by participants to guide their delivery negotiations. The market report nor the formula price are non-binding, but are intended to provide information concerning the market and a reasonable price that might be generated by the arbitration system.

Matching of Class A IFQ with IPQ is facilitated through a process of share commitments and dissemination of information concerning available shares. Once shares are matched, the parties unable to negotiate terms of delivery may use the arbitration system to resolve those terms.

To ensure predictability and fairness, the arbitration system sets forth standards to be followed by formula arbitrators and contract arbitrators. Although different standards apply to the formula arbitrator and the contract arbitrator, the differences between the standards are very limited and do not substantively change the general approach to be applied. The regulations state that both the non-binding price formula and contract arbitrator's decision must "(A) Be based on the historical distribution of first wholesale revenues between fishermen and processors in the aggregate based on arm's length first wholesale prices and ex-vessel prices, taking into consideration the size of the harvest in each year; and (B) Establish a price that preserves the historical division of revenues in the fishery while considering" several listed factors.[6]

A detailed description of the arbitration system is contained in the section of this review that examines the performance of that system.

2.2.8 Cooperatives

The program allows harvesters to form voluntary cooperatives associated with one or more processors holding PQS. Cooperatives receive the annual IFQ allocated to their members. Formation of cooperatives is intended to facilitate production efficiency by aiding harvesters in coordinating harvest activities among members and deliveries to processors. In addition, the cooperative relationship can facilitate the trading of IFQ under prearranged terms and conditions. Such trades help harvesters consolidate small portions of their allocations on a single vessel when a small portion of each vessel's allocation is remaining. In addition, processors can benefit by associating with a cooperative; for example, coordinated deliveries can result in less down time for processing crews and equipment and decrease deadloss by reducing queuing of harvesters waiting to offload their catches. Scheduling of deliveries is especially important under the program because the allocation of harvest shares can result in the extension of fishing over a longer period.

A minimum membership of four unique QS holders is required for cooperative formation. Cooperatives must file a cooperative agreement with NOAA Fisheries annually. Once the filing is made, the cooperative receives the annual allocation of its members in the applicable program fisheries. Cooperative members are permitted to leave a cooperative at any time after a season retaining their QS and associated

[6] Listed factors in both standards include current ex vessel prices for all IFQ types, consumer and wholesale product prices, innovations and developments of both sectors, efficiency and productivity of both sectors, quality, the interest of maintaining financially healthy and stable harvesting and processing sectors, safety and expenditures for ensuring adequate safety, timing and location of deliveries, and cost of harvesting and processing less than the full IFQ or IPQ allocation (underages) to avoid penalties for overharvesting IFQ and reasonable deadloss.

IFQ. Harvesters within a cooperative may transfer IFQ freely since those IFQ are directly allocated to the cooperative and are counted against the cooperative's allocation. Vessels on which cooperative shares are fished are not subject to use caps. IFQ are also freely transferable between cooperatives, but these transfers require filing with NOAA Fisheries before they can be fished.

2.2.9 Community Development Quota and Adak community allocations

The program made changes in the allocations under the Community Development Quota (CDQ) program. The CDQ program was broadened to include the Eastern Aleutian Islands (Dutch Harbor) golden king crab fishery and the Western Aleutian Islands (Adak) red king crab fishery. In addition, the allocations in all crab fisheries covered by the CDQ program were increased from 7.5 to 10 percent of the TAC. These changes in the CDQ allocations are intended to further facilitate fishing activity and economic development in rural Western Alaska communities. The CDQ allocations are managed independently from the program and are not subject to IPQ and regional landing requirements. However, CDQ groups are required to deliver at least 25 percent of the allocations to shoreside processors.

Sea time eligibility requirements for the purchase of owner QS are waived for CDQ and community groups in eligible communities allowing those communities to build and maintain local interests in harvesting. CDQ and community groups are not permitted to purchase C shares.

The program also made an allocation to the community of Adak from the Western Aleutian Islands (Adak) golden king crab fishery in an amount equal to the unused resource during the qualifying period. This allocation is capped at 10 percent of the total allocation in that fishery. This allocation to Adak is thought to be appropriate because that community was excluded from the CDQ program because of its history as a military community.

2.2.10 Crew loan program

The rationalization program includes a low interest loan program to assist eligible captains and crew in purchasing QS. Implementation of the loan program was delayed because of the absence of a Congressional appropriation to authorize loans, which was provided in early 2008. In February of 2008, the Council passed a motion recommending that loan funds be available exclusively to licensed crew who are U.S. citizens with at least 150 days sea time as part of a harvesting crew in any U.S. commercial fishery, and who have made at least one delivery in a fishery subject to the crab rationalization program in two of the three years prior to application for the loan. The Council recommended that loan funds for QS purchase in a fishery be available only to persons holding below a threshold amount of QS in that fishery (varying by fishery from 0.1 percent to 1.0 percent of the QS pool) after completing the purchase. In addition, the Council proposed that a borrowing limit be established so that no person could borrow more than 10 percent of the available funds in any year. These recommendations were incorporated into the proposed rule that will establish the loan program. The final rule is forthcoming.

2.2.11 Sideboards to protect participants in other fisheries

Sideboards limit the activity of crab vessels in other fisheries to protect participants in those fisheries from a possible influx of activity that could arise from vessels that exit the program fisheries or are able to time activities in the program fisheries to increase participation in other fisheries. In the development of the program, the Council included sideboards to protect harvesters in the Gulf of Alaska groundfish fisheries from possible increase in effort from participants in the crab fisheries.

2.2.12 Economic data collection program

The program includes a comprehensive economic data collection requirement to help the Council and NMFS assess the success of the program and develop amendments to the program. The data collection requirement includes two variations of Economic Data Reports (EDRs): a historic EDR and an annual EDR. The first requires submission of historical-based economic data from 1998, 2001 and 2004. Historical EDRs capture pre-program implementation data for comparison to the economics of harvesting and processing before and after program implementation. The annual EDRs capture economic data on an annual basis at the conclusion of each calendar year's crab fisheries. Historical EDRs were collected in June and July 2005; the first annual EDRs were collected in 2006 for the 2005 calendar year.

Participation in the data collection program is mandatory for all participants in the program fisheries, including catcher vessel, catcher processor, stationary floating crab processors and shoreside crab processors. Should a submitter fail to submit an annual EDR by the due date, NMFS is authorized to withhold issuance or transfer of shares. Persons submitting the data have an opportunity to correct errors before enforcement action is taken.

EDRs contain cost, revenue, ownership and employment data. These data are collected and held the Pacific States Marine Fisheries Commission (PSMFC). PSMFC abides by all statutory and regulatory data confidentiality requirements, and will only release the data to NMFS, Council staff, and any other authorized users in a "blind" format. Specifically, all identifiers associated with data submitters will be eliminated and replaced with fictitious vessel and processor identifiers for purposes of analyses. However, in cases where the data are requested by NMFS Alaska Region Restricted Access Management, NMFS Office of Enforcement, NOAA General Counsel, the U.S. Department of Justice or the Federal Trade Commission for a purpose connected to law enforcement or qualification for quota and other Federal permits, PSMFC will provide the data and the identity of the submitter.

At its October 2010 meeting, the Council adopted a purpose and need statement to guide revisions to the crab economic data reporting program. Based on reviews of the data collection program, development of the metadata, and review of the data by the Pacific Northwest Crab Industry Advisory Committee and testimony from the industry, the Council concluded that substantial portions of the data that are inaccurate or wholly (or partially) redundant with other existing data collection requirements. In addition, the Council noted that the costs of the program greatly exceed estimates provided in the development of the data collection program. To address these problems, the Council intends to amend the data collection program to improve accuracy and informativeness of the data and remove redundancies with other existing reporting requirements, and reduce industry and administrative costs. The Council has requested that staff develop draft alternatives that could be used for this purpose. Those draft alternatives will be provided at a future meeting.

3 HARVEST SHARE HOLDINGS

3.1 Harvest sector privileges

Prior to implementation of the rationalization program, NOAA Fisheries managed the Bering Sea and Aleutian Island crab fisheries under the License Limitation Program (LLP), whereby vessels assigned a LLP license could participate in those fisheries designated by the license. With the implementation of the rationalization program, participation in program fisheries is limited by QS and the IFQ allocation yielded annually by those IFQ. This section of the paper summarizes the distribution of harvest privileges under the LLP and rationalization program.

3.1.1 LLP licenses

The LLP was a limited entry program which allocated licenses based on historic participation. Licenses were issued with species-area (fishery) endorsements (see Table 3-1). Licenses were issued by vessel type (catcher vessel or catcher processor) and specified a maximum vessel length (MLOA). Since licenses could carry multiple species-area endorsements, the total number of licenses was not additive.[7]

Table 3-1 LLP licenses in the Bering Sea and Aleutian Islands crab fisheries (2005).

LLPs Licenses endorsed for / also endorsed for	Bristol Bay red king crab	Bering Sea *C. opilio* and *C. bairdi*	Pribilof red and blue king crab	St. Matthew Island blue king crab	Aleutian Island red king crab	Aleutian Island golden king crab	Catcher processor
Bristol Bay red king crab	**270**	264	110	168	28	25	26
Bering Sea *C. opilio* and *C. bairdi*		**273**	109	169	30	27	27
Pribilof red and blue king crab			**118**	77	15	8	2
St. Matthew Island blue king crab				**170**	26	19	13
Aleutian Island red king crab					**30**	8	4
Aleutian Island golden king crab						**28**	9

Source: NMFS RAM Division.

The moratorium, established in 1995, limited speculative entry into the fisheries while the LLP was being developed and approved. Nevertheless, the fisheries remained heavily overcapitalized. Further, the limited access management increased the incentive for all license holders to participate in the fisheries because a person could not receive a return without participating. Some participants allege that financial pressures of boat payments ensured their participation, as revenues from the fisheries were their primary source of income from their vessels. Participants also likely remained in the fisheries to reinforce their stake in any future history-based allocation.

Entry into the fisheries occurred in different ways. Crew members worked their way up to become skippers and used their crew compensation to purchase interests in vessels. Alternatively, persons entered the fisheries as an investment. These persons, who in some cases had no other interest or involvement in the fishery, typically used capital from other sources to purchase vessel interests in the fisheries.

As shown in Table 3-2, the transfer of LLP licenses to new entrants following implementation of the LLP was limited.[8] There were a number of reasons for the small volume of transfers. First, entry to the crab fisheries was costly because it required the purchase of an LLP permit and a properly configured vessel from which to fish. Secondly, the continuing overcapitalization situation, together with the historically

[7] . Exceptions to the LLP license requirement included vessels that do not exceed 32 feet LOA in the BSAI and certain vessels constructed for, and used exclusively in, CDQ fisheries.

[8] The reported volume of LLP license transfers may be an underestimate because NOAA Fisheries Restricted Access Management recorded only those transfers in which the named license holder changed.

low GHLs for the Bering Sea *C. opilio* fishery, made the crab fisheries economically unattractive for potential new entrants. Moreover, as the economic benefits derived from the fisheries declined, it became more difficult to acquire financing for the purchase of licenses and vessels.

Table 3-2 Volume of license transfers under the LLP.

Year	Number of transfers							
	Total	Bristol Bay red king crab	Bering Sea *C. opilio* and *C. bairdi*	Pribilof red and blue king crab	St. Matthew Island blue king crab	Aleutian Island red king crab	Aleutian Island golden king crab	Catcher processor
2002	1	1	1	0	1	0	0	0
2003	3	3	3	1	0	1	2	2
2004	1	1	0	0	0	0	0	0

Source: NMFS RAM LLP license file.
Includes only transfers with change of named license holder.

3.2 Initial allocations of QS by sector and region

When the program was implemented, NOAA Fisheries made initial allocations of owner QS to persons holding LLP licenses. Since most licenses were held by corporations, aggregation by owner name typically will not reflect actual common control of QS holdings. Complex corporate ownership patterns prevented a complete assessment of the level of concentration of ownership beyond relying on the named owner for this report. Consequently, levels of consolidation of owner shares exceed those represented in the following tables and discussion.

Table 3-3 shows a summary of the initial owner quota share allocations to harvesters in the different program fisheries. The Aleutian Islands fisheries, which have the least participants, were the most concentrated. In all fisheries, the largest initial allocation exceeded the individual use cap. In the Western Aleutian Island golden king crab and Western Aleutian Islands red king crab fisheries the largest initial allocation was in excess of 4 times the share cap; in the Bristol Bay red king crab, Bering Sea *C. opilio*, Bering Sea *C. bairdi*, Eastern Aleutian Islands golden king crab, and St. Matthew Island blue king crab fisheries, the largest initial allocation was more than double the individual use cap. Notwithstanding these large allocations, the median allocation in all fisheries, except the Eastern Aleutian Islands golden king crab fishery, was less than half the individual use cap. The regional distribution of shares differed with landing patterns that arose from the geographic distribution of fishing grounds and processing activities. In the Bering Sea *C. opilio* fishery, almost half of the catcher vessel owner QS are designated for landing in the North region, while in excess of two-thirds of the catcher vessel owner pool is designated for landing in the North region in both the St. Matthew Island blue king crab and Pribilof red and blue king crab fisheries.

Table 3-3 Initial allocation of owner quota shares.

Fishery	Share holdings by region						Across regions			
	Region	Percent of Pool	QS holders	Mean holdings	Median holdings	Maximum holding	QS holders	Mean holdings	Median holdings	Maximum holding
Bristol Bay red king crab	North	2.4	28	0.1	0.1	0.2	251	0.4	0.4	2.2
	South	93.0	241	0.4	0.3	2.1				
	Catcher processor	4.5	13	0.3	0.4	1.0				
Bering Sea *C. opilio*	North	42.6	205	0.2	0.2	1.2	241	0.4	0.4	2.4
	South	48.4	214	0.2	0.2	2.1				
	Catcher processor	9.1	14	0.6	0.7	1.2				
Bering Sea *C. bairdi*	Undesignated	93.3	248	0.4	0.3	2.4	258	0.4	0.3	2.4
	Catcher processor	6.7	14	0.5	0.4	1.0				
Eastern Aleutian Island golden king crab	South	95.2	13	7.3	6.6	20.4	15	6.7	6.0	20.4
	Catcher processor	4.8	2	2.4	2.4	4.1				
Western Aleutian Island golden king crab	Undesignated	26.9	13	2.1	1.0	11.0	15	6.7	1.8	45.7
	West	26.9	9	3.0	1.3	13.5				
	Catcher processor	46.2	2	23.1	23.1	45.7				
Western Aleutian Island red king crab	South	61.0	29	2.1	0.6	13.5	30	3.3	0.6	45.2
	Catcher processor	39.0	2	19.5	19.5	37.8				
St. Matthew Island blue king crab	North	76.7	121	0.6	0.6	3.4	135	0.7	0.6	4.4
	South	21.3	83	0.3	0.1	3.8				
	Catcher processor	2.0	5	0.4	0.3	0.9				
Pribilof red and blue king crab	North	67.1	84	0.8	0.6	3.1	112	0.9	0.5	3.4
	South	32.4	76	0.4	0.3	2.8				
	Catcher processor	0.5	1	0.5	0.5	0.5				

Source: NMFS Restricted Access Management QS database, initial allocation.
Note: These share holdings data are publicly available and non-confidential.

Crew quota share were allocated to captains based on their individual catch histories. In addition, only individuals are permitted to acquire and hold C shares. Consequently, concentration of C share holdings is accurately reflected in the following discussion and tables.

The initial crew quota share allocations showed a similar pattern across the program fisheries (see Table 3-4). Since fewer persons qualified for initial allocations, the initial C share QS holdings were more concentrated than initial owner QS holdings. Yet, in most cases, the initial allocations of C share QS were more evenly distributed among initial recipients. In most fisheries, the largest initial allocations of C share QS are a smaller percentage of the C share QS pool. Also, since C share use caps are double owner share caps, few initial allocations of C share QS exceeded the applicable use cap. Initial allocations of C share QS exceeded the use cap in only the Western Aleutian Island golden king crab and Western Aleutian Islands red king crab fisheries, where very few persons qualified for an allocation. With the exception of the Bering Sea *C. bairdi* fishery, in each fishery catcher vessel QS is a larger share of the pool of C share QS than catcher vessel owner QS. No catcher processor C share QS exists in the Eastern Aleutian Island golden king crab, St. Matthew Island blue king crab, and the Pribilof red and blue king crab fisheries.

Table 3-4 Initial allocation of crew quota shares.

Fishery	Share holdings by operation type						Share holdings across operation types			
	Operation type	Percent of pool	QS holders	Mean holding	Median holding	Maximum holding	QS holders	Mean holding	Median holding	Maximum holding
Bristol Bay red king crab	Catcher vessel	96.5	178	0.5	0.5	1.1	181	0.6	0.5	1.2
	Catcher processor	3.5	8	0.4	0.4	1.2				
Bering Sea *C. opilio*	Catcher vessel	94.1	152	0.6	0.6	1.3	155	0.6	0.6	1.6
	Catcher processor	5.9	8	0.7	0.7	1.6				
Bering Sea *C. bairdi*	Catcher vessel	91.8	170	0.5	0.5	1.7	176	0.6	0.5	1.7
	Catcher processor	8.2	15	0.5	0.4	1.5				
Eastern Aleutian Island golden king crab	Catcher vessel	100.0	13	7.7	8.2	12.8	13	7.7	8.2	12.8
Western Aleutian Island golden king crab	Catcher vessel	57.5	8	7.2	5.6	21.7	9	11.1	6.2	41.7
	Catcher processor	42.5	2	21.3	21.3	41.7				
Western Aleutian Island red king crab	Catcher vessel	86.4	4	21.6	14.3	49.5	4	25.0	20.8	49.5
	Catcher processor	13.6	1	13.6	13.6	13.6				
St. Matthew Island blue king crab	Catcher vessel	100.0	72	1.4	1.4	3.1	72	1.4	1.4	3.1
Pribilof red and blue king crab	Catcher vessel	100.0	40	2.5	2.4	4.8	40	2.5	2.4	4.8

Source: NMFS Restricted Access Management QS database, initial allocation.

3.3 Transfers of quota share

Transfers are administered by NOAA Fisheries Restricted Access Management (RAM) Office. In the first three years of the program, all transfers were by written application. These paper transfers are usually processed by RAM within two or three days of receipt of a complete application, but can take up to 10

days. A newly developed system of electronic transfers now allows for real time transfers through the internet.

Table 3-5 shows the number of QS transferred by operation type, share type, and fishery. In the first five years of the program, substantial portions of the harvesting QS pools have been transferred. Transfers of shares in the Eastern Aleutian Islands golden king crab fishery sum to over 50 percent of the QS pool, while transfers sum to in excess of 20 percent of the respective QS pools in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries.[9] In addition, transfers summing at approximately 50 percent of the C share pool in the Bristol Bay red king crab and over 75 percent of the C share pool in the Bering Sea *C. opilio* fisheries have occurred in the first five years of the program. Some portion of these totals likely include shares that have traded more than once. The transfers of C shares may be a reflection of persons who are no longer employed in the fisheries divesting of their shares. As with other data concerning owner share holdings, transfer data can be misleading. In some cases, transfers are changes in the name of the holder. In other cases, the transfer might reflect a change in structure of the share holding entity (such as the addition of a new partner or a change in corporate ownership). Yet, if ownership structure changes while the entity holding shares remains unchanged, it is possible that no transfer will be reflected in the data.

Table 3-5 Transfers of harvesting QS by share type and fishery (2005 through 2010).

Fishery	Sector	2005		2006		2007	
		Number of units	Percentage of QS pool	Number of units	Percentage of QS pool	Number of units	Percentage of QS pool
Bristol Bay red king crab	Catcher processor crew						
	Catcher processor owner	1,569,702	0.39			1,095,593	0.27
	Catcher vessel crew	1,394,428	0.35	1,226,094	0.31	570,569	0.14
	Catcher vessel owner	9,519,319	2.37	25,903,537	6.45	15,714,819	3.91
Bering Sea *C. opilio*	Catcher processor crew			222,842	0.02		
	Catcher processor owner	11,997,148	1.19			9,972,035	0.99
	Catcher vessel crew	2,995,884	0.30	3,049,661	0.30	821,969	0.08
	Catcher vessel owner	36,952,703	3.68	51,615,892	5.14	49,652,053	4.94
Bering Sea *C. bairdi*	Catcher processor crew	19,854	0.01				
	Catcher processor owner	1,570,469	0.78				
	Catcher vessel crew	528,329	0.26	181,990	0.09		
	Catcher vessel owner	9,930,491	4.95	3	0.00		
Eastern Aleutian Islands golden king crab	Catcher processor owner					396,848	3.97
	Catcher vessel crew	43,372	0.43			35,191	0.35
	Catcher vessel owner	1,021,237	10.21			3,034,034	30.34
Eastern Bering Sea *C. bairdi*	Catcher processor owner			460,039	0.23	911,106	0.45
	Catcher vessel crew			491,486	0.25	178,143	0.09
	Catcher vessel owner			14,485,599	7.22	7,397,444	3.69
Pribilof red and blue king crab	Catcher vessel crew			48,351	0.16		
	Catcher vessel owner	382,973	1.27	960,391	3.20	637,488	2.12
St. Matthew Island blue king crab	Catcher vessel crew	49,745	0.16	60,004	0.20	35,644	0.12
	Catcher vessel owner	766,644	2.53	1,160,704	3.84	2,058,705	6.80
Western Aleutian Island golden king crab	Catcher processor crew						
	Catcher processor owner			1,646	0.00	190,857	0.48
	Catcher vessel crew	75,643	0.19			74,001	0.19
	Catcher vessel owner	878,114	2.20			4,008,216	10.02
Western Aleutian Island red king crab	Catcher vessel owner			1,232,580	2.05	797,165	1.33
Western Bering Sea *C. bairdi*	Catcher processor owner			460,039	0.23	911,106	0.45
	Catcher vessel crew			469,861	0.23	178,143	0.09
	Catcher vessel owner			14,485,599	7.22	6,086,453	3.03

Source: RAM transfer data.
* Total includes transfers of Bering Sea C.bairdi from 2005 and 2006.
Note: Percentages are of total QS pool of which owner shares are 97 percent and crew shares are 3 percent.

[9] It should be noted that some shares may have been transferred multiple times, so sums may not represent the portion of the pool transferred from their initial holder.

Fishery	Sector	2008		2009		2010		Total across all years (as percentage of QS pool)
		Number of units	Percentage of QS pool	Number of units	Percentage of QS pool	Number of units	Percentage of QS pool	
Bristol Bay red king crab	Catcher processor crew			16,141	0.00			0.00
	Catcher processor owner	2,047,730	0.51	771,900	0.19	622,435	0.16	1.52
	Catcher vessel crew	567,719	0.14	427,846	0.11	45,874	0.01	1.05
	Catcher vessel owner	21,506,925	5.36	13,403,897	3.34	1,304,924	0.32	21.75
Bering Sea *C. opilio*	Catcher processor crew			71,261	0.01			0.03
	Catcher processor owner	8,593,014	0.86	11,217,492	1.12			4.16
	Catcher vessel crew	1,056,848	0.11	1,121,203	0.11	191,093	0.02	0.92
	Catcher vessel owner	21,731,910	2.16	24,397,671	2.43	2,392,908	0.24	18.59
Eastern Aleutian Islands golden king crab	Catcher processor owner							3.97
	Catcher vessel crew	59,908	0.60	15,789	0.16			1.54
	Catcher vessel owner	47,819	0.48	804,355	8.04			49.07
Eastern Bering Sea *C. bairdi*	Catcher processor owner	1,371,158	0.68	1,311,988	0.65			2.02
	Catcher vessel crew	242,855	0.12	29,223	0.01	33,887	0.02	0.49
	Catcher vessel owner	7,697,362	3.84	4,367,051	2.18			16.93
Pribilof red and blue king crab	Catcher vessel crew	36,000	0.12					0.28
	Catcher vessel owner	242,664	0.81					7.40
St. Matthew Island blue king crab	Catcher vessel crew	24,951	0.08	9,320	0.03			0.59
	Catcher vessel owner	476,273	1.57	885,520	2.93			17.67
Western Aleutian Island golden king crab	Catcher processor crew	9,257	0.02					0.02
	Catcher processor owner							0.48
	Catcher vessel crew	59,446	0.15					0.52
	Catcher vessel owner							12.22
Western Aleutian Island red king crab	Catcher vessel owner	395,110	0.66					4.04
Western Bering Sea *C. bairdi**	Catcher processor owner	1,371,158	0.68	1,311,988	0.65			2.02
	Catcher vessel crew	242,855	0.12	20,608	0.01	33,887	0.02	0.47
	Catcher vessel owner	7,697,361	3.84	4,367,051	2.18			16.27

Source: RAM transfer data.

* Total includes transfers of Bering Sea *C.bairdi* from 2005 and 2006.

Note: Percentages are of total QS pool of which owner shares are 97 percent and crew shares are 3 percent.

3.4 Current holdings

Share holdings distribution data in the Bristol Bay red king crab, Bering Sea *C. opilio*, and both Bering Sea *C. bairdi* fisheries suggest that owner quota share have become slightly more concentrated since the initial allocation (see Table 3-6). In each of these fisheries, the maximum holding increased to a level that exceeds the individual cap applicable to most holders. CDQ groups, who are subject to separate higher share holdings caps, are permitted to acquire shares over the cap level that applies to all other persons. In each case, one of those groups has acquired shares beyond the individual cap applicable to persons other than CDQ groups. Although these data suggest substantial consolidation in the fisheries, the number of owner quota share holders increased or has stayed close to constant since the initial allocation.

Table 3-6 Current owner quota share holdings by region.

cvpo qs

Fishery	Share holdings by region						Across regions			
	Region/Catcher processor	QS holders	Percent of pool	Mean holding	Median holding	Maximum holding	QS holders	Mean holding	Median holding	Maximum holding
Bristol Bay red king crab	North	33	2.42	0.1	0.0	0.2	257	0.39	0.31	4.79
	South	248	93.04	0.4	0.3	4.5				
	Catcher processor	12	4.54	0.4	0.3	1.0				
Bering Sea *C. opilio*	North	219	42.55	0.2	0.1	1.2	246	0.41	0.34	4.92
	South	218	48.37	0.2	0.1	3.2				
	Catcher processor	14	9.08	0.6	0.6	2.2				
Eastern Bering Sea *C. bairdi*	Undesignated	237	93.28	0.4	0.3	4.2	245	0.41	0.28	4.96
	Catcher processor	13	6.72	0.5	0.4	1.1				
Western Bering Sea *C. bairdi*	Undesignated	238	93.28	0.4	0.3	4.2	246	0.41	0.28	4.96
	Catcher processor	13	6.72	0.5	0.4	1.1				
Eastern Aleutian Island golden king crab	South	15	95.16	6.3	5.0	20.0	17	5.88	4.45	20.00
	Catcher processor	2	4.84	2.4	2.4	4.1				
Western Aleutian Island golden king crab	Undesignated	12	26.86	2.2	1.0	11.0	15	6.67	1.78	45.73
	West	8	26.91	3.4	1.2	13.5				
	Catcher processor	3	46.22	15.4	0.5	45.7				
Western Aleutian Island red king crab	South	32	60.97	1.9	0.5	13.5	33	3.03	0.62	45.16
	Catcher processor	2	39.03	19.5	19.5	37.8				
St. Matthew Island blue king crab	North	132	76.72	0.6	0.5	3.4	147	0.68	0.52	4.95
	South	95	21.31	0.2	0.1	2.5				
	Catcher processor	5	1.97	0.4	0.3	0.9				
Pribilof red and blue king crab	North	90	66.62	0.7	0.5	3.1	119	0.84	0.49	3.41
	South	81	32.86	0.4	0.2	2.8				
	Catcher processor	1	0.52	0.5	0.5	0.5				

Source: NMFS Restricted Access Management IFQ database, crab fishing year 2010-2011.

Note: These share holdings data are publicly available and non-confidential.

The current distribution of C share quota share holdings shows larger changes from the initial allocation than that of owner shares (see Table 3-7). Persons have consolidated holdings, acquiring shares to the individual cap in the Bristol Bay red king crab, Bering Sea *C. opilio*, and both Bering Sea *C. bairdi* fisheries. Approximately 20 and 40 fewer persons hold shares in each of these fisheries than held shares at the initial allocation. Although active participation requirements did not apply for the first three years of the program and the exemption of cooperative members from the requirements continues to apply, these people may have divested as they lost their connection to the fisheries. C share holders might also be more likely to divest of their share holdings, since those holdings are a relatively small portion of the overall QS pool, limiting the annual income that might be derived from those shares. Holders of owner QS who no longer enter a vessel into the fishery may be more likely to maintain their share holdings, as the flow of income from those shares is likely to be substantially greater, since those shares make up a much larger share of the QS pool.

Table 3-7 Current C share quota share holdings by operation type.

cvpcstats

Fishery	Share holdings by operation type						Share holdings across operation types			
	Operation type	Percent of pool	QS holders	Mean holding	Median holding	Maximum holding	QS holders	Mean holding	Median holding	Maximum holding
Bristol Bay red king crab	Catcher vessel	96.5	138	0.7	0.5	2.0	141	0.7	0.6	2.0
	Catcher processor	3.5	8	0.4	0.4	1.2				
Bering Sea *C. opilio*	Catcher vessel	94.1	125	0.8	0.7	2.0	127	0.8	0.7	2.0
	Catcher processor	5.9	7	0.8	0.7	2.0				
Eastern Bering Sea *C. bairdi*	Catcher vessel	91.8	144	0.6	0.6	2.0	150	0.7	0.6	2.0
	Catcher processor	8.2	15	0.5	0.4	1.5				
Western Bering Sea *C. bairdi*	Catcher vessel	91.8	144	0.6	0.6	2.0	150	0.7	0.6	2.0
	Catcher processor	8.2	15	0.5	0.4	1.5				
Eastern Aleutian Island golden king crab	Catcher vessel	100.0	11	9.1	6.3	20.0	11	9.1	6.3	20.0
Western Aleutian Island golden king crab	Catcher vessel	57.5	7	8.2	6.3	21.7	8	12.5	7.5	41.7
	Catcher processor	42.5	2	21.3	21.3	41.7				
Western Aleutian Island red king crab	Catcher vessel	86.4	4	21.6	14.3	49.5	4	25.0	20.8	49.5
	Catcher processor	13.6	1	13.6	13.6	13.6				
St. Matthew Island blue king crab	Catcher vessel	100.0	68	1.5	1.4	3.3	68	1.5	1.4	3.3
Pribilof red and blue king crab	Catcher vessel	100.0	39	2.6	2.6	4.8	39	2.6	2.6	4.8

Source: NMFS Restricted Access Management QS database.

Note: These share holdings data are publicly available and non-confidential.

3.5 Processor holdings of catcher vessel owner QS

Under the program, a holder of PQS and its affiliates who hold catcher vessel owner QS do not receive allocations of Class B IFQ, up to the PQS holder's annual IPQ allocation. These persons receive Class A IFQ exclusively to offset their allocations of IPQ, and, for any remaining catcher vessel owner QS, receive a split of Class A IFQ and Class B IFQ in the same proportion as catcher vessel owner QS holders with no PQS holder affiliation. This split Class A IFQ/Class B IFQ allocation is determined such that the overall share of Class B IFQ in the fishery is 10 percent of the catcher vessel owner IFQ allocation. In the Bristol Bay red king crab 2009-2010 season, QS holders with no processor affiliation received approximately 11.3 percent of their annual IFQ allocation as Class B IFQ, suggesting that slightly less than 20 percent of the QS pool is held by persons with affiliations with PQS holders. A similar portion of the Bering Sea *C. bairdi* catcher vessel owner pool is subject to PQS affiliation, while slightly less of the Bering Sea *C. opilio* catcher vessel owner pool is subject to PQS affiliation. In the two Aleutian Island golden king crab fisheries almost no QS are held by persons with affiliations with PQS holders in that fishery (although a few of the QS holders have affiliations with holders of PQS in other fisheries).

Table 3-8 Allocations of Class A IFQ and Class B IFQ by processor affiliation (2009-2010)

Fishery	QS holders with a processor affiliation			QS holders without processor affilation			
	Number of QS holders	Percent of Class A IFQ pool received	Percent of Class B IFQ pool received	Number of QS holders	Percent of Class A IFQ pool received	Percent of Class B IFQ pool received	Percent of allocation as B shares
Bristol Bay red king crab	23	18.2	5.8	257	81.8	94.2	11.3
Bering Sea *C. opilio*	21	15.9	7.8	242	84.1	92.2	10.9
Eastern Aleutian Islands golden king crab	4	21.3	20.3	15	78.7	79.7	10.1
Eastern Bering Sea *C. bairdi*	21	17.4	5.5	237	82.6	94.5	11.3
St. Matthew Island blue king crab	12	16.1	9.1	143	83.9	90.9	10.8
Western Aleutian islands golden king crab	4	9.8	9.8	12	90.2	90.2	10.0

Source: RAM IFQ database (2009-2010).

Note: Processor affiliates may receive Class B IFQ for IFQ allocations in excess of IPQ holdings. A QS holder is considered affiliated, if it is affiliated with a holder of PQS in any fishery.

4 HARVEST SECTOR

This section reviews harvest sector IFQ use and participation in the fisheries in the first five years of the program. The section begins with a brief discussion of participation levels before and after implementation of the program and the overall harvest of IFQ. The section goes on to discuss cooperative fishing and leasing, to the extent that those practices are known. The section concludes with a discussion of vessel operations and the distribution of catch among the participating fleet.

Annual IFQ allocations are issued in pounds of allowable catch and are classified based on operation type, holder, and share class (see Table 4-1). Approximately 97 percent of the annual allocation is owner shares, while the remaining 3 percent are allocated as captain/crew shares (or C shares). The division of shares by operation type is based on catch histories of eligible participants in the qualifying years. In addition, 90 percent of the annual IFQ allocation of catcher vessel owner shares is Class A IFQ, which must be delivered to a processor holding unused IPQ, while the remaining 10 percent are issued as Class B IFQ, which may be delivered to any processor.

Table 4-1 IFQ allocation by share type (2009-2010).

	Catcher vessel			Catcher processor		Total
	Owner		Captain/	Owner	Captain/	
Fishery	Class A	Class B	crew		crew	
Bristol Bay red king crab	12,008,706	1,334,304	415,245	634,726	15,125	14,408,106
Bering Sea *C. opilio*	34,302,929	3,811,430	1,219,957	3,804,875	76,117	43,215,308
Eastern Aleutian Islands golden king crab	2,355,354	261,707	84,934	133,003		2,834,998
Eastern Bering Sea *C. bairdi*	989,502	109,951	33,376	79,189	2,986	1,215,004
St. Matthew Island blue king crab	899,128	99,901	31,196	20,073		1,050,298
Western Aleutian Islands golden king crab	1,197,824	133,091	44,009	1,144,038	32,538	2,551,500

Source: NMFS Restricted Access Management IFQ database, crab fishing year 2009-2010.

4.1 Vessel participation

Table 4-2 displays changes in the numbers of vessels participating in fisheries under the program, compared with years just prior to program implementation. A precipitous decline in the fleets in all fisheries occurred on implementation of the program. In the Bristol Bay red king crab fishery, the fleet contracted to less than one-third its pre-rationalization size. In the Bering Sea *C. opilio* fishery, the contraction was of smaller magnitude because this fleet had contracted to some degree prior to implementation of the program, as GHLs in the fishery were at historic lows in the years preceding the program. The table shows that, as a percent of historic participation, catcher processor participation in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries dropped slightly less than participation of catcher vessels. Substantial fleet consolidation also occurred in the smaller Aleutian Islands golden king crab fisheries, while the Bering Sea *C. bairdi* fisheries were reopened under the program after being closed for nearly a decade. Despite the fleet consolidation, average vessel catches in the fishery currently parallel those of seasons prior to 2000, when either fewer vessels were participating in the crab fisheries or one or more of the major fisheries had a relatively high harvest (see Figure 4-1).

Table 4-2 Catch and number of vessels by operation type.

Fishery	Season	Catch	Catch (as percent of total) by catcher vessels	Catch (as percent of total) by catcher processors	Number of vessels participating: catcher vessels	Number of vessels participating: catcher processors	Number of vessels participating: all unique vessels
Bering Sea *C. opilio*	2001	22,940,704	86.5	13.5	201	8	207
	2002	29,609,702	94.4	5.6	182	9	190
	2003	25,410,122	96.8	3.2	185	5	190
	2004	21,939,493	97.0	3.0	183	6	189
	2005	22,655,777	97.1	2.9	161	6	167
	2005 - 2006	33,248,009	92.2	7.2	76	4	78
	2006 - 2007	32,699,911	90.9	8.4	66	4	70
	2007 - 2008	56,722,400	92.4	7.6	74	4	78
	2008 - 2009	52,687,374	92.8	7.1	73	4	77
	2009 - 2010	43,193,971	100.0		67	2	69
Bristol Bay red king crab	2001	7,681,106	96.6	3.4	224	8	230
	2002	8,770,348	95.2	4.8	234	9	241
	2003	14,237,375	95.7	4.3	242	8	250
	2004	13,889,047	96.7	3.3	243	8	251
	2005 - 2006	16,472,400	96.5	2.8	88	4	89
	2006 - 2007	13,877,870	97.0	2.9	79	3	81
	2007 - 2008	18,324,046	97.0	2.8	72	3	74
	2008 - 2009	18,288,881	97.1	2.4	75	3	77
	2009 - 2010	14,337,782	99.5		69	2	70
Eastern Bering Sea *C. bairdi*	2006 - 2007	1,267,106	72.7	2.2	33	3	36
	2007 - 2008	1,439,435	46.4		19	1	20
	2008 - 2009	1,553,584	62.5		20	1	21
	2009 - 2010	1,189,573	97.9		16	1	17
Western Bering Sea *C. bairdi*	2005 - 2006	791,025	54.3		42	2	43
	2006 - 2007	633,910	64.4		34	2	36
	2007 - 2008	467,136	23.9		26	1	27
	2008 - 2009	108,368	7.8		27	0	27
St. Matthew Island blue king	2009 - 2010	460,859	43.9		7	0	7
Eastern Aleutian Islands golden king crab	2001 - 2002	3,128,409	100.0		19	0	19
	2002 - 2003	2,765,436	100.0		19	0	19
	2003 - 2004	2,900,247	100.0		18	0	18
	2004 - 2005	2,846,273	100.0		20	0	20
	2005 - 2006	2,569,209	95.2		6	1	7
	2006 - 2007	2,692,009	99.7		5	1	6
	2007 - 2008	2,690,377	99.6		3	1	4
	2008 - 2009	2,823,773	99.6		3	0	3
	2009 - 2010	2,832,932	99.9		3	0	3
Western Aleutian Islands golden king crab	2001 - 2002	2,693,221	100.0		8	1	9
	2002 - 2003	2,605,237	100.0		5	1	6
	2003 - 2004	2,637,161	100.0		5	1	6
	2004 - 2005	2,639,862	100.0		5	1	6
	2005 - 2006	2,382,468	98.0		2	1	3
	2006 - 2007	2,002,186	82.3		2	1	3
	2007 - 2008	2,246,040	92.4		2	1	3
	2008 - 2009	2,252,111	88.3		2	1	3
	2009 - 2010	2,478,313	97.1		2	1	3
All fisheries	2001 - 2002				235	11	243
	2002 - 2003				238	11	247
	2003 - 2004				245	9	254
	2004 - 2005				247	9	256
	2005 - 2006				100	5	101
	2006 - 2007				87	5	91
	2007 - 2008				83	5	87
	2008 - 2009				84	5	88
	2009 - 2010				76	3	78

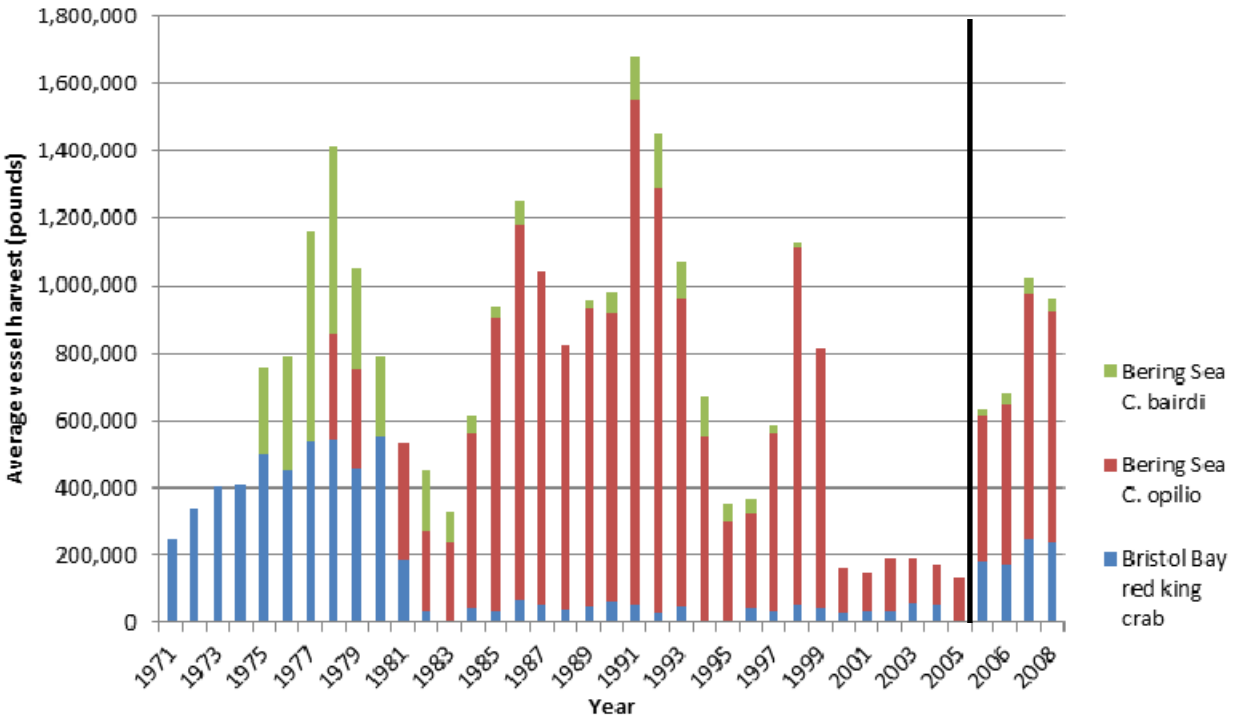
Sources: ADFG fishtickets prior to 2005 and NMFS RAM catch data (for 2005-2006 through 2009-2010)

Notes: Catch as a percent of IFQ allocations for 2005-2006 through 2009-2010 seasons.

"All fishery" participation in a season includes all fisheries prosecuted between July 1 and June 30.

For 2005-2006 through 2009-2010, catcher processor vessel counts include all vessels harvesting catcher processor shares.

Fleet consolidation in the program fisheries was the result of owners and operators making business decisions to idle boats in order to remove excess capacity from the fisheries. Leasing of quota, and the accompanying retirement or sidelining of excess capital, has taken place to the degree but more quickly than most predicted. A few factors likely contributed to the substantial consolidation that occurred in the first years of the program. Consolidation was stimulated by the cooperative structure under the program. Cooperatives created the framework for and led to the development of harvesting associations. These strengthening relationships, in turn, created an environment ripe for leasing. The cooperative structure also reduces administrative burdens for in-season quota exchanges among members, which are not reported to NOAA Fisheries administrators, since each cooperative manages the aggregated allocation of IFQ of its members. In addition, it is likely that a portion of the fleet active prior to implementation of the program only remained in the fishery because of the impending rationalization program. Owners of these vessels quickly removed their vessels once the program was implemented.



Source: ADFG Annual Management Report 2008-2009.
Notes: Harvests for seasons overlapping two calendar years are attributed to one of the two years, to avoid double counting catches from a single fishery in the same year. Harvest per vessel is sum of average vessel's harvest in each fishery.

Figure 4-1 Approximate annual average vessel harvests in the Bristol Bay red king crab, Bering Sea C. opilio, and Bering Sea C. opilio fisheries (1971 through 2008-2009).

In the first five years of the program, participants have harvested most of the issued IFQ (Table 4-3). The percentage of shares harvested is relatively consistent across regions in most fisheries. The exceptions are the Western Bering Sea *C. bairdi* and Eastern Bering Sea *C. bairdi*, the Western Aleutian Islands golden king crab and the St. Matthew Island blue king crab fisheries. The *C. bairdi* fisheries, as well as the St. Matthew Island blue king crab fishery, are reported by participants to be particularly difficult to prosecute because of low catch rates. This complication seems to have been resolved in the Eastern *C. bairdi* fishery as most of the TAC was harvested in the 2009-2010 season. The St. Matthew Island fishery opens in October, one month later than its historical September opening. Some participants attribute low catch rates in the fishery to the later opening under current regulations. Crab are thought to migrate offshore and be more dispersed in October which may contribute to lower catches. Reduced fleet size due to

consolidation may also have contributed to low total catch relative to the TAC during the 2009-2010 season. Harvest of the Western Aleutian Islands golden king crab fishery in some years has been reported to be economically challenging because of low market prices for golden king crab and limited processing capacity in the West region (where 50 percent of the catcher vessel owner IFQ is required to be landed). The 2009-2010 harvests suggest that the recent amendment creating an exemption to the regional landing requirement (by agreement of QS holders, PQS holders and the communities of Atka and Adak) will resolve the processing capacity issue in the fishery. Success of that amendment in the long run will depend on the parties developing a consistent position on when the exemption is merited.

Although little can be disclosed concerning catcher processor catches, a comparison of the number of vessels by operation type and the number of vessels harvesting IFQ by share type shows that catcher vessels are harvesting a portion of the catcher processor allocation for delivery to shore-based processors. The use of catcher processor shares by catcher vessels likely arises from two types of activities. Some share holders may transfer their shares to catcher vessels as a part of planned consolidation of operations; others may make transfers of small amounts after harvesting most of their holdings to avoid stranding the remaining portions of their allocations.

Table 4-3 Percentage of IFQ harvested by operation type, share type, and region.

pct ifq harv

Season	Fishery	Catcher vessel												Catcher processor			
		Owner										Crew		Owner		Crew	
		Class A North		Class A South		Class A West		Class A Undesignated		Class B							
		Number of vessels	Percent of IFQ harvested	Number of vessels	Percent of IFQ harvested	Number of vessels	Percent of IFQ harvested	Number of vessels	Percent of IFQ harvested	Number of vessels	Percent of IFQ harvested	Number of vessels	Percent of IFQ harvested	Number of vessels	Percent of IFQ harvested	Number of vessels	Percent of IFQ harvested
2005 - 2006	Bristol Bay red king crab	9	100.0	84	99.9					68	99.7	65	95.6	8	100.0	6	99.8
	Bering Sea *C. opilio*	59	99.3	69	99.6					55	99.2	50	93.6	7	99.9	7	87.4
	Eastern Aleutian Islands golden king crab			6	95.1					6	92.6	4	95.9	3	100.0		
	Western Aleutian Island golden king crab					2	*	2	*	2	*	2	*	2	*	2	*
	Western Bering Sea *C. bairdi*							32	58.4	18	41.5	10	27.9	2	*	2	*
2006 - 2007	Bristol Bay red king crab	6	100.0	75	100.0					61	99.2	58	96.1	8	99.9	7	100.0
	Bering Sea *C. opilio*	43	100.0	54	100.0					50	99.9	44	96.8	7	100.0	5	86.8
	Eastern Aleutian Islands golden king crab			5	100.0					4	100.0	3	88.4	2	*		
	Eastern Bering Sea *C. bairdi*							27	79.0	11	68.5	13	55.5	5	42.5	4	55.0
	Western Aleutian Island golden king crab					1	*	2	*	2	*	2	*	2	*	1	*
	Western Bering Sea *C. bairdi*							28	69.0	11	56.0	10	*	3	33.4	2	*
2007 - 2008	Bristol Bay red king crab	6	100.0	71	100.0					45	99.8	41	99.4	10	99.9	7	100.0
	Bering Sea *C. opilio*	67	100.0	69	100.0					50	99.9	37	100.0	8	100.0	6	100.0
	Eastern Aleutian Islands golden king crab			3	99.9					3	98.2	2	*	1	*		
	Eastern Bering Sea *C. bairdi*							18	47.0	6	52.2	4	38.7	3	36.4		
	Western Aleutian Island golden king crab					1	*	2	*	2	*	1	*	2	*	1	*
	Western Bering Sea *C. bairdi*							25	26.4	4	14.7	4	*	1	*		
2008 - 2009	Bristol Bay red king crab	5	100.0	74	100.0					42	98.5	32	98.9	10	100.0	8	100.0
	Bering Sea *C. opilio*	62	100.0	67	100.0					55	100.0	39	100.0	14	99.9	6	100.0
	Eastern Aleutian Islands golden king crab			3	100.0					3	98.6	3	*	1	*		
	Eastern Bering Sea *C. bairdi*							18	64.2	6	67.2	10	*	2	*	2	*
	Western Aleutian Island golden king crab					2	*	2	*	1	*	1	*	1	*	1	*
	Western Bering Sea *C. bairdi*							19	8.2	8	10.1	5	*	1	*	1	*
2009 - 2010	Bristol Bay red king crab	6	99.7	68	99.6					45	98.3	36	99.4	8	100.0	9	100.0
	Bering Sea *C. opilio*	54	100.0	61	100.0					46	100.0	33	100.0	14	99.5	8	99.9
	Eastern Aleutian Islands golden king crab			3	99.9					3	100.0	3	*	1	*		
	Eastern Bering Sea *C. bairdi*							13	98.8	10	100.0	9	86.3	5	89.0	3	83.2
	Western Aleutian Island golden king crab					2	*	2	*	2	*	2	*	1	*	2	*
	St. Matthew Island blue king crab	7	58.1978	1	*					1	*	1	*	0	0.0		

Source: RAM IFQ database, 2005-2006 through 2009-2010.
* withheld for confidentiality.
Note: blanks are inapplicable.

While most participants have managed to harvest close to their full allocations, a few overages have occurred in the first five years of the program (Table 4-4). Overages have averaged approximately 30,000 pounds per year aggregated across all fisheries (or less than 5,000 pounds per fishery each year). These overages average slightly more than 4 one-hundredths of a percent of the TAC. Although 22 overages occurred in the second year of the program, overages have since declined to a total of 6 in the most recent season. Although the amounts of the overages in the most recent season cannot be reported due to confidentiality limitations, they are inconsequential and did not lead to any violations. Cooperative membership likely plays a role in reducing the number of overages, since IFQ attributable to QS of several different holders are aggregated at the cooperative level. Cooperative held IFQ is fished as a pool by members with no overage until the entire cooperative allocation is fully harvested. Consequently, individual harvesters in the cooperative may exceed their intended catch without an overage, provided the

cooperative holds unused shares. Any consequence of these overharvests are internal to the cooperative (i.e., addressed under the terms of the cooperative agreement).[10]

The ability of harvesters to avoid overages is also aided by permissible discarding. Under the program, harvesters are permitted to discard crab without charge against IFQ. So, when a harvester estimates that available IFQ are fully used, any catch in remaining deployed gear may be discarded. Under this system, overages are effectively dependent on the ability of a harvester to estimate the quantity of crab harvested and in the tanks. In addition, the amendment allowing for post-delivery transfer of IFQ and IPQ to cover overages also may contribute to the decline in overages in the two most recent years of the program.

Lastly, in the most recent season, harvesters are permitted to engage in post-delivery transfers to avoid overages. Under the system, an overage may be covered by a post-delivery transfer prior to June 30th, the end of the crab fishing year. Although few overages are believed to have required transfers under the provision, allowing overages to be addressed in this manner is believed to further limit the potential for overages under the system.

Table 4-4 Overages by fishery

Season	Fishery	Number of participating vessels	Number of landings	Number of overages	Number of overages exceeding 3 percent	Weight of overages	Percent of landings with overage
2005-2006	Bristol Bay red king crab	89	238	8	4	10,912	3.36
	Bering Sea *C. opilio*	78	270	6	2	8,294	2.22
	Western Bering Sea *C. bairdi*	43	68	0	0	0	0.00
	Eastern Aleutian Islands golden king crab	7	30	1	*	*	3.33
	Western Aleutian Islands golden king crab	3	21	1	*	*	4.76
2006-2007	Bristol Bay red king crab	81	175	9	*	9,661	5.14
	Bering Sea *C. opilio*	70	246	9	5	40,763	3.66
	Eastern Bering Sea *C. bairdi*	36	29	2	*	*	6.90
	Western Bering Sea *C. bairdi*	36	53	0	0	0	0.00
	Eastern Aleutian Islands golden king crab	6	56	1	*	*	1.79
	Western Aleutian Islands golden king crab	3	11	1	*	*	9.09
2007-2008	Bristol Bay red king crab	74	237	5	2	3,854	2.11
	Bering Sea *C. opilio*	78	427	8	3	9,320	1.87
	Eastern Bering Sea *C. bairdi*	20	50	0	0	0	0.00
	Western Bering Sea *C. bairdi*	27	43	0	0	0	0.00
	Eastern Aleutian Islands golden king crab	4	29	0	0	0	0.00
	Western Aleutian Islands golden king crab	3	17	1	*	*	5.88
2008-2009	Bristol Bay red king crab	77	241	7	0	4,959	2.90
	Bering Sea *C. opilio*	77	396	5	1	5,627	1.26
	Eastern Bering Sea *C. bairdi*	21	53	1	0	189	1.89
	Western Bering Sea *C. bairdi*	27	50	0	0	0	0.00
	Eastern Aleutian Islands golden king crab	3	29	1	*	*	3.45
	Western Aleutian Islands golden king crab	3	17	1	0	*	5.88
2009-2010	Bristol Bay red king crab	70	205	2	*	*	0.98
	Bering Sea *C. opilio*	69	309	2	*	*	0.65
	Eastern Bering Sea *C. bairdi*	17	41	0	0	0	0.00
	Eastern Aleutian Islands golden king crab	3	32	2	*	*	6.25
	Western Aleutian Islands golden king crab	3	20	0	0	0	0.00
	St. Matthew Island blue king crab	7	30	0	0	0	0.00

Source: NMFS RAM IFQ database, crab fishing years 2005-2006, 2006-2007, 2007-2008, 2008-2009, and 2009-2010.

* withheld for confidentiality.

Note: Six overages during the 2005-2006 though 2009-2010 period were catcher processor overages.

Overall, fleet consolidation in the fisheries has tended to distribute catch to larger vessels. The fleet consolidation has led to all but two vessels less than 85 feet in length dropping out of the fisheries. In

[10] Although an overage may not occur when a person makes a landing in excess of the intended delivery, the excess catch must be covered by some share holdings. At times, these excesses may be covered by A shares intended to be harvested by another cooperative member (provided those A shares are (or may be)) committed to processor receiving the delivery; other times, B shares must be used for these excesses.

addition, vessels less than 100 feet in length have disproportionately left the fleet, with catches being consolidated on larger vessels. While vessels greater than 125 make up slightly less of the fleet than vessels greater than 100 feet and less than 125 feet, catches of the larger vessels have increased. This pattern has occurred consistently across all fisheries in the program. The resulting fleet is generally made up of larger vessels than the prerationalization fleet, while continuing to maintain diversity.

Table 4-5 Catch by vessel length in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (2001 through 2007-2008)

Fishery	Season	Vessels less than 85 feet LOA			Vessels greater than or equal to 85 feet LOA and less than 100 feet LOA			Vessels greater than or equal to 100 feet LOA and less than 125 feet LOA			Vessels greater than or equal to 125 feet LOA		
			Harvests			Harvests			Harvests			Harvests	
		Number of vessels	in pounds	as a percent of total harvests	Number of vessels	in pounds	as a percent of total harvests	Number of vessels	in pounds	as a percent of total harvests	Number of vessels	in pounds	as a percent of total harvests
Bristol Bay red king crab	2001	10	160,491	2.1	45	1,114,990	14.5	107	3,382,283	44.0	68	3,023,342	39.4
	2002	12	274,123	3.1	47	1,520,342	17.3	111	3,914,558	44.6	71	3,061,325	34.9
	2003	14	382,110	2.7	50	2,277,265	16.0	112	5,848,643	41.1	74	5,729,357	40.2
	2004	15	366,134	2.6	49	2,208,933	15.9	115	6,366,532	45.8	72	4,947,448	35.6
	2005-2006	1	*	*	12	*	*	45	6,471,954	39.3	31	8,378,643	50.9
	2006-2007	2	*	*	13	*	*	39	5,553,331	40.0	27	6,627,815	47.8
	2007-2008	1	*	*	11	*	*	36	7,786,012	42.5	26	8,569,799	46.8
	2008-2009	1	*	*	10	*	*	39	7,640,165	41.8	27	8,405,474	46.0
	2009-2010	2	*	*	9	*	*	33	5,659,956	39.5	26	6,710,378	46.8
Bering Sea *C. opilio*	2001	6	356,254	1.6	38	2,547,796	11.1	94	8,648,476	37.7	69	11,388,178	49.6
	2002	4	302,559	1.0	35	3,730,703	12.6	87	12,529,356	42.3	64	13,047,084	44.1
	2003	3	394,264	1.6	42	4,333,115	17.1	84	10,859,325	42.7	61	9,823,418	38.7
	2004	5	279,963	1.3	32	2,852,864	13.0	88	9,320,915	42.5	64	9,485,751	43.2
	2005	4	263,500	1.2	28	3,555,960	15.7	83	10,735,190	47.4	52	8,101,127	35.8
	2005-2006				9	2,546,765	7.7	37	11,811,936	35.5	32	18,889,308	56.8
	2006-2007				10	4,025,321	12.3	32	10,598,626	32.5	28	18,035,201	55.2
	2007-2008				10	6,073,006	10.7	39	24,301,061	42.8	29	26,348,333	46.5
	2008-2009				9	5,153,064	9.8	37	19,358,721	36.7	31	28,175,589	53.5
	2009-2010	1	*	*	10	*	*	31	16,355,645	37.9	27	22,914,964	53.1

Sources: ADFG fishtickets and NMFS RAM catch data (for 2005-2006 through 2009-2010)

Table 4-6 Participation by vessel length in the Aleutian Island golden king crab and Bering Sea *C. bairdi* fisheries (2001-2002 through 2007-2008)

Fishery	Season	Vessels less than 85 feet LOA	Vessels greater than or equal to 85 feet LOA and less than 100 feet LOA	Vessels greater than or equal to 100 feet LOA and less than 125 feet LOA	Vessels greater than or equal to 125 feet LOA
Eastern Aleutian Island golden king crab	2001-2002		3	9	7
	2002-2003		3	9	7
	2003-2004		3	8	7
	2004-2005		3	9	8
	2005-2006			3	4
	2006-2007			2	4
	2007-2008			2	2
	2008-2009			2	1
	2009-2010			2	1
Eastern Bering Sea *C. bairdi*	2006-2007		5	17	14
	2007-2008	1	3	10	6
	2008-2009		2	11	8
	2009-2010	1	2	9	5
Western Aleutian Island golden king crab	2001-2002			3	6
	2002-2003			3	3
	2003-2004			3	3
	2004-2005			3	3
	2005-2006			1	2
	2006-2007			1	2
	2007-2008			1	2
	2008-2009			1	2
	2009-2010			1	2
Western Bering Sea *C. bairdi*	2005-2006		5	20	18
	2006-2007		5	15	16
	2007-2008		6	14	7
	2008-2009		4	15	8

Sources: ADFG fishtickets and NMFS RAM catch data (for 2005-2006, 2006-2007, and 2007-2008)

4.2 Summary of leasing and cooperative fishing

Short term transfers under leases and cooperative fishing arrangements are the primary means by which QS holders in the crab fisheries have achieved fleet consolidation under the rationalization program. This section examines the use of cooperative fishing and leasing in the fisheries under the rationalization program.

Favorable lease rates have made quota leasing (inside and outside of cooperatives) particularly attractive under the rationalization program. High lease rates have likely contributed greatly to consolidation under the program. Lease rates fluctuate across seasons and are believed to vary across the fleet. Currently lease data are poor and do not support analysis. Anecdotal evidence suggest that lease rates in the Bristol Bay red king crab fishery have been as high as 70 percent of the ex vessel price, while Bering Sea *C. opilio* lease rates have exceeded 50 percent of the ex vessel price in some cases. In the Bering Sea *C. bairdi* fisheries lease rates are said to have fluctuated from approximately 20 percent to 35 percent of the ex vessel price. The lower rate in this fishery is likely a reflection of the fact that these fisheries have had relatively lower catch rates and low TACs. Lease rates in the Eastern Aleutian Islands golden king crab fishery are said to be approximately 50 percent of the ex vessel prices, while lease rates in the Western Aleutian Islands golden king crab fishery are said to be approximately 20 percent to 25 percent of the ex vessel price. The low lese rate in the Western Aleutian Islands fishery likely has resulted from the high operating costs and low ex vessel price in that remote fishery. In the one year of fishing in the St.

Matthew Island blue king crab fishery, lease rates are said to have been approximately 30 percent to 35 percent of the ex vessel price.[11]

The cooperative arrangements and the complexity of ownership patterns in the fisheries prevent any reliable estimates of the extent of leasing in the fisheries. Intra-cooperative transfers of IFQ are not administered or tracked by managers, limiting available information concerning these transfers.[12] Vessel ownership data are limited. QS ownership information reveal complex, overlapping individual, partnership, and corporate holdings of QS. This array of QS ownership arrangements, together with the absence of vessel ownership information, limits any ability to develop a full understanding of the scope of leasing in the fisheries.[13]

Cooperative membership appeals to QS holders for several reasons. Cooperative shares are more easily consolidated because transfers among cooperative members are administered by the cooperative rather than by NOAA Fisheries, with NOAA Fisheries monitoring catch of the cooperative, as a whole. Since NOAA Fisheries monitors a cooperative's fishing in the aggregate, share transactions among members may not be directly reported. Liberal rules exempt vessels fishing cooperative allocations from vessel IFQ use caps. In addition, the inability of non-cooperative IFQ holders to engage in IFQ transfers with cooperatives increases the incentive for cooperative membership as the share of IFQ held outside of cooperatives (which may be available for coordinating harvest activity among non-cooperative IFQ holders) decreases. Because of these attributes, most QS holders have elected to join cooperatives, with almost all IFQ held by cooperatives by the third year (Table 4-7). The degree of consolidation of harvest activity is also shown by the relatively large share of the IFQ held by a relatively small number of cooperatives in the fisheries. By the 2007-2008 (the third year of the program), Bristol Bay red king crab and Bering Sea *C. opilio* fisheries, fewer than 20 cooperatives held in excess of 98 percent of the IFQ, with a single cooperative holding in excess of 20 percent of the IFQ in the Bristol Bay fishery. Although these cooperatives may allow each large QS holder to fish their contribution to the cooperative's IFQ, the cooperative management provides a framework that simplifies consolidation in the harvest sector. In the fifth year of the program, independent harvesters consolidated several cooperatives that had previously participated collectively in the arbitration system into a single cooperative. This cooperative held in almost three-quarters of the IFQ pool in the all fisheries except the Western Aleutian Island golden king crab fishery.

[11] These lease rates, together with ex vessel prices (less landing fees), are likely the best source of information for establishing the value of QS and IFQ in the fisheries. Annual IFQ are simply valued at the competitive market lease rates. QS can be valued based on the discounted stream of lease revenues that would be yielded annual IFQs. The potential production efficiency benefits of the program to harvesters in the Bristol Bay red king crab fisheries were explored by Matulich (2008). In that paper, a simulation of pre and post rationalization harvests (based on 2004 operating costs, TACs, and prices) suggested trades of quota among different vessel owners based on efficiency differences across vessel classes would result in substantial benefits to harvesters under the program. Although harvest by vessel class in the simulation varies substantially from fleet composition in the fishery, the simulation findings are reinforced by lease rates observed in the program.

[12] Although leasing information is collected in the economic data reports, the reliability of those data are uncertain because the leasing definition may not be consistently interpreted across the fleet and some transactions may be between affiliates.

[13] Determining the scope of leasing also requires the development of a definition of leasing. Depending on the definition, two very similar arrangements could be characterized differently. In addition, under any definition, minor changes in a relationship may result in the recharacterization of the relationship as a lease. For example, under most definitions of leasing if two persons have equal QS holdings and one independently owns a vessel that harvests all of the yielded IFQ, half of the IFQ would be viewed as leased. If these persons formed a partnership that held all of the QS, it is possible that none of the IFQ would be viewed as leased.

The extent to which harvests of allocations are managed by the collectively varied within and across cooperatives, but has increased substantially over time. The consolidation of several cooperatives into a single cooperative has resulted in fewer than 20 IFQ holders (including cooperative IFQ holders) in all but one fishery. Catches of the largest cooperative's harvests are coordinated within and among subgroups (or districts), which are effectively the separate cooperatives that merged, to varying degrees. These subgroups each manage their own portions of the cooperatives allocation and to a varying degree activities are coordinated between the subgroups. Some of these subgroups have relatively central management of harvest activities, while others leave members to determine the harvest of their own allocations. In addition, some subgroups communicate extensively during the season. Although most cooperatives (and subgroups of the largest cooperative) have continued to allow individual members to arrange the harvest of their shares, management of harvests at the cooperative (and subgroup) level has increased. This relinquishing of individual management of the harvest of shares not only contributes to consolidation of IFQ harvests, but also has allowed for better coordination, to reduce the disruption of unanticipated circumstances.

Table 4-7 Percent of IFQ held by cooperatives.

Fishery	2005 - 2006					
	Number of IFQ holders (including cooperatives)	Number of cooperatives	Number of cooperative members (all cooperatives)	Percent of IFQ allocated to cooperatives	Maximum cooperative allocation (as percent of IFQ pool)	Maximum number of members in a cooperative
Bristol Bay red king crab	90	13	306	83.3	16.9	74
Bering Sea *C. opilio*	82	13	285	83.6	15.2	64
Bering Sea *C. bairdi*	111	13	291	82.5	14.3	69
Eastern Aleutian Island golden king crab	7	3	22	91.2	59.9	12
Western Aleutian Island golden king crab	3	3	18	100.0	47.3	12

Fishery	2006 - 2007					
	Number of IFQ holders (including cooperatives)	Number of cooperatives	Number of cooperative members (all cooperatives)	Percent of IFQ allocated to cooperatives	Maximum cooperative allocation (as percent of IFQ pool)	Maximum number of members in a cooperative
Bristol Bay red king crab	37	16	350	98.2	21.7	87
Bering Sea *C. opilio*	31	16	318	98.5	19.4	74
Eastern Bering Sea *C. bairdi*	54	15	327	96.9	17.2	75
Western Bering Sea *C. bairdi*	55	16	338	96.9	17.9	75
Eastern Aleutian Island golden king crab	5	4	23	99.9	45.9	12
Western Aleutian Island golden king crab	4	3	17	99.8	45.6	10

Fishery	2007 - 2008					
	Number of IFQ holders (including cooperatives)	Number of cooperatives	Number of cooperative members (all cooperatives)	Percent of IFQ allocated to cooperatives	Maximum cooperative allocation (as percent of IFQ pool)	Maximum number of members in a cooperative
Bristol Bay red king crab	28	17	361	98.7	20.5	85
Bering Sea *C. opilio*	25	18	347	99.4	18.8	73
Eastern Bering Sea *C. bairdi*	29	13	313	99.0	17.9	74
Western Bering Sea *C. bairdi*	32	16	336	99.0	14.8	74
Eastern Aleutian Island golden king crab	5	4	23	99.9	53.3	11
Western Aleutian Island golden king crab	4	3	15	99.8	48.1	9

Fishery	2008 - 2009					
	Number of IFQ holders (including cooperatives)	Number of cooperatives	Number of cooperative members (all cooperatives)	Percent of IFQ allocated to cooperatives	Maximum cooperative allocation (as percent of IFQ pool)	Maximum number of members in a cooperative
Bristol Bay red king crab	25	18	377	99.6	19.9	80
Bering Sea *C. opilio*	24	18	349	99.9	17.2	70
Eastern Bering Sea *C. bairdi*	26	16	329	99.8	25.1	70
Western Bering Sea *C. bairdi*	27	17	345	99.8	16.7	70
Eastern Aleutian Island golden king crab	4	3	20	99.9	47.8	8
Western Aleutian Island golden king crab	5	4	22	99.8	46.1	10

Fishery	2009 - 2010					
	Number of IFQ holders (including cooperatives)	Number of cooperatives	Number of cooperative members (all cooperatives)	Percent of IFQ allocated to cooperatives	Maximum cooperative allocation (as percent of IFQ pool)	Maximum number of members in a cooperative
Bristol Bay red king crab	14	9	378	99.9	73.2	295
Bering Sea *C. opilio*	13	9	350	99.9	74.4	274
Eastern Bering Sea *C. bairdi*	21	8	324	99.8	74.2	225
Eastern Aleutian Island golden king crab	3	3	17	100.0	84.3	13
Western Aleutian Island golden king crab	2	2	19	100.0	53.9	14
St. Matthew blue king crab	11	4	176	99.7	87.5	159

Source: NMFS RAM IFQ data.

High operating costs in the first few years of the program also contributed to the high amount of leasing (and rapid consolidation of fishing). Fuel prices increased greatly during the 2005-2006 season, increasing by more than 50 percent. Several participants also reported increases in insurance costs, in part, because many now purchase cargo insurance to cover the quota landings committed to IPQ holders and lease payments committed to other quota holders. In the face of exceptionally favorable quota lease rates and high operational costs many participants elected to lease their quota holdings. Although fuel costs have stabilized, they have remained high.

In addition, consolidation within cooperatives continued as cooperative members become more comfortable with cooperative management of their quota. The result of these factors has been greater consolidation of IFQ harvests. During the 2007-2008 season, the number of vessels participating in the Bristol Bay red king crab fishery fell to 74 despite a TAC increase of 31 percent from the previous year. In the Bering Sea *C. opilio* fishery, an increase in the TAC in the third year of approximately 70 percent stimulated the reentry of vessels. This increase, however, only returned the fleet to a size of 78 vessels, its size in the first year of the program. As a result, the average vessel harvest in the fishery increased by more than 50 percent, despite the increase in the number of vessels.

Comparing the harvests of vessels fishing in cooperatives with the harvests of vessels fishing outside of cooperatives provides some insight into the contribution of cooperatives to consolidation. Table 4-8 through Table 4-14 show the number of vessels fishing inside and outside of cooperatives, as well as the average vessel's catch in pounds and as a percentage of the IFQ pool, and the median vessel's catch as a percentage of the IFQ pool for each fishery. In the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries, since first year of the program between 15 percent and 20 percent of the vessels fishing cooperative held IFQ exceeded the vessel use cap that applies only to vessels fishing individual IFQ. Although the average cooperative vessel harvest has fluctuated, the median vessel harvest rose each of the first three years in both of these fisheries, leveling at approximately 200,000 pounds in the Bristol Bay red king crab fishery and slight more than 600,000 pounds in the Bering Sea *C. opilio* fishery. As notable as the concentration of harvest activity by cooperative vessels is the decline in harvests and average vessel harvests of individually held IFQ. The low median vessel harvest of individual IFQ in the third year suggests that by that time, only a few vessels in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries continued to make full trips to harvest individually held IFQ.

Table 4-8 Number of vessels fishing and catch inside and outside of cooperatives in the Bristol Bay red king crab fishery.

BBR	Fishing inside cooperatives					Fishing outside cooperatives		
Season	Number of vessels	Average vessel's catch of cooperative held IFQ	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool	Cooperative vessels fishing over the non-cooperative cap	Number of vessels	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool
2005-2006	71	193,671	1.2	0.9	10	37	0.4	0.3
2006-2007	77	177,108	1.3	1.2	15	16	0.1	0.0
2007-2008	72	251,226	1.4	1.2	13	7	0.2	0.0
2008-2009	76	239,849	1.3	1.1	13	6	0.1	0.0
2009-2010	70	204,591	1.4	1.4	14	4	0.0	0.0

Source: RAM IFQ landings data

Table 4-9 Number of vessels fishing and catch inside and outside of cooperatives in the Bering Sea *C. opilio* fishery.

BBS	Fishing inside cooperatives					Fishing outside cooperatives		
Season	Number of vessels	Average vessel's catch of cooperative held IFQ	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool	Cooperative vessels fishing over the non-cooperative cap	Number of vessels	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool
2005-2006	63	443,474	1.3	1.0	13	34	0.5	0.2
2006-2007	69	466,406	1.4	1.3	13	12	0.1	0.0
2007-2008	78	722,911	1.3	1.1	12	7	0.1	0.0
2008-2009	77	683,270	1.3	1.1	12	5	0.0	0.0
2009-2010	69	625,402	1.4	1.4	14	3	0.0	0.0

Source: RAM IFQ landings data

The consolidation of catch across vessels fishing cooperative held IFQ in the *C. bairdi* fisheries differs from that in the two larger fisheries. In these fisheries, the average catch is substantially less than the median suggesting that most vessels have minor amounts *C. bairdi* catch. These catch amounts suggest that few vessels (inside or outside of cooperatives) target *C. bairdi*, which is likely the case because of the relatively low TACs and reported low catch rates in the fisheries.

Table 4-10 Number of vessels fishing and catch inside and outside of cooperatives in the Eastern Bering Sea *C. bairdi* fishery.

EBT	Fishing inside cooperatives					Fishing outside cooperatives		
Season	Number of vessels	Average vessel's catch of cooperative held IFQ	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool	Cooperative vessels fishing over the non-cooperative cap	Number of vessels	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool
2006-2007	34	36,246	2.1	0.2	12	4	0.5	0.0
2007-2008	20	71,972	2.3	1.1	5	0		
2008-2009	20	*	*	1.2	8	1	*	*
2009-2010	16	*	*	3.5	10	1	*	*

Source: RAM IFQ landings data

Table 4-11 Number of vessels fishing and catch inside and outside of cooperatives in the Western Bering Sea *C. bairdi* fishery.

WBT	Fishing inside cooperatives					Fishing outside cooperatives		
Season	Number of vessels	Average vessel's catch of cooperative held IFQ	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool	Cooperative vessels fishing over the non-cooperative cap	Number of vessels	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool
2005-2006	31	21,484	1.5	0.2	7	14	0.6	0.5
2006-2007	36	17,609	1.8	0.0	12	0		
2007-2008	27	17,301	0.9	0.5	4	0		
2008-2009	26	*	*	0.0	*	1	*	*

Source: RAM IFQ landings data

The two Aleutian Islands golden king crab fisheries have experienced substantial consolidation through cooperatives, as well. In the last three seasons the average catch of vessels harvesting cooperative IFQ has exceeded the 20 percent cap that applies only to non-cooperative IFQ harvests. The relatively small TACs, remoteness, and specialized nature of these fisheries likely contributed to their consolidation. In addition, in only the first year of the program did any vessels harvest any individually held IFQ in these fisheries.

Table 4-12 Number of vessels fishing and catch inside and outside of cooperatives in the Eastern Aleutian Islands golden king crab fishery.

EAG	Fishing inside cooperatives					Fishing outside cooperatives		
Season	Number of vessels	Average vessel's catch of cooperative held IFQ	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool	Cooperative vessels fishing over the non-cooperative cap	Number of vessels	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool
2005-2006	6	389,408	14.4	12.9	*	3	2.9	0.2
2006-2007	6	448,444	16.6	12.5	*	0		
2007-2008	4	672,594	24.9	*	*	0		
2008-2009	3	941,258	33.2	*	*	0		
2009-2010	3	944,311	33.3	*	*	0		

Source: RAM IFQ landings data
* Withheld for confidentiality.

Table 4-13 Number of vessels fishing and catch inside and outside of cooperatives in the Western Aleutian Islands golden king crab fishery.

WAG	Fishing inside cooperatives					Fishing outside cooperatives		
Season	Number of vessels	Average vessel's catch of cooperative held IFQ	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool	Cooperative vessels fishing over the non-cooperative cap	Number of vessels	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool
2005-2006	3	794,156	32.7	*	*	0		
2006-2007	3	666,759	27.4	*	*	0		
2007-2008	3	748,680	30.8	*	*	0		
2008-2009	3	750,704	29.4	*	*	0		
2009-2010	3	826,104	32.4	*	*	0		

Source: RAM IFQ landings data
* Withheld for confidentiality.

The St. Matthew blue king crab opened for the 2009-2010 season for the first time in ten years. Few vessels participated in the fishery, with no vessels fishing individually held IFQ.

Table 4-14 Number of vessels fishing and catch inside and outside of cooperatives in the St. Matthew Island blue king crab fishery.

SMB	Fishing inside cooperatives					Fishing outside cooperatives		
Season	Number of vessels	Average vessel's catch of cooperative held IFQ	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool	Cooperative vessels fishing over the non-cooperative cap	Number of vessels	Average vessel's catch as percentage of IFQ pool	Median vessel's catch as percentage of IFQ pool
2009-2010	7	65,837	6.3	3.7	3	0		

Source: RAM IFQ landings data

The degree to which IFQ held by a cooperative are managed as a pool varies across cooperatives (and districts within the largest cooperative). Cooperatives (and districts) managing their IFQ as a pool typically distribute underages (or unused IFQ) among members in proportion to members' QS holdings in the program fishery. This method of distributing IFQ ensures that cooperative members share in both the benefits and costs of the cooperative's ability to precisely manage the use of its IFQ.

In addition to altering the relationship among harvesters, cooperatives altered the relationship between harvesters and processors. Former competitors are now in the same cooperative structure, and deliveries (and harvester efforts) may be structured to increase efficiencies in processing. Cooperatives have tended to hire business managers that work with processors to coordinate the fleet, and this has increased information flow between catcher vessels and processors to a level that did not occur in the past due to competitive/business information tensions between the two sectors.

4.3 Vessel operations

Comparing vessel activities before and after implementation of the program brings to light further changes in the fleet dynamics in the fisheries. Table 4-16 shows some simple statistics of the fleet participating in the Bristol Bay red king crab fishery during the years immediately prior to program implementation and the first five years of the program. Figure 4-2 shows the distribution of catch across the fleet during those years, with each point showing the average catch of four vessels to protect confidentiality. The table and histogram show the considerable consolidation that occurred in the first year of the program. In the Bristol Bay red king crab fishery, the fleet contracted to slightly more than one-third its pre-rationalization size. Since many of the vessels that remained active in the program fisheries fished for more than the QS allocation attributed to the vessel (while other vessels sat idle and owners collected lease royalties), most active vessels substantially increased their catch after rationalization. Under the rationalization program, both the median and largest vessel harvests have been more than double the levels in pounds (and as a percent of the total catch) of the years immediately preceding implementation of the program. The mean and median vessel harvest in the fishery grew consistently in the first three years of the program, before declining in the two most recent years. The largest harvests have fluctuated, both in pounds and as a percent of the total harvests. The histogram of harvests shows an overall consistent pattern of consolidation since implementation.

Table 4-15 Simple statistics of the fleet participating in the Bristol Bay red king crab fishery.

BBR								
Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four vessel harvests	
			as percent of total allocation	in pounds	as percent of total allocation	in pounds	as percent of total allocation	in pounds
2001	230	7,681,106	0.43	33,396	0.37	28,747	1.28	98,202
2002	241	8,770,348	0.41	36,391	0.40	35,316	0.82	71,911
2003	250	14,237,375	0.40	56,950	0.33	47,540	1.40	198,892
2004	251	13,889,047	0.40	55,335	0.38	52,780	0.86	119,599
2005-2006	89	16,472,400	1.12	185,120	0.85	140,698	3.90	643,007
2006-2007	81	13,877,870	1.23	170,149	1.05	146,273	3.27	453,161
2007-2008	74	18,324,046	1.35	247,343	1.22	222,838	3.57	654,402
2008-2009	77	18,288,881	1.30	237,016	1.10	200,548	2.91	532,475
2009-2010	70	14,337,782	1.42	203,826	1.40	200,502	2.86	410,199

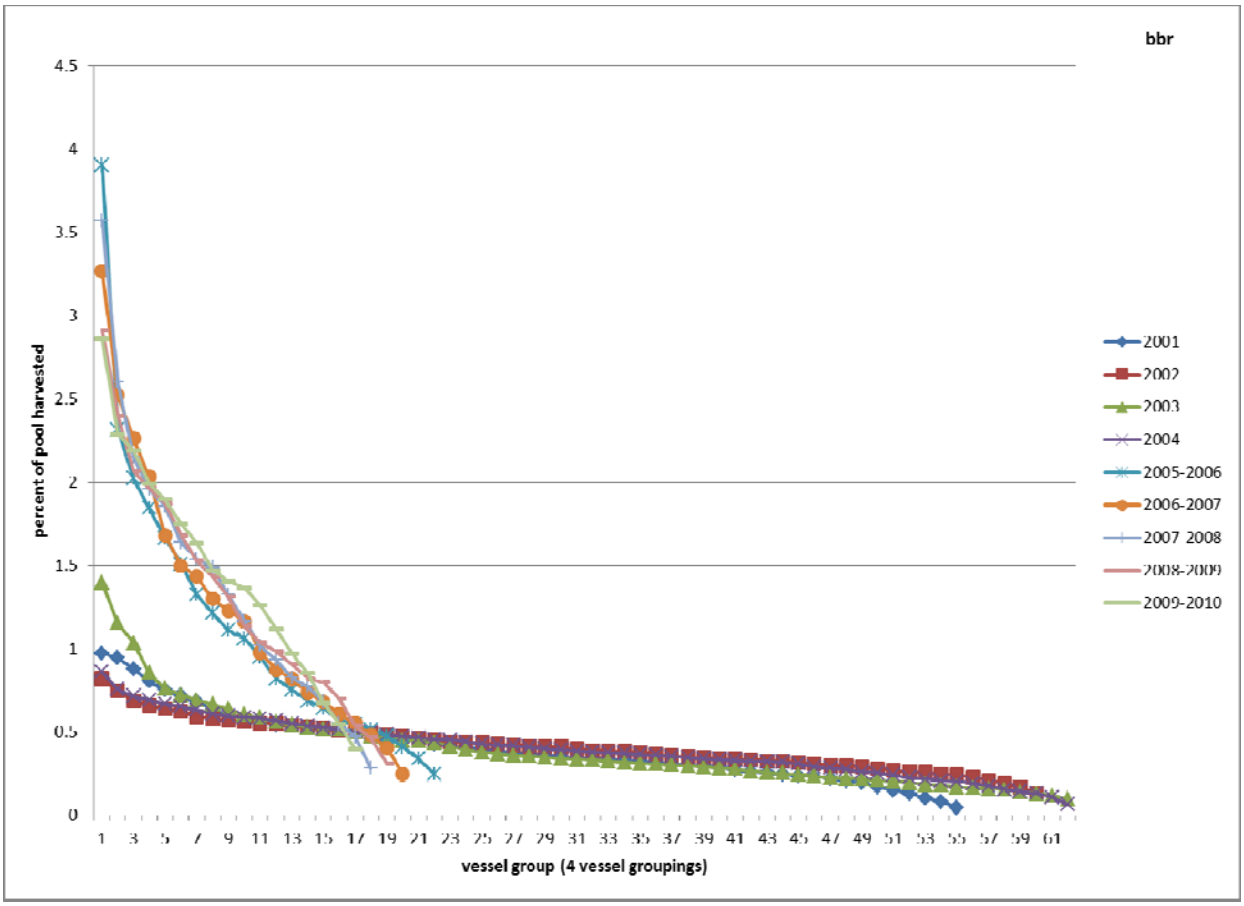


Figure 4-2 Catch by vessel as a percent of the total allocation in the Bristol Bay red king crab fishery

Table 4-16 shows simple catch statistics of the fleet participating in the Bering Sea *C. opilio* fishery during the years immediately prior to program implementation and the first five years of the program. Figure 4-3 is a histogram showing the distribution of catch across the fleet during those years, with vessels grouped in fours to protect confidentiality. In the first year of the program in Bering Sea *C. opilio* fishery, the fleet contracted to levels similar to those in the Bristol Bay red king crab fishery, but the contraction was of smaller magnitude because this fleet had contracted to some degree prior to implementation of the program. The relatively fewer vessels in the Bering Sea *C. opilio* fishery prior to the 2005-2006 season likely occurred because GHLs in that fishery were at historic lows leading up to implementation of the program. From 1997 through 1999, the average vessel harvest was approximately 617,000, substantially higher than the average vessel harvest in the 2005-2006 season. In the first year of the program, the harvests of the largest vessels in the fleet greatly exceeded the largest harvests in years immediately preceding rationalization.[14] Since the 2005-2006 season, average vessel harvests have increased considerably, largely from higher TACs beginning in the third year of the program. Unlike the Bristol Bay red king crab fishery, the fleet size fluctuated across the five years, with lows in the 2006-2007 and 2009-2010 seasons, and highs each of the other seasons.

[14] The four largest vessels in the fishery in 2001 harvested a substantially greater share than the four largest harvests in any other prerationalization year. This likely occurred because some catcher processors did not acknowledge a catcher vessel strike in the fishery that year.

Table 4-16 Simple statistics of the fleet participating in the Bering Sea *C. opilio* fishery.

BSS								
Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four vessel harvests	
			as percent of total allocation	in pounds	as percent of total allocation	in pounds	as percent of total allocation	in pounds
2001	207	22,940,704	0.48	110,825	0.38	86,479	2.59	593,306
2002	190	29,609,702	0.53	155,841	0.50	147,730	1.44	425,538
2003	190	25,410,122	0.53	133,737	0.49	125,655	1.07	271,901
2004	189	21,939,493	0.53	116,082	0.49	106,791	1.30	284,844
2005	167	22,655,777	0.60	135,663	0.57	128,122	1.21	273,237
2005-2006	78	33,248,009	1.27	423,485	1.05	349,851	3.59	1,192,020
2006-2007	70	32,699,911	1.42	463,589	1.19	389,008	4.14	1,352,638
2007-2008	78	56,722,400	1.28	727,105	1.08	611,366	3.27	1,853,105
2008-2009	77	52,687,374	1.30	684,153	1.12	587,842	3.24	1,709,247
2009-2010	69	56,722,400	1.45	821,658	1.39	788,013	3.65	2,070,602

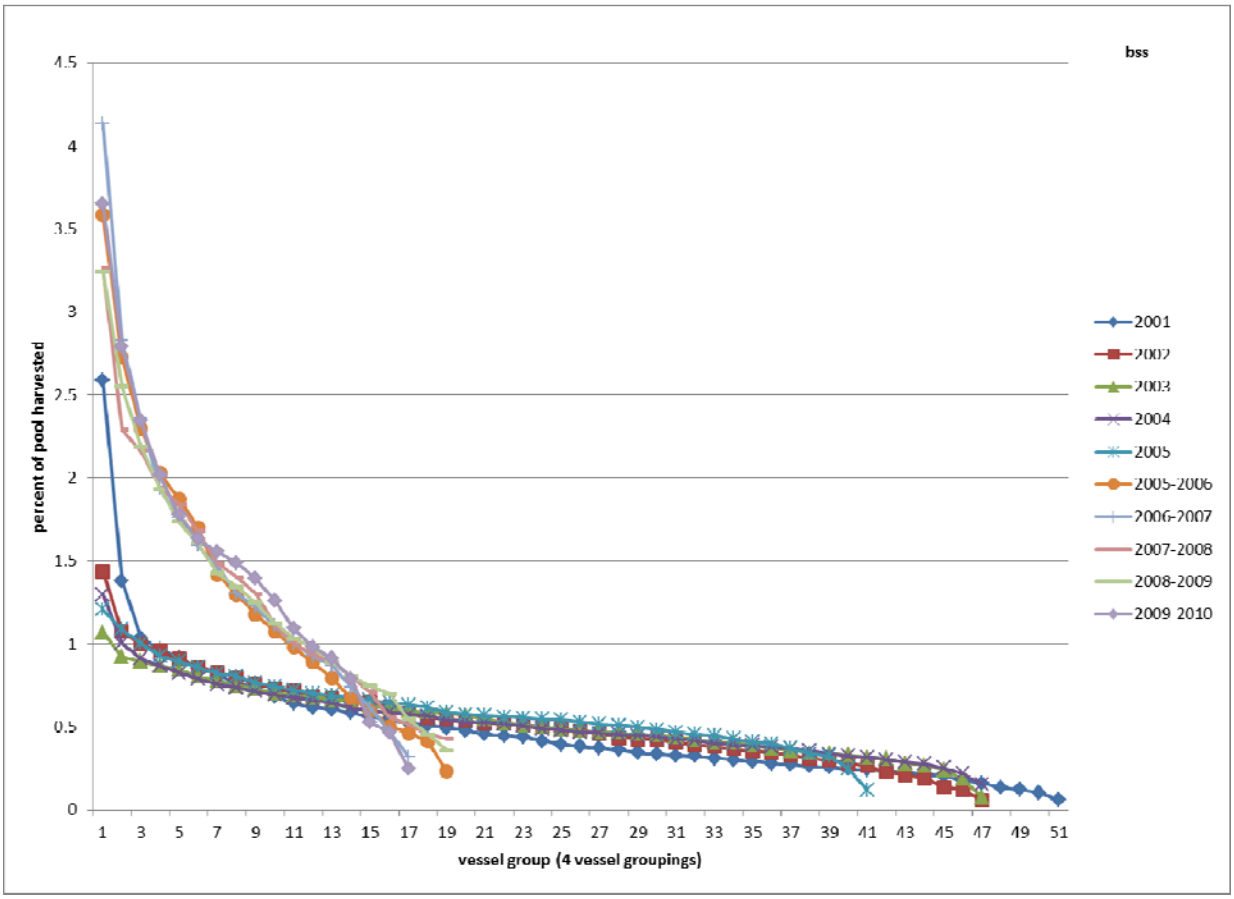


Figure 4-3 Catch by vessel as a percent of the total allocation in the Bering Sea *C. opilio* fishery.

Table 4-17 and Table 4-18 show simple catch statistics of the fleets participating in the Western and Eastern Bering Sea *C. bairdi* fisheries during the first five years of the program. These fisheries were reopened under the program after being closed for nearly a decade. Figure 4-4 and Figure 4-5 are histograms showing the distribution of catch across the fleets during the first five years of the program, with vessels grouped in fours to protect confidentiality. Participants initially intended to harvest these fisheries incidentally to the Bering Sea *C. opilio* and Bristol Bay red king crab fisheries, but have found it

necessary to target *C. bairdi* to catch a reasonable portion of the quota. The relatively low median vessel catch and high average of the high four vessel catches is a reflection of the tendency of few vessels to actively target *C. bairdi*.

Table 4-17 Simple statistics of the fleet participating in the Western Bering Sea *C. bairdi* fishery.

WBT								
Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four vessel harvests	
			as percent of total allocation	in pounds	as percent of total allocation	in pounds	as percent of total allocation	in pounds
2005-2006	43	791,025	1.26	9,981	0.26	2,051	6.97	55,151
2006-2007	36	633,910	1.79	11,337	0.04	255	8.32	52,724
2007-2008	27	467,136	0.88	4,127	0.51	2,372	2.70	12,635
2008-2009	27	108,368	0.29	314	0.01	9	1.82	1,978

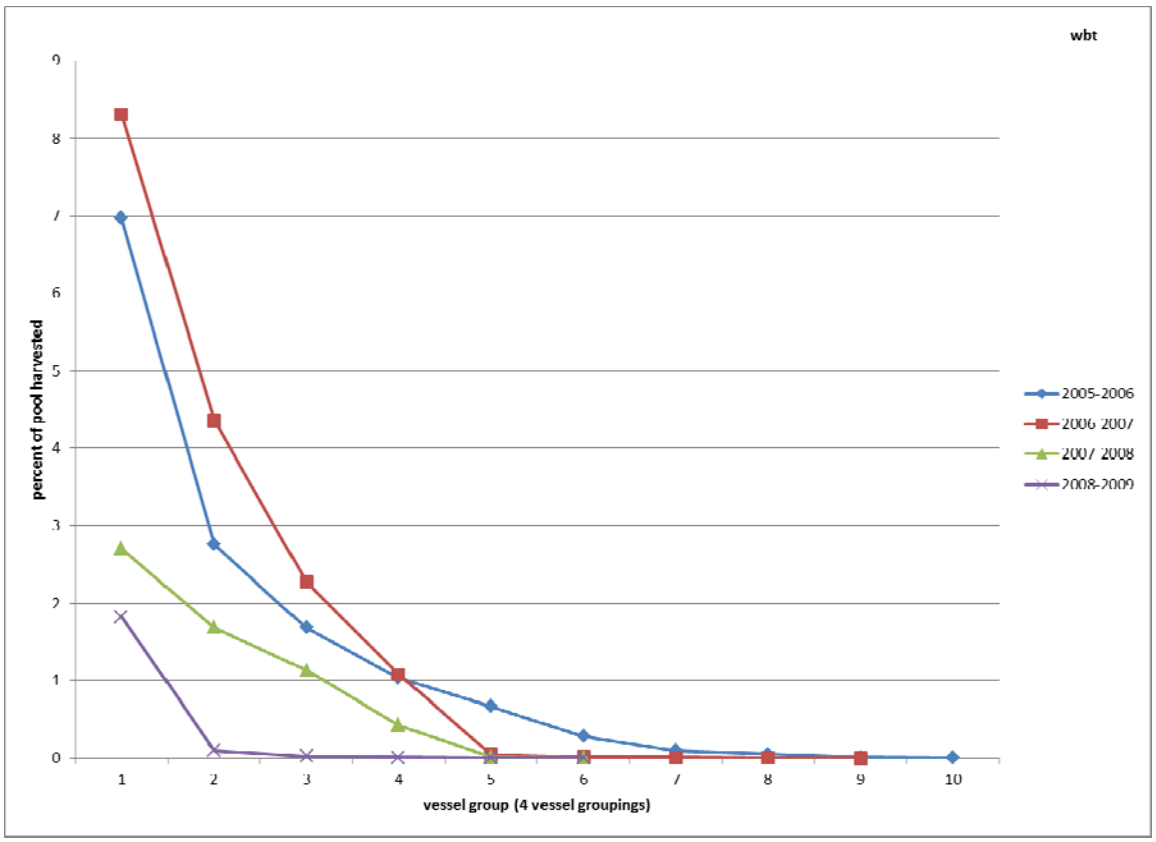


Figure 4-4 Catch by vessel as a percent of the total allocation in the Western Bering Sea *C. bairdi* fishery.

Table 4-18 Simple statistics of the fleet participating in the Eastern Bering Sea *C. bairdi* fishery.

EBT								
Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four vessel harvests	
			as percent of total allocation	in pounds	as percent of total allocation	in pounds	as percent of total allocation	in pounds
2006-2007	36	1,267,106	2.08	26,365	0.23	2,878	9.58	121,423
2007-2008	20	1,439,435	2.32	33,414	1.09	15,695	7.81	112,409
2008-2009	21	1,553,584	2.98	46,220	0.90	14,057	10.64	165,351
2009-2010	17	1,189,573	5.76	68,510	2.73	32,488	15.62	185,871

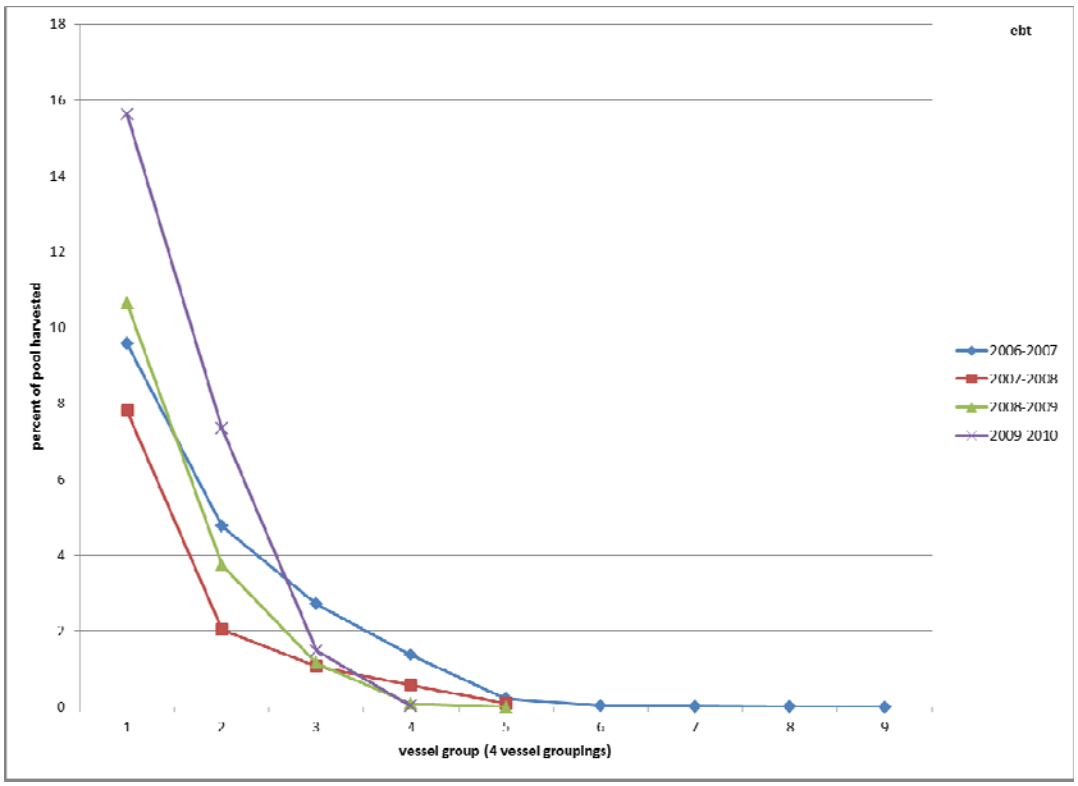


Figure 4-5 Catch by vessel as a percent of the total allocation in the Eastern Bering Sea *C. bairdi* fishery.

Table 4-19 and Table 4-20 show simple catch statistics of the fleets participating in the Eastern and Western Aleutian Islands golden king fisheries during the first five years of the program. Data confidentiality restrictions preclude the distribution of catch across the fleets from being shown. Substantial fleet consolidation occurred in these smaller fisheries. Both fisheries' fleets consolidated to half or fewer vessels than pre-rationalization levels. The harvest amounts of the average vessel in the rationalized fisheries are substantially greater than harvests in the rationalized Bristol Bay red king crab fishery. The average vessel's harvests in the Eastern fishery are comparable to the average harvests in the *C. opilio* fishery, which are half of the harvests of the average vessel in the Western fishery. These high harvest levels are not surprising given the relative catch rates, manner of prosecution (i.e., longline pots), limited grounds, and relative price. These factors all contribute to greater levels of concentration than in the Bristol Bay red king crab fishery, while all except price contribute to greater consolidation than in Bering Sea *C. opilio* fishery. The substantially greater concentration in the Western fishery results from

the remoteness of those grounds, which together with high fuel prices and low crab prices (particularly in the first year of the program) substantially reduced economic returns in that fishery.

Table 4-19 Simple statistics of the fleet participating in the Eastern Aleutian Islands golden king crab fishery.

EAG								
Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four vessel harvests	
			as percent of total allocation	in pounds	as percent of total allocation	in pounds	as percent of total allocation	in pounds
2001-2002	19	3,128,409	5.26	164,653	5.19	162,353	9.65	302,015
2002-2003	19	2,765,436	5.26	145,549	5.05	139,601	8.90	246,047
2003-2004	18	2,900,247	5.56	161,125	5.28	153,039	8.76	254,082
2004-2005	20	2,846,273	5.00	142,314	5.47	155,654	7.97	226,772
2005-2006	7	2,569,209	13.59	349,251				
2006-2007	6	2,692,009	16.61	447,116				
2007-2008	4	2,690,377	24.91	670,197				
2008-2009	3	2,823,773	33.20	937,530				
2009-2010	3	2,832,932	33.31	943,622				

Table 4-20 Simple statistics of the fleet participating in the Western Aleutian Islands golden king crab fishery.

WAG								
Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four vessel harvests	
			as percent of total allocation	in pounds	as percent of total allocation	in pounds	as percent of total allocation	in pounds
2001-2002	9	2,693,221	11.11	299,247	4.46	120,155	21.70	584,538
2002-2003	6	2,605,237	16.67	434,206	13.59	354,129	24.50	638,228
2003-2004	6	2,637,161	16.67	439,527	13.99	368,959	23.80	627,711
2004-2005	6	2,639,862	16.67	439,977	14.17	374,012	24.18	638,314
2005-2006	3	2,382,468	32.68	778,622				
2006-2007	3	2,002,186	27.44	549,372				
2007-2008	3	2,246,040	30.81	692,002				
2008-2009	3	2,252,111	29.42	662,617				
2009-2010	3	2,478,313	32.38	802,408				

The St. Matthew Island blue king crab opened for a single season since implementation of the rationalization program. With only seven vessels participating in the fishery, catches were relatively concentrated, but a substantial portion of the IFQ were left unharvested.

Table 4-21 Simple statistics of the fleet participating in the St. Matthew Island blue king crab fishery.

SMB								
Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four vessel harvests	
			as percent of total allocation	in pounds	as percent of total allocation	in pounds	as percent of total allocation	in pounds
2009-2010	7	460,859	6.27	28,888	3.69	16,991	9.11	42,003

Prior to the rationalization program, seasons in all of the program fisheries, except the Western Aleutian Islands golden king crab fishery, were typically less than one month long. In the Bristol Bay red king crab fishery, which drew the most participants, seasons lasted less than one week in the years immediately preceding implementation of the rationalization program. Both the Bering Sea *C. opilio* and the Eastern Aleutian Islands golden king crab fisheries lasted for less than one month, both of which had progressively shorter seasons leading up to implementation of the program. Although the Western Aleutian Islands golden king crab fishery lasted several months, its seasons also shortened progressively leading up to implementation of the program.

Table 4-22 Season openings and closings in four years prior to August 2005 implementation of the rationalization program.

Fishery	Season	Season opening	Season closing
Bristol Bay red king crab	2001	October 15	October 18
	2002		October 18
	2003		October 20
	2004		October 18
Bering Sea *C. opilio*	2002	January 15	February 8
	2003		January 25
	2004		January 23
	2005		January 20
Eastern Aleutian Islands golden king crab	2001-2002	August 15	September 10
	2002-2003		September 7
	2003-2004		September 8
	2004-2005		August 29
Western Aleutian Islands golden king crab	2001-2002	August 15	March 30
	2002-2003		March 8
	2003-2004		February 2
	2004-2005		January 3

Source: ADFG Annual Management Report.

The allocation of exclusive harvest shares allowed the seasons in the fisheries to be extended substantially. Currently season limits are imposed for biological reasons. With this new latitude to schedule harvest activity, participants have dispersed catch substantially across the allowable seasons (see Table 4-23).[15] For example, the 2005-2006 Bristol Bay red king crab season was prosecuted towards the over the 3-month period following the October 15, 2005 season opening date; the first delivery was made on October 20, 2005; and the last delivery was made on the day after the regulatory closure date of January 15, 2006. In all of the fisheries, deliveries have been distributed over a period of several months; however, deliveries remain most concentrated in the Bristol Bay red king crab fishery (and the St. Matthew Island blue king crab fishery). The season in those fisheries are only four months and four and one-half months, respectively, substantially shorter than the season in other fisheries, and markets tend to be strongest near the year's end leading up to the holidays.

[15] The following tables concerning deliveries include only catcher vessel activity.

Table 4-23 Post-rationalization pattern of deliveries by fishery.

Fishery	Season	Season opening	Date of first delivery	Week of most deliveries (in pounds)		Date of last delivery	Season closing
				Weekending date	Percent of quota delivered		
Bristol Bay red king crab	2005-2006	October 15	October 20	November 5	28.6	January 16	January 15
	2006-2007		October 19	November 5	44.0	November 28	
	2007-2008		October 18	November 5	31.1	January 15	
	2008-2009		October 18	November 5	28.7	January 17	
	2009-2010		October 17	November 5	41.0	January 16	
Bering Sea *C. opilio*	2005-2006	October 15	October 27	February 4	11.0	May 27	May 15 (east) May 31 (west)*
	2006-2007		November 7	February 25	11.1	May 5	
	2007-2008		November 18	February 25	13.0	May 10	
	2008-2009		November 30	February 11	10.7	May 16	
	2009-2010		October 25	March 4	15.5	May 6	
Eastern Aleutian Islands golden king crab	2005-2006	August 15	August 30	September 19	14.1	March 28	May 15
	2006-2007		August 31	**	**	January 13	
	2007-2008		August 30	**	**	February 9	
	2008-2009		September 7	October 3	14.8	December 22	
	2009-2010		August 31	September 12	17.1	January 10	
Eastern Bering Sea *C. bairdi*	2006-2007	October 15	October 23	March 11	18.1	March 27	March 31
	2007-2008		October 20	March 24	7.0	April 2	
	2008-2009		October 19	**	**	March 11	
	2009-2010		October 17	November 19	22.7	March 1	
Western Aleutian Islands golden king crab	2005-2006	August 15	September 6	October 24	11.4	March 25	May 15
	2006-2007		September 10	**	**	May 6	
	2007-2008		September 14	**	**	May 21	
	2008-2009		September 13	**	**	May 12	
	2009-2010		September 5	**	**	May 18	
Western Bering Sea *C. bairdi*	2005-2006	October 15	October 27	March 25	7.9	May 3	March 31
	2006-2007		November 4	March 11	16.3	April 5	
	2007-2008		November 16	March 3	5.5	March 31	
	2008-2009		January 11	March 11	4.0	April 6	
St. Matthew Island blue king crab	2009-2010	October 15	October 23	November 19	14.4	December 7	February 1

Source: RAM IFQ landings data

* The boundary between the Eastern and Western Subdistricts is 173° W longitude.

** withheld for confidentiality.

The concentration of deliveries in the Bristol Bay red king crab fishery is also demonstrated by examining the cumulative catch by week throughout the season (see Figure 4-6).[16] In all five years of the program, approximately 50 percent of the catch was landed in the first two weeks of November. The number of vessels making deliveries also peaked during this period, with between approximately 40 and 60 vessels making deliveries (see Figure 4-7). Participation in the first week of the fishery and after the sixth week were substantially lower – approximately 10 vessels or fewer.

[16] In weeks with fewer than 3 vessels with landings, catch is aggregated with the most proximate week with landings to protect confidentiality.

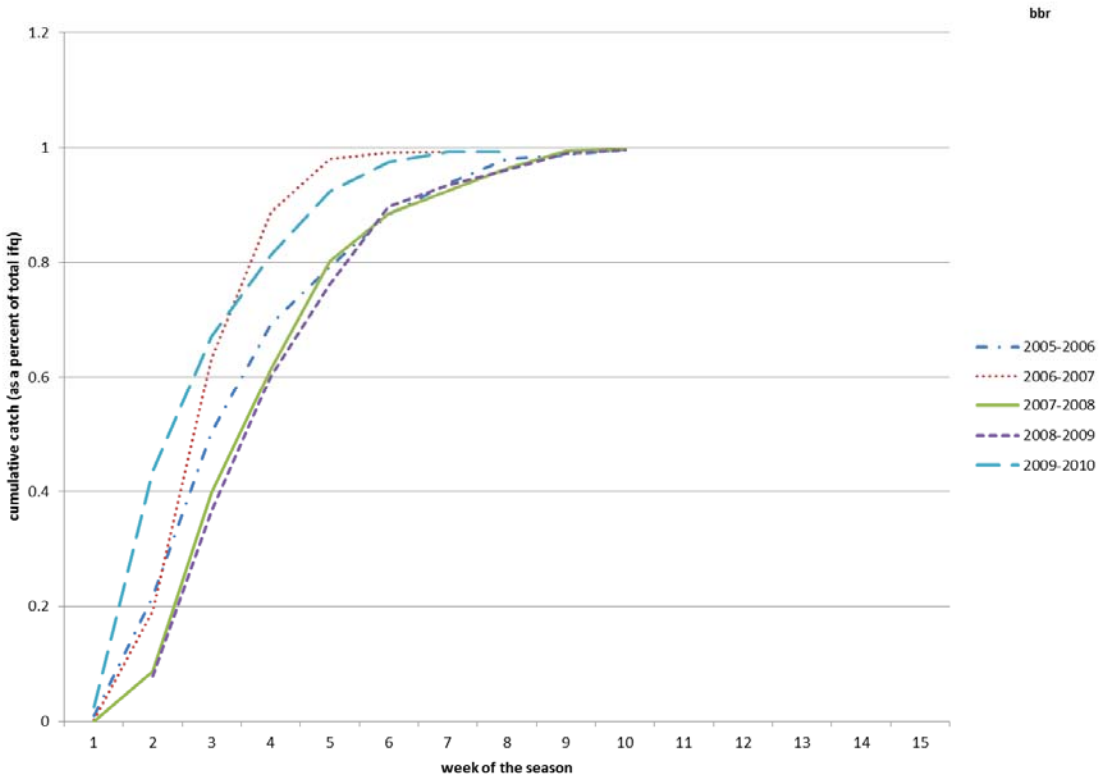


Figure 4-6 Post-rationalization cumulative deliveries in the Bristol Bay red king crab fishery.

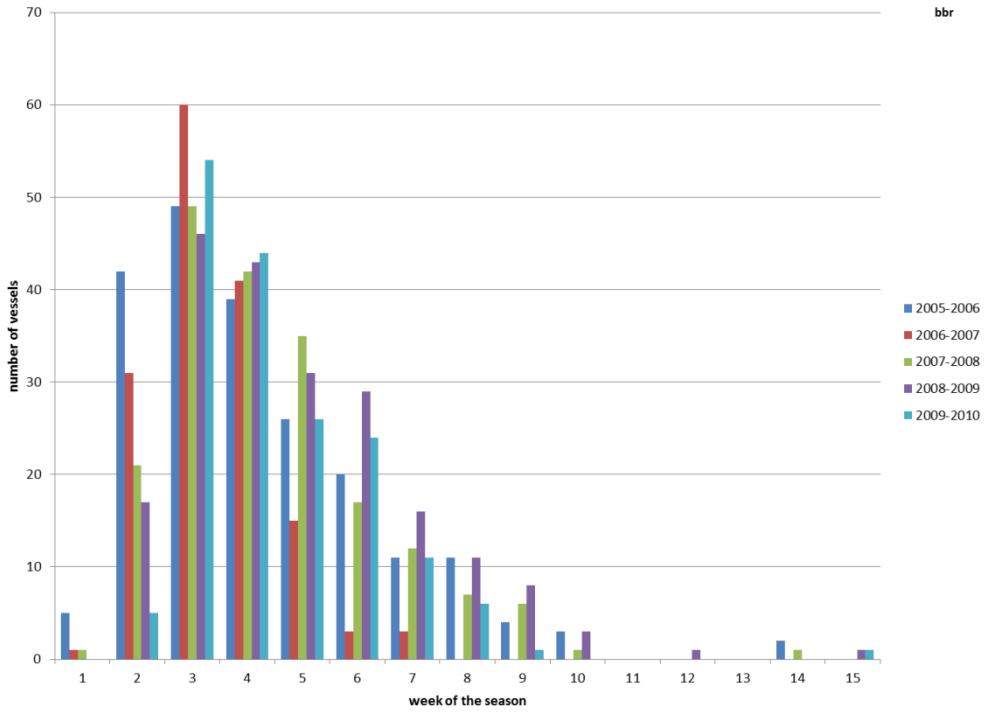


Figure 4-7 Vessels making deliveries by week in the Bristol Bay red king crab fishery (2005-2006 through 2009-2010).

The distribution of landings across the Bering Sea *C. opilio* season under the rationalization program is much more disperse than in the Bristol Bay red king crab fishery (see Figure 4-8). Less than 10 percent of the total catch is landed prior to the New Year. Shortly after the New Year, activity in the fishery has increased, with more than 5 percent of the total catch landed each week for several consecutive weeks. Vessel participation is consistently strongest during this period, but has varied across years (see Figure 4-9). Although vessel participation appears weak at times during the period (e.g., less than 10 vessels making landings during a week in 2006–2007 in the sixteenth week of the season), some vessels are likely fishing on extended trips, not making a delivery each week.

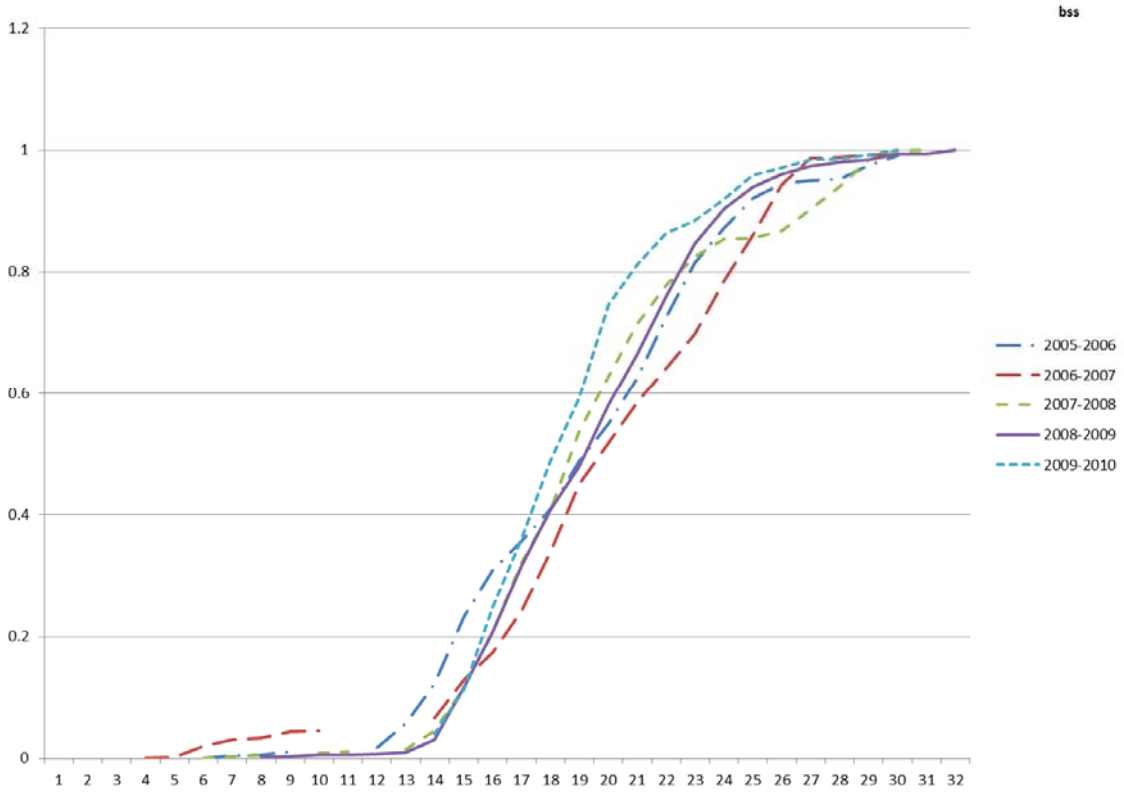


Figure 4-8 Post-rationalization cumulative deliveries in the Bering Sea *C. opilio* fishery.

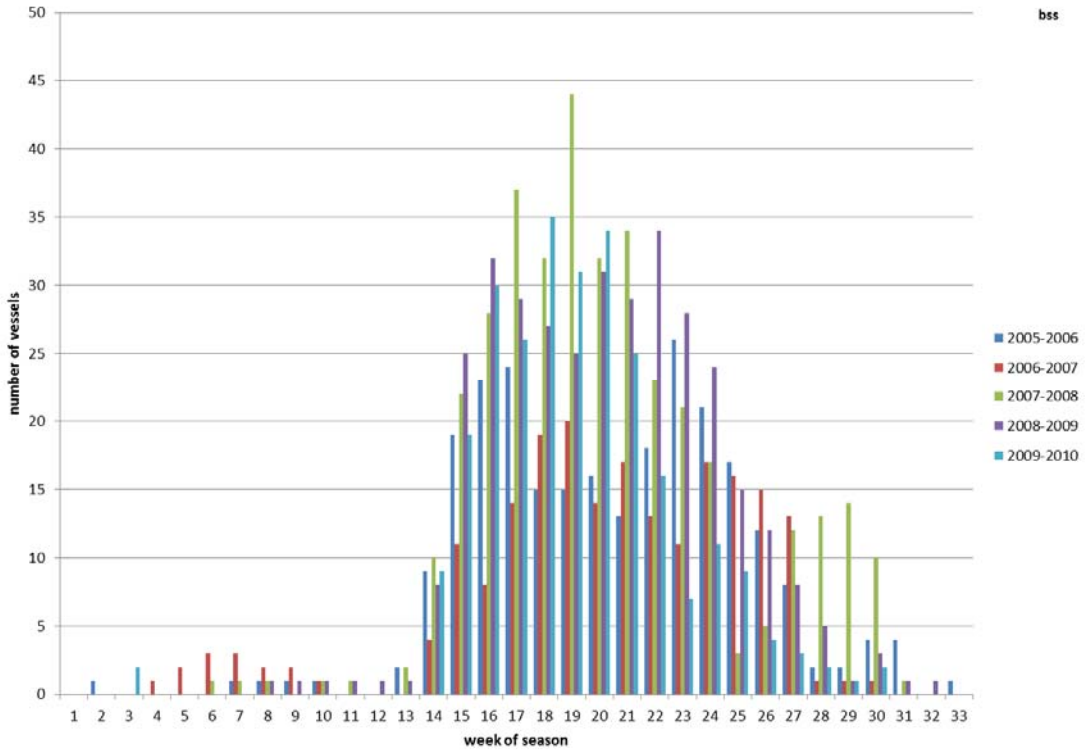


Figure 4-9 Vessels making deliveries by week in the Bering Sea *C. opilio* fishery (2005-2006 through 2007-2008).

The extension of fishing over a longer period after program implementation has substantially changed the number and volume of deliveries. If a delivery is defined as a set of fish tickets with a single processor on a single day, a comparison of pre-rationalization deliveries (Table 4-24) with post-rationalization deliveries (Table 4-25) shows that the average number of deliveries per vessel has doubled in most program fisheries.[17] In addition, the average amount of crab delivered has increased. Prior to the rationalization program, in most fisheries vessels made a single delivery after a fishery closing. Under the rationalization program, almost all vessels make multiple deliveries in a season, fishing closer to the vessel's capacity prior to making deliveries. In general, deliveries average near or more than 100,000 pounds in each fishery, with the exceptions of the Bering Sea *C. bairdi* and St. Matthew Island blue king crab fisheries, which have had relatively low catch rates.

[17] In some instances, multiple deliveries are suggested by multiple fish tickets across multiple days in a single delivery.

Table 4-24 Pre-rationalization number and volume of deliveries by fishery.

Fishery	Season	Number of vessels	Number of deliveries	Average number of deliveries per vessel	Maximum number of deliveries by a vessel	Average delivery	Median delivery	Average delivery of 3 vessels with largest average delivery
Bristol Bay red king crab	2001	224	228	1.0	3	32,302	28,285	94,055
	2002	234	234	1.0	1	36,204	34,580	71,911
	2003	242	246	1.0	2	55,111	46,587	198,892
	2004	243	246	1.0	2	54,009	52,105	114,212
Bering Sea *C. opilio*	2001	201	255	1.3	3	77,805	64,396	253,970
	2002	182	373	2.0	4	74,902	64,402	332,877
	2003	185	222	1.2	3	110,841	103,624	260,376
	2004	183	209	1.1	2	101,793	96,305	284,844
	2005	161	184	1.1	3	119,602	116,459	260,055
Eastern Aleutian Islands golden king crab	2001	19	45	2.4	4	69,520	64,270	135,157
	2002	19	43	2.3	3	64,312	52,732	112,656
	2003	18	37	2.1	3	78,385	74,116	127,041
	2004	20	33	1.7	2	86,251	78,443	178,952
Western Aleutian Islands golden king crab	2001-2002	8	63	7.9	17	29,354	28,809	33,362
	2002-2003	5	44	8.8	15	40,082	40,490	
	2003-2004	5	38	7.6	12	52,510	50,265	
	2004-2005	5	32	6.4	10	58,517	51,801	

Source: ADFG Fish tickets.

Note: Blanks are withheld for confidentiality. Deliveries include all offloads in a single day. A delivery may be divided between two processors.

Table 4-25 Post-rationalization number and volume of deliveries by fishery.

dlvdata

Fishery	Season	Number of vessels	Number of deliveries	Average number of deliveries per vessel	Maximum number of deliveries by a vessel	Average delivery	Median delivery	Average delivery of 3 vessels with largest average delivery
Bristol Bay red king crab	2005-2006	88	233	2.6	6	68,366	60,713	217,511
	2006-2007	79	170	2.2	5	79,355	66,544	211,753
	2007-2008	72	222	3.1	7	80,186	72,728	180,477
	2008-2009	75	226	3.0	8	78,658	73,026	189,599
	2009-2010	69	192	2.8	6	72,860	66,658	171,501
Bering Sea *C. opilio*	2005-2006	76	260	3.4	10	118,621	112,076	283,254
	2006-2007	66	228	3.5	11	131,165	120,434	253,611
	2007-2008	74	399	5.4	14	131,400	115,892	278,541
	2008-2009	73	370	5.1	12	132,234	123,752	274,397
	2009-2010	67	285	4.3	9	146,444	138,469	295,371
Eastern Aleutian Islands golden king crab	2005-2006	6	28	4.7	6	91,060	100,547	107,370
	2006-2007	5	24	4.8	12	111,307	113,598	
	2007-2008	3	27	9.0	10	94,973	87,652	
	2008-2009	3	26	8.7	12	108,607	107,607	
	2009-2010	3	27	9.0	11	104,923	110,646	
Eastern Bering Sea *C. bairdi*	2006-2007	33	51	1.5	4	24,061	5,824	94,443
	2007-2008	19	50	2.6	7	28,033	16,991	54,225
	2008-2009	20	50	2.5	11	30,622	24,124	95,910
	2009-2010	16	32	2.0	5	36,872	29,437	86,694
Western Aleutian Islands golden king crab	2005-2006	2	19	9.5	10			
	2006-2007	2	9	4.5	5			
	2007-2008	2	16	8.0	13			
	2008-2009	2	14	7.0	13			
	2009-2010	2	13	6.5	11			
Western Bering Sea *C. bairdi*	2005-2006	42	69	1.6	5	11,042	1,662	44,006
	2006-2007	34	55	1.6	4	11,150	419	41,657
	2007-2008	26	43	1.7	5	10,632	6,596	38,752
	2008-2009	27	50	1.9	5	2,167	39	28,293
St. Matthew Island blue king crab	2008-2009	7	16	2.3	5	28,804	26,386	34,622

Source: RAM IFQ database, 2005-2006, 2006-2007, and 2007-2008.

Note: Blanks are withheld for confidentiality. Deliveries include all offloads in a single day. A delivery may be divided between

Under the rationalization program, since allocations are exclusive, participants do not need to race to prevent others from preempting their catch. To improve returns from the fisheries, participants have an incentive to reduce costs. The most obvious means of reducing costs is fleet consolidation, which is demonstrated by the removal of vessels from the fisheries. Stacking quota on fewer vessels can save on costs not only of capital, but also on maintenance, insurance, crew, fuel, and other variable input costs. Stimulated by fuel price increases that occurred in the first two years of the program, several participants in the fisheries have reported that the exclusive allocations have allowed them to reduce vessel speed to conserve fuel without risking loss of catch.

The pot usage and pot catches in the fisheries suggest vessels are using the flexibility provided by exclusive allocations and extended seasons, as well as more liberal regulations on pot sharing, to save on operating costs in the fisheries (see Table 4-26). In the first five years of the program, the number of registered pots per vessel remained constant or increased in all fisheries, while the total number of registered pots in each fishery declined or remained constant. Prior to implementation of the program, pot limits constrained pot usage in some fisheries. Those limits were relaxed under the rationalization program, allowing vessels to choose the number of pots to use to increase operational efficiency. Some vessels are reported to have increased their pot holdings through acquisitions of used post, which are reported to be readily available in the market.[18] With fewer vessels in the fisheries, participants report that used pots are readily available. In addition, pot sharing arrangements are reported to be common. In most fisheries, these practices have led to the pulling of pots more times each season. Vessels are believed to have increased soak times through slowing the pace of fishing and allowing pots to fish during periods when deliveries are made. These increased soak times are believed to have contributed to the increased catch per unit effort observed in most fisheries in the first five years of the program. A different effect has arisen in the Aleutian Islands fisheries where increased soak times (and an accompanying increase in catch per unit effort) has reduced the number of pulls per pot.

[18] Although the crab EDR collects information on pot purchases, that collection provides no information on the condition of pots acquired or whether all pots were, in fact, used in the fisheries. According to some fishery participants, purchases have included pots in a variety of conditions (and often unknown conditions). In addition, pots in the golden king crab fisheries are less expensive than pots used in other fisheries and may skew data that does not distinguish pots by fishery.

Table 4-26 Pots usage and catches by fishery

Fishery	Season	Catch (in pounds)	Number of pots registered	Number of pot lifts	Lifts per registered pot	Average catch per unit effort (crabs per pot lift)	Pots per vessel
Bristol Bay red king crab	2000	7,468,240	26,352	98,694	3.7	12	108
	2001	7,681,106	24,571	63,242	2.6	19	107
	2002	8,770,348	25,833	68,328	2.6	20	107
	2003	14,237,375	46,964	128,430	2.7	18	188
	2004	13,889,047	49,506	90,976	1.8	23	197
	2005 - 2006	16,472,400	15,713	99,573	6.3	25	177
	2006 - 2007	13,887,531	14,685	64,325	4.4	34	181
	2007 - 2008	18,324,046	11,885	101,734	8.6	28	161
	2008-2009	18,288,881	15,098	124,739	8.3	22	196
	2009-2010	14,337,782	14,977	107,058	7.1	21	214
Bering Sea *C. opilio*	2001	22,940,704	40,379	176,930	4.4	97	195
	2002	29,609,702	37,807	308,132	8.2	76	199
	2003	25,410,122	20,452	139,279	6.8	154	108
	2004	21,939,493	14,444	110,087	7.6	157	76
	2005	22,655,777	12,840	69,863	5.4	239	77
	2005 - 2006	33,248,009	13,734	108,320	7.9	204	176
	2006 - 2007	32,699,911	10,851	80,112	7.4	332	155
	2007-2008	56,722,400	13,647	129,457	9.5	352	175
	2008-2009	52,687,374	12,549	148,220	11.8	279	163
	2009-2010	43,193,971	11,804	124,661	10.6	255	171
Eastern Aleutian Islands golden king crab	2000 - 2001	3,086,890	10,598	71,551	6.8	10	707
	2001 - 2002	3,128,409	12,927	62,639	4.8	12	680
	2002 - 2003	2,765,436	11,834	52,042	4.4	12	623
	2003 - 2004	2,900,247	12,518	58,883	4.7	11	695
	2004 - 2005	2,846,273	13,165	34,848	2.6	18	658
	2005 - 2006	2,569,209	8,833	21,898	2.5	25	1,262
	2006 - 2007	2,692,009	8,150	23,839	2.9	24	1,358
	2007 - 2008	2,690,377	4,200	20,496	4.9	28	1,050
	2008-2009	2,823,773	4,200	21,855	5.2	27	1,400
	2009-2010	2,832,932	4,600	23,442	5.1	26	1,533
Western Aleutian Islands golden king crab	2000 - 2001	2,902,518	8,910	101,239	11.4	7	743
	2001 - 2002	2,693,221	8,491	105,512	12.4	7	943
	2002 - 2003	2,605,237	6,225	78,979	12.7	8	1,038
	2003 - 2004	2,637,161	7,140	66,236	9.3	10	1,190
	2004 - 2005	2,639,862	7,240	56,846	7.9	12	1,207
	2005 - 2006	2,382,468	4,800	27,503	5.7	21	1,600
	2006 - 2007	2,002,186	6,000	22,694	3.8	20	2,000
	2007-2008	2,246,040	4,800	25,287	5.3	21	1,600
	2008-2009	2,252,111	4,900	22,351	4.6	23	1,633
	2009-2010	2,478,313	5,050	22,746	4.5	25	1,683
Bering Sea *C. bairdi**	2005 - 2006	791,025	545	29,693	54.5	12	13
	2006 - 2007	1,901,016	4,140	49,192	11.9	17	115
	2007 - 2008	1,906,571	3,102	49,901	16.1	17	115
Eastern Bering Sea *C. bairdi*	2008-2009	1,553,584	2,034	20,862	10.3	20	97
	2009-2010	1,189,573	1,771	8,529	4.8	28	104
Western Bering Sea *C. bairdi*	2008-2009	108,368	1,307	4,414	3.4	2	48
St. Matthew Island blue king crab	2009-2010	460,859	1,022	10,697	10.5	10	146

Sources: ADFG Annual Management Report and fishtickets and NMFS RAM catch data

*Note - Registration for the two *C. bairdi* fisheries was separated in the 2008-2009 season.

Many of the changes that occurred in the catcher vessel fleet have also similarly affected the catcher processor fleet. Catcher processors have consolidated catch on fewer vessels improving production efficiencies and allowing for better product quality. Very little data from the catcher processor fleet can be released because of confidentiality protections.

4.4 Captains and crew

Prior to implementation of the rationalization program, a holder of a License Limitation Program license endorsed for one or more of the crab fisheries needed to enter a vessel into a fishery to realize any return. As a consequence, license holders (particularly those who had invested in a vessel to use in the fisheries and carried mortgage obligations) are reported to have been compelled to participate in the fisheries, regardless of whether returns were expected to be substantial (or even cover the full costs of participation). With relatively high participation rates, crew positions were readily available particularly for good, experienced crew. Although financial pressures might have otherwise limited the ability of vessel owners to compensate crew, the large number of vessels simultaneously participating in the fisheries provided persons willing to work on vessels with some leverage in any negotiation for a position.

This leverage was likely manifest in two ways. First, crew shares likely reflected some of this additional leverage. Most crew were paid on a share system, under which payment is a percentage of vessel revenues after deduction of specified costs (most frequently food, fuel and bait). In individual cases, some crew may have been able to negotiate a more senior position and higher share for themselves, if a vessel needed to fill that more senior position. In addition, crewmembers on average might have received a higher share percentage for their work, than would have been paid in a more competitive labor market. This market power may be evident as share percentages and deductions in the crab fisheries were similar to those in other fisheries (such as pot fishing for Pacific cod) despite substantially higher daily revenues from the crab fisheries. Admittedly, crab fishing introduces greater risks than cod fishing, which should provide for a premium for crab fishing. Yet, it is unlikely that any vessel owner who attempted to reduce crew shares in the fishery to a level that would compensate crew at a daily rate similar to that in other pot fisheries would have been able to retain a good crew. The magnitude of the difference in daily revenues between fisheries suggests that crew may have received extraordinary shares (and pay) in the crab fisheries under the LLP.

The leverage of crew in these negotiations also shows in the payment of late (or last minute) hires in the fisheries. It was not uncommon for some vessel owners to make hires to fill out their crews in the last few days before the season opened. Crew hired for these positions were typically hired at the same share they would have received had they been hired earlier, a few weeks or a month prior to the opening. These late hires would have done little gear and boat work prior to the opening, but received a share comparable to other crew, as they were needed by both the vessel owner and the other crew for the vessel to participate in the fishery. These late hires clearly exploited their leverage with both vessel owners and other crew.

The greatest effect on crew arising from the rationalization program was the loss of crew positions brought on by consolidation in the fisheries. Crew sizes are generally unchanged since implementation of the program, so vessel participation provides a direct estimate of the number of crew that have left the fisheries. Data from Crab Economic Data Reports (see Table 4-27), as well as anecdotal reports, indicate that crew sizes have changed minimally (at most one person per vessel) since implementation of the program. In some instances, vessels are reported to have added crew to reduce the burden of deck labor in the fisheries. Absent improved data, the removal of vessels from the fisheries provides a direct estimate of the number of crew jobs lost. Assuming six crew members per vessel, approximately 975 fewer crew (including captains) were employed in the Bristol Bay red king crab fishery on average in the each of the first five years of the rationalization program, in comparison to the 2000 to 2004 season average;

approximately 675 fewer crew were employed in the Bering Sea *C. opilio* fishery on average in each of the first five years of the program, when compared to the 2001 to 2005 season average.[19]

Although these job losses are substantial, one must also consider the terms of employment in the prerationalization fisheries in assessing the magnitude of the loss. Prior to implementation of the program, few crab deck jobs, fully supported a crewmember. Because of the low total catches and high number of vessels in the fisheries in years leading up to the rationalization program, most crew worked only a month or so in the crab fisheries. Crew typically worked other jobs (including crew jobs in other fisheries) throughout the remainder of the year. In addition, since pay was a share of the vessel's net revenues in the derby, pay was subject to risk. The relatively short tenure of crab crew jobs was attractive to many crew who were able to negotiate (or take) short periods away from other employment to fish crab. Notwithstanding the relatively short term of these jobs, for many deck crew, their crab fishing jobs were reported to have provided important contributions to annual income. Particularly in the case of crew from remote communities with few job opportunities, replacing income from lost crab crew jobs is reported to be problematic.

Crab Economic Data Reports provide some indication of crew pay effects arising from the rationalization program. These data, particularly prior to 2007, should be interpreted as only providing a general reflection of conditions, as many respondents are believed to have misinterpreted some of the questions concerning crew compensation. Despite any shortcomings, it is believed that these data provide a general understanding of the direction and gross scale of changes in crew compensation under the program.[20]

Crew shares and payments reflect the course of changes that arose in the crab fisheries under the rationalization program, including these changes in deductions and charges. Except in 1998 in the Bering Sea *C. opilio* fishery (when the TAC in that fishery greatly exceeded the TAC in any subsequent year), fleet consolidation (together with some contribution from generally higher TACs) increased the average vessel harvest substantially from the years immediately preceding the program. In years with comparable TACs, average vessel catches in the rationalized fishery were approximately triple the pre-rationalization levels. This consolidation, and the means by which it occurred, greatly increased the catches the revenues from which are the basis for crew shares.

Since crew compensation arrangements vary across the fleet, changes in crew share payments can be best assessed by examining the change in payment amounts and change the percentage of gross vessel revenues paid to crew before and after the implementation of the program. Available data suggest that

[19] Note that these estimates are based on an assumption of 6 persons per crew (including captain). Crab Economic Data Reports suggest that average crews are approximately 5 persons; however, these surveys may have some biases. For years prior to implementation of the program, the surveys requested average crew size. Subsequent to the implementation the survey requests the number of paid crew per fishery. Both suggest that average crews are slightly less than 6 persons.

[20] Specifically, captain and crew payment questions requested the actual amount paid to crew, not their payment before "shared expenses" (such as food, fuel, or bait) were "deducted". The subsequent question distinguishes "deductions," which are shared expenses subtracted from vessel revenues prior to calculation of the crew share, from "charges," which are crew borne expenses removed after the calculation of crew shares. Most respondents are believed to have included the amount paid to crew in settlement checks without distinguishing whether "charges" might be removed before making that payment. As a result, it is uncertain whether charges were removed by respondents, although the instructions direct a respondent to remove only deductions (not charges). The discrepancy could be significant, particularly in pre-rationalization years, when crew payments were substantially lower dollar amounts. For example, a $1,000 plane ticket to Dutch Harbor may be the difference between a $5,000 payment and a $6,000 payment for a crewmember in the Bering Sea *C. opilio* 2001 season. In addition, although data are collected for most of the items deducted or charged, much of those data are of poor quality. In combination, these issues limit the ability to fully and accurately understand crew or captain pay.

mean and median crew payments as a percentage of gross vessel revenues declined by approximately one-third under the rationalization program (see Table 4-27). Although this decline is substantial, on average, the increase in revenues from consolidation (i.e., increase in average vessel harvest) more than compensated for additional deductions, charges, and decrease share percentages. In general, this additional compensation came at the cost of greater crew efforts harvesting those additional pounds.

In reviewing crew compensation on a fishery basis, two seasons in the Bering Sea *C. opilio* fishery stand out. In 1998, the extremely large total catch supported a very high average vessel harvest – more than twice the average vessel harvest any other year for which Economic Data Reporting data are available. This high vessel harvest level supported very high average crew compensation. Despite the high vessel catches in 1998, in 2007 (the second year of the rationalization program), average crew compensation in the fishery approached the 1998 level. This level of average crew compensation arose because of a relatively high price for crab in 2007 ($1.71 per pound based on Economic Data Reporting data) compared to 1998 ($0.57 per pound based on Economic Data Reporting data) and despite the lower percent of gross vessel revenues paid to crew. The 2006 year in the fishery shows an opposite price effect. In that year, mean crew compensation increased only slightly from levels seen in the years immediately preceding implementation of the program. In that year, crab prices dropped by more than one-third (to $1.11 in 2006 from $2.03 in 2004 and $1.80 in 2005 based on Economic Data Reporting data). As a result of this price drop (and the changes in deductions, charges, and crew shares), average crew compensation increased only slightly, despite a substantial increase in average vessel harvests. Also notable (and perhaps more concerning) is a consistent decline in average crew compensation as a percentage of ex vessel revenues in the Bristol Bay red king crab fishery since implementation of the program. In addition to the large drop in average crew compensation from approximately 35 percent of gross vessel revenues to approximately 23 percent of gross vessel revenues in the first year, that percentage has dropped to slightly less than 20 percent in the most recent year. This continuing drop may reflect additional leasing or QS transfers that are charged or deducted prior to applying crew share percentages, but also may be affected by an increasing tendency of participants to charge royalties against shares received in the initial allocation prior to applying crew share percentages, as data reflecting leasing are not available.

Table 4-27 Crew size, harvest, captain pay, crew pay, and percentage of gross vessel revenues paid to crew in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries by fishery (1998, 2001, 2004-2009).

Fishery	Year	Number of vessels	Mean crew size	Mean vessel harvest (pounds)	Captain pay ($)		Mean crew pay (excluding captain) ($)	Crewmember pay ($)		Percent of gross vessel revenues paid to crew (including captain)	
					Mean	Median		Mean	Median	Mean	Median
Bristol Bay red king crab	1998	190	5.2	56,289	23,086	21,782	47,220	9,132	8,128	35.3	35.1
	2001	182	4.7	36,195	25,954	22,610	48,856	10,199	8,473	35.7	35.3
	2004	220	5.3	58,802	35,753	33,912	75,381	14,104	13,196	35.7	35.9
	2005	83	4.9	194,812	69,596	59,210	131,947	26,500	23,476	25.0	22.7
	2006	76	4.9	201,666	53,276	49,728	104,701	21,089	20,384	23.4	22.7
	2007	70	5.0	269,194	78,257	70,522	156,998	31,027	27,956	22.6	21.1
	2008	75	5.2	246,932	79,547	72,616	174,486	33,660	28,108	22.8	20.9
	2009	67	5.1	223,270	60,633	59,258	128,753	24,861	22,618	20.4	19.7
Bering Sea *C. opilio*	1998	162	6.0	1,098,577	98,098	92,472	197,756	33,551	30,988	36.2	35.3
	2001	158	5.4	112,589	22,614	19,295	45,793	8,224	6,894	31.4	31.8
	2004	167	4.9	123,606	33,509	30,280	66,533	13,433	12,009	35.1	35.0
	2005	147	4.7	158,943	34,929	34,578	66,965	14,296	13,529	34.6	35.5
	2006	73	5.1	453,455	38,585	34,281	76,575	14,840	13,514	23.6	22.0
	2007	63	5.2	496,195	62,640	57,413	130,322	24,584	23,508	24.4	22.7
	2008	72	5.6	780,820	94,467	94,408	194,336	34,599	32,440	23.3	22.8
	2009	71	5.5	721,180	69,881	67,970	154,837	27,442	25,667	23.1	23.0

Source: Crab Economic Data Reporting.

Notes: Mean crew size is a count of all crew paid shares excluding the captain. Excludes any vessels on which crew were paid in excess of 75 percent of the vessel's gross revenues. Adjusted for inflation using the CPI-U to 2009 dollars.

Examining compensation on vessels that participate in both the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries provides a more complete view of compensation of crew active in both fisheries (Table 4-28). Even in 2006, when Bering Sea *C. opilio* prices were particularly low, the average crew earned substantially greater compensation than in the years preceding rationalization, with the exception of 1998, when harvests from the Bering Sea *C. opilio* fishery were substantially greater than for any other year for which data are available. Despite these reinforcing factors, the average crew on a vessel that participated in both fisheries received comparable compensation in 1998 and 2006. Notably, data for these vessels also suggest a possible progressive decline in the crew share percentages from approximately 24 percent of gross revenues in the first full calendar year of the program to slightly less than 21 percent in the fourth calendar year.

Table 4-28 Harvest, captain pay, crew pay, and percentage of gross vessel revenues paid to crew by vessels participating in both the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (1998, 2001, 2004, 2006-2009).

Year	Number of vessels	Vessel revenues		Captain pay		Crew pay (excluding captain)		Percent of gross to crew (including captain)	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median
1998	151	1,034,471	983,861	123,019	116,947	249,953	232,979	35.9	35.3
2001	143	435,583	369,474	50,310	43,426	97,279	87,042	34.1	34.3
2004	162	620,513	583,453	72,301	69,625	148,010	135,224	35.7	35.5
2006	56	1,367,208	1,244,964	98,025	96,090	195,317	185,298	24.0	24.2
2007	55	2,210,463	1,958,662	144,081	145,564	300,238	283,862	23.0	22.4
2008	61	2,729,428	2,646,745	179,973	176,911	385,464	365,392	22.6	22.4
2009	57	2,256,501	2,090,932	141,269	138,993	308,668	272,565	21.5	20.9

Source: Crab Economic Data Reporting.

Notes: 2005 omitted, as Bering Sea *C. opilio* fishery prosecuted as limited entry derby and Bristol Bay red king crab prosecuted as share-based fishery. Excludes any vessels on which crew were paid in excess of 75 percent of the vessel's gross revenues. Adjusted for inflation using CPI-U to 2009 dollars.

Although catch consolidation has benefited remaining crew, a competing effect arose from deductions or charges against crew shares or direct reductions in crew share percentages, through which the quota costs of consolidation are effectively shared with crew. One potential means of changing crew compensation under the rationalization program is a change in deductions and charges. Although the amounts any of deductions and charges may be inaccurate in the Economic Data Reports, whether an item is deducted or charged to crew is believed to be accurately captured. These data suggest that with respect to vessel operating expenses, the percentage of the fleet imposing deductions and charges has remained relatively constant through the transition to the rationalization program.

Table 4-29 Number of vessels deducting or charging vessel operating expenses from crew compensation (1998, 2001, 2004-2009).

Year	Fuel				Food				Bait			
	Deducted	Charged	Neither	Unreported	Deducted	Charged	Neither	Unreported	Deducted	Charged	Neither	Unreported
1998	171	12	37	1	67	138	15	1	176	10	37	1
2001	176	11	32	1	63	140	15	1	180	9	34	1
2004	193	8	38	1	72	152	18	1	200	6	37	1
2006	80	4	18	0	21	69	12	0	80	4	18	0
2007	69	4	13	1	20	60	7	0	69	4	13	1
2008	80	5	10	1	17	73	6	0	78	4	12	1
2009	70	2	11	1	25	54	5	0	71	2	11	0

Year	Observers				Gear				Fish taxes			
	Deducted	Charged	Neither	Unreported	Deducted	Charged	Neither	Unreported	Deducted	Charged	Neither	Unreported
1998	48	0	97	61	38	8	160	5	199	6	15	3
2001	57	0	91	51	31	8	164	3	203	6	9	2
2004	65	0	92	56	40	10	169	6	216	9	13	2
2006	28	0	41	29	10	3	74	13	96	1	5	0
2007	22	0	17	48	6	2	57	22	82	2	2	1
2008	18	0	20	58	10	3	62	21	92	2	1	1
2009	13	0	11	60	11	1	50	22	80	1	1	2

Source: Crab EDR data

Notes: Travel costs are omitted as those data were not collected prior to implementation of the program. Freight costs are omitted, as few vessels have deducted or charged those costs in any year.

Unreported includes responses of unapplicable, uncertain, and multiple responses suggesting different treatment in different fisheries.

While the treatment of most vessel operating expenses has remained relatively constant, a notable change in deductions and charges since program implementation is the additional deduction of quota expenses. Prior to program implementation, a small portion of the fleet deducted CDQ quota expenses prior to the

payment of crew compensation. Since implementation of the program, most of the fleet deducts IFQ quota expenses. In addition, the number of vessels and percentage of the fleet deducting CDQ quota expenses has increased substantially. It is not known at this time whether this change has arisen from the redistribution of CDQ quota among more vessels, or if the change is caused by shifting of additional expenses to crew. These additional charges (particularly IFQ quota charges and deductions) are believed to be largely responsible for the decrease in the percentage of gross vessel revenues paid to crew under the program.

Table 4-30 Number of vessels deducting or charging expenses for acquired quota from crew compensation (1998, 2001, 2004-2009).

Year	CDQ				IFQ			
	Deducted	Charged	Neither	Unreported	Deducted	Charged	Neither	Unreported
1998	18	0	88	84				
2001	19	0	83	73				
2004	24	0	89	83				
2006	34	0	18	46	78	1	15	8
2007	28	0	7	52	67	1	12	7
2008	28	0	8	60	74	2	11	9
2009	22	0	1	61	66	1	4	13

Source: Crab EDR data

Unreported includes responses of unapplicable, uncertain, and multiple responses suggesting different treatment in different fisheries. One vessel is reported to have deducted IPQ costs in both years, but the nature of that cost is unknown.

Anecdotal reports reinforce this conclusion. Most vessel owners assert that these changes are applied simply to reflect the change in vessel owner revenues arising from the costly acquisition of shares to harvest. Many crew are said to have received full crew share on IFQ initially allocated to the vessel owner; however, in some cases vessel owners are reported to deduct IFQ value from revenues prior to paying crew, even for shares received in the initial allocation. The propensity to charge or deduct IFQ costs for shares received in the initial allocation is said to be increasing over time. In addition, shares paid on leased IFQ fished by a vessel are universally said to be computed after deduction of any lease payments to the IFQ owner. Consequently, the base revenues used to compute a crew payment for catch of leased IFQ were reduced by as much as 65 to 70 percent in the Bristol Bay red king crab fishery and as much as 45 to 50 percent in the Bering Sea *C. opilio* fishery. Likewise, royalties are also reported to be deducted prior to computing crew settlements on IFQ yielded by purchased QS in most cases. As a result, sellers of quota (either through leases or sales of QS) receive a large portion of the revenues from their shares. In the transfer of quota received in the initial allocation, these revenues may be used to pay outstanding vessel mortgages or other vessel related costs (if the vessel is maintained for use in other fisheries). Any remaining amounts are profits to the share holder. A vessel owner's revenues from acquisitions after the initial allocation would be used, in part, to cover the holder's cost of acquiring that quota. Although most changes in deductions, charges, and crew share percentages are to cover quota costs, anecdotal reports suggest that in some cases these changes have arisen from opportunistic vessel owners exerting negotiating leverage on crew. In these later cases, vessel owners have been able to exploit fleet contraction (and the surplus of available crew) to reduce crew compensation. Although these practices have been reported anecdotally and are suggested by the declining crew share percentages in the fisheries, data to directly assess the extent of these practices are not available.

Examining changes in crew compensation relative to pounds harvested by a vessel reinforces the conclusion that quota costs are a major contributor to declines in the percentage of gross vessel revenues paid to crew (see Table 4-31). It may be expected that vessels that harvest greater amounts of crab will incur greater quota costs (through leases of IFQ and QS purchases). The deduction of these costs prior to payment of crew will effectively reduce the percentage of gross vessel revenues paid to crew. Prior to implementation of the rationalization program, crews on all vessels appear to have received a relatively

similar share of gross vessel revenues regardless of a vessel's catch. Vessel harvests varied greatly, with crew on vessels harvesting in the highest quartile harvesting and earning between two and three times the amount harvested and earned by crew on vessels in the lowest quartile.[21]

Since implementation of the program, two changes in the distributions of vessel harvest amounts and crew payments are notable. First, vessel harvests vary more greatly across the fleet. In the Bristol Bay red king crab fishery, average harvests of vessels in the highest quartile are now between four and five times the average harvest of vessels in the lowest quartile, while in the Bering Sea *C. opilio* fishery, average harvests of vessels in the highest quartile are between five and six times the average harvests of vessels in the lowest quartile. While catch is more consolidated in all quartiles, vessels in the highest quartile are able to amass a substantially greater portion of the total catch through quota transfers (than could be amassed under the competition of the pre-rationalization derby fisheries).

The second change is in the percentage of gross vessel revenues paid to crew. In the quartile with the lowest harvests, crews have received between 3 and 4 percent less of the gross vessel revenues of the vessel on average after implementation of the rationalization program. The magnitude of this drop suggests that a substantial share of the quota harvested on these vessels is fished without deduction or charge of quota fees or any other substantial adjustment in crew share payments. In the second quartile of harvests in both fisheries, vessel harvests are approximately double those in the first quartile. Crews on these vessels are paid a lower percentage of gross vessel revenues than crews in the lowest harvesting quartile (or approximately 10 percent less than prior to the rationalization program). The effect of the additional harvests on average crew compensation, however, is greater than the lower percentage of gross vessel revenues, resulting in an increase in compensation of approximately one-third over the lowest quartile. In general, this relationship continues in the two larger harvesting quartiles. Vessel harvests generally increase by between 50 percent and 100 percent with each successive quartile. In addition, average crewmember compensation generally increases by approximately one-third on average (with a few notable and possibly important exceptions). As a result, average crewmember pay on vessels in the highest harvesting quartile are more than double that of crew in the lowest quartile, while harvests in the highest quartile are between three and five times the harvests in the lowest quartile. Crew pay as a percentage of gross vessel revenues generally declines in each successive quartile, suggesting that quota fees take an increasing share of vessel revenues as a vessel acquires additional quota to harvest. These declines result in pay to crew being over 30 percent of gross vessel revenues on vessels in the quartile harvesting the least crab and 20 percent or less of gross vessel revenues on the vessels in the quartile harvesting the most crab. Overall, these data suggest that as a vessel consolidates catch, a greater share of its harvests is subject to quota fees. The increase in catch supplements crew incomes, but at a lower rate than the vessel's initial allocation quota, which are often fished with no (or lower) quota fees.

Beyond this general trend, a few particular exceptions should be noted. In the two most recent years in the Bristol Bay red king crab fishery, vessels in the highest harvesting quartile have paid crew on average less than vessels in the third quartile, despite harvesting substantially more crab. In the most recent year, these vessels on average have paid crews less than 15 percent of gross revenues – decreasing the crew's percentage of gross revenues to less than half the prerationalization level. The specific reason for this difference is not known, but it likely arises from these vessels charging royalties or lease fee on substantially greater amounts of their catch (possibly including the any initial allocation fished by the vessel). It is possible that some of these vessels entered the fishery without the owner having access to an initial allocation, in which case, the owner may have substantially greater quota costs.

[21] It should be noted that in some instances, owners of multiple vessels are reported to have structured transfers among their own vessels as leases, charging or deducting lease fees prior to computing crew shares, in a manner similar to leases between unrelated entities.

Table 4-31 Crewmember pay and percent of gross vessel revenues paid to crew by quartile of pounds harvested in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (1998, 2001, 2004-2009).

Fishery	Year	Number of vessels per quartile	First quartile of pounds harvested			Second quartile of pounds harvested		
			Mean pounds harvested	Mean to single crewmember	Percent of gross to crew (including captain)	Mean pounds harvested	Mean to single crewmember	Percent of gross to crew (including captain)
Bristol Bay red king crab	1998	47/48	32,057	4,260	33.5	55,779	7,196	36.4
	2001	45/46	17,209	4,318	33.2	30,548	7,589	36.5
	2004	55	31,614	6,973	35.2	53,948	12,063	34.5
	2005	20/21	67,192	14,665	32.8	122,533	22,937	28.6
	2006	19	72,298	12,256	29.2	134,887	18,956	26.6
	2007	17/18	102,044	21,087	32.9	199,686	27,126	22.7
	2008	19	85,136	18,803	29.0	172,348	30,214	25.0
	2009	16/17	92,251	16,038	27.7	184,818	22,221	20.0
Bering Sea *C. opilio*	1998	40/41	710,320	19,567	37.3	1,229,896	28,437	36.0
	2001	39/40	55,000	3,040	27.4	94,065	5,857	30.7
	2004	41/42	73,679	7,121	33.9	108,465	10,836	34.7
	2005	36/37	93,280	8,239	32.4	134,285	12,444	36.1
	2006	18/19	163,023	8,052	30.2	328,713	11,465	22.4
	2007	15/16	192,282	15,270	32.4	358,559	20,854	24.5
	2008	18	307,686	19,499	27.8	555,737	32,402	24.6
	2009	17/18	300,835	15,661	27.8	512,418	23,795	24.4

Fishery	Year	Third quartile of pounds harvested			Fourth quartile of pounds harvested		
		Mean pounds harvested	Mean to single crewmember	Percent of gross to crew (including captain)	Mean pounds harvested	Mean to single crewmember	Percent of gross to crew (including captain)
Bristol Bay red king crab	1998	80,269	9,625	35.1	127,442	15,356	36.0
	2001	43,060	10,429	37.3	83,940	18,336	35.6
	2004	71,054	15,159	36.7	110,466	22,220	36.3
	2005	229,772	29,033	21.5	429,370	38,801	17.3
	2006	225,650	23,541	20.5	425,448	29,601	17.1
	2007	304,404	34,184	19.3	499,673	41,332	16.0
	2008	281,259	45,426	21.8	436,847	39,414	15.6
	2009	249,735	31,528	19.7	358,570	29,137	14.7
Bering Sea *C. opilio*	1998	1,609,405	36,349	34.7	2,219,132	49,580	36.8
	2001	140,113	8,639	34.0	254,340	15,239	33.5
	2004	145,814	14,884	36.4	231,883	20,741	35.4
	2005	171,446	15,616	35.8	297,069	20,721	34.0
	2006	511,024	16,375	21.8	903,721	23,013	20.3
	2007	519,289	25,133	21.3	963,512	36,495	19.9
	2008	815,865	35,964	21.8	1,432,385	50,529	19.2
	2009	736,305	28,703	21.0	1,311,810	40,955	19.5

Source: Crab Economic Data Reporting.
Notes: Pay to single crewmember is based on count of all crew paid shares excluding the captain. Excludes any vessels on which crew were paid in excess of 75 percent of the vessel's gross revenues. Adjusted for inflation using CPI-U to 2009 dollars.

While generally, the effects of the change to the rationalization program on crew have been driven by consolidation and related quota charges, it is important to recognize the effects differ across the fleet. In the most common case, crew are reported to have received historic share payments for quota received in the initial allocation by the vessel owner, supplemented with shares from the discounted base revenues on

acquired quota; however, other circumstances are said to exist, which are not directly revealed by aggregated (or available) data. In some instances, vessel owners received little quota in the initial allocation. In these instances, crew are reported to receive virtually all share payments from the discounted revenue base (i.e., after deduction of quota fees). In addition, in some instances vessel owners are reported to have charged quota fees on quota received in the initial allocation, lowering the base on which shares are calculated for all quota fished on the vessel. Depending on the level of quota fees, crew could receive substantially reduced payments from the historic shares, despite a vessel fishing mostly quota received in the initial allocation. Although some instances of crew compensation moving away from a traditional crew share format to a wage labor or salary format were reported in the first year of the program, it is believe that the most (if not all) crew in the fisheries are currently paid on a traditional crew share basis. It remains to be seen whether the trend of declining crew shares will continue as recipients of initial allocations depart from the fishery (or if those share holders actively fishing their quota, attempt to charge crew for the harvest of shares received in the initial allocation).

An additional factor to consider in assessing crew compensation under the rationalization program is the change in daily compensation. If only fishing, transiting, and offloading days are considered, crew appear to suffered a decline in daily compensation under the rationalization program; however, such an approach assumes that crew work no additional days in preparation for a season or at the end of a season. If each crewmember is assumed to work an additional 10 days on the vessel and gear, the conclusion is far less clear, with crew daily compensation in a similar range to prerationalization daily pay.[22] This relative equivalence (or ambiguity) arises from several competing effects. Prior to the program, crews spent few days fishing, so days spent on vessel and gear work made up a greater share of their time. Since the program was implemented, vessels have stacked substantially greater catches on the remaining active vessels increasing the revenue base on the average vessel. These two factors, on average, counterbalance the effect of quota royalties (or the reduced share of gross revenues paid to crew) that has diminished crew pay.[23]

[22] The number of days working on a vessel outside of the fishing days is not known; however, Coast Guard safety studies have assumed approximately 10 days per season working on a vessel and gear work, plus additional time transiting to and from ports prior and after the season.

[23] Another study using EDR data concluded unequivocally that the majority of remaining crew received greater daily pay during the first three years of the program, when compared to the three reported prerationalization years (Abbott, Wilen, and Garber Yonts, forthcoming). This result seems to be driven by the estimates of time working outside of the reported time fishing, transiting, and offloading; however, the paper's description of the methodology for that estimation is not specific. In addition, the conclusion is sensitive to crab prices, but adjusting for prices does not resolve the ambiguity of the outcome in this analysis, as daily returns remain within the historic range after the adjustment. Otherwise, the paper's conclusions are generally not inconsistent with the discussion in this paper.

Table 4-32 Daily crew compensation in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (1998, 2001, 2004, and 2005-2009)

Fishery	Year	Number of vessels	Fishing, transiting and offloading			Fishing, transiting and offloading plus 10 days boat and gear work		
			Mean number of days	Mean daily captain pay ($)	Mean daily crew member pay ($)	Mean number of days	Mean daily captain pay ($)	Mean daily crew member pay ($)
Bristol Bay red king crab	1998	190	8.0	3,019	1,190	18.0	1,293	511
	2001	182	6.1	4,555	1,799	16.1	1,634	643
	2004	220	7.0	5,441	2,134	17.0	2,116	833
	2005	82	26.4	2,927	1,148	36.4	1,948	755
	2006	76	22.3	2,669	1,060	32.3	1,703	673
	2007	69	32.4	2,647	1,057	42.4	1,922	766
	2008	75	32.6	2,673	1,149	42.6	1,935	831
	2009	66	31.0	2,220	926	41.0	1,557	646
Bering Sea *C. opilio*	1998	162	66.1	1,483	507	76.1	1,288	440
	2001	158	33.4	671	244	43.4	517	188
	2004	167	13.9	2,512	998	23.9	1,420	566
	2005	147	11.1	3,509	1,450	21.1	1,707	702
	2006	73	39.7	1,095	416	49.7	809	308
	2007	62	36.8	1,867	726	46.8	1,379	537
	2008	72	48.8	2,028	772	58.8	1,622	611
	2009	69	50.5	1,501	594	60.5	1,199	474

Source: Crab Economic Data Reporting.

Notes: Mean crew size is a count of all crew paid shares excluding the captain. Prerationalization fishing, transiting, and offloading days are from fishery opening until last vessel offload. Excludes any vessels on which crew were paid in excess of 75 percent of the vessel's gross revenues. Payments are adjusted for inflation using CPI-U to 2009 dollars.

Overall, data and anecdotal reports suggest that remaining crew positions in the fisheries are more stable and are generally greater total pay under the rationalization program. Crew typically know the amount of quota that will be harvested and terms of payment prior to beginning fishing, allowing them to project income for a season. Prior to implementation of the rationalization program, compensation hinged entirely on success in the limited access derby fishery. The consolidation of catch under the rationalization program has reportedly allowed some crew to rely exclusively on crab fishing for their incomes. Other crew are reported to work on the crab vessel in other fisheries or tendering, relying on employment from their crab fishing vessels for all of their income. Vessel owners hiring crew generally give priority to crew willing to work in all crab fisheries in which the vessel participates (and non-crab fisheries or tendering, if the vessel engages in those activities). These preferences have led to changes in crew composition, as some former participants are unwilling to give up other employment to work exclusively for a crab vessel. Maintaining a steady crew, however, can greatly simplify vessel management, reduce hiring costs arising from high turnover, and improve efficiency and safety, as crew become more familiar with the vessel's operation and fellow crew. Although these benefits arise for crew remaining in the fishery, many crew have lost the relatively high paying, short term work in the crab fisheries since implementation of the program.

The share of gross revenues paid to crews in the fishery has declined under the program substantially from quota leasing (and charging of royalties against revenues for quota fished on a vessel). To date, for individual active crew, the decrease is largely offset by consolidation of catch on fewer vessels. This consolidation has extended the season for crews, resulting in greater annual pay and comparable daily pay, when compared to crew pay prior to implementation of the program. Although pay has remained higher in the fishery, a steady downward trend in the percentage of gross revenues paid to crew (particularly in the Bristol Bay red king crab fishery) is suggested by crew compensation data. The trend

is most prevalent in vessels with the greatest harvests in the fishery (which also are likely to have the greatest quota acquisition costs).

4.5 Effects of the buyback

In December of 2004, eight months before fishing began under the rationalization program, NOAA Fisheries tendered payments to 25 successful bidders under a $100 million fishing capacity reduction program in the Bering Sea and Aleutian Islands crab fisheries included in the rationalization program. Each bid offered to remove a vessel from all fisheries and relinquish all associated fishing privileges (including the assigned LLP licenses) and any future privileges arising out of the fishing history of the vessel. The capacity reduction program sought to obtain the maximum sustained reduction in crab fishing capacity at the least cost by establishing a bidding procedure that would remove vessels considered to have the highest value as crab harvesting vessels per dollar bid for their removal. A bid was valued by dividing the bid by the total value of the crab caught aboard the vessel during the period specified by the program. The resulting bids were then ranked from smallest to largest bid value, with bids accepted so that the cumulative value of accepted bids would use as much of the $100 million loan as possible. The effect was to remove vessels with the greatest amount of fishing history (as specified by the buyback program) using the $100 million loan funding.

After the winning bids were announced, NMFS conducted a post bidding referendum to determine whether eligible voters authorized an industry fee system to repay the loan. The referendum succeed by receiving the required favorable votes of in excess of two-thirds of the LLP holders in the now rationalized fisheries.

Since the qualifying years under the buyback differed from those specified by the rationalization program, bids may have been valued differently under the buyback than they would have had the rationalization qualifying years been used to specify their values. At the time of the referendum, LLP holders requested that Council staff prepare revised estimates of denominators that could be used for calculating individual allocations under the rationalization program removing catch histories of the buyback vessels. Since the rationalization program was fully defined at the time of the buyback referendum, these estimates could be used by persons participating in the referendum to estimate the effects of the buyback on their initial allocations of QS. Based on the information concerning histories of the vessels included in successful bids contain in the referendum letter and the revised rationalization program denominators, LLP holders passed a referendum approving the buyback of vessels and the accompanying fees that would be imposed on landings in the crab fisheries. The result was the removal of the 25 vessels and accompanying LLPs from the crab fisheries (see Table 4-33).

Table 4-33 Licenses purchased by the capacity reduction program by fishery endorsement.

Total	Bristol Bay red king crab	Bering Sea *C. opilio* and *C. bairdi*	Pribilof red and blue king crab	St. Matthew Island blue king crab	Aleutian Island red king crab	Aleutian Island golden king crab
25	24	25	13	22	1	3

Source: Federal Register Vol. 96 No. 226, November 24, 2004.

Assessing the effects of the buyback on consolidation of fishing and QS holdings in the fisheries is not without complication. Although initial QS allocations, including and excluding the licenses removed by the buyback were calculated at the time the program was implemented, these estimates are known to have contained error. In addition, the effects of the buyback on the initial allocation to a license varied

depending on the specific annual history associated with the license. Yet, examining the evolution of the fisheries under the rationalization program provides insight into the effects of the buyback on consolidation. Since the rationalization program was implemented, QS holdings have consolidated beyond that attributable to the buyback. Similarly, fleet consolidation has removed between half and two-thirds of the vessels from each of the crab fisheries (including the 25 vessels removed by the buyback). In every fishery included in the rationalization program, fleet and quota consolidation has occurred well beyond that attributable to the buyback. In other words, persons remaining in the fisheries, who had already removed vessels and effectively acquired additional QS through the buyback, have chosen to remove additional vessels by leasing IFQ and further consolidating QS holdings, through the markets for those shares. Given that the buyback was a voluntary program, under which owners and holders voluntarily removed their vessels and licenses from the fisheries on receipt of voluntary payments of owners and holders of remaining vessels and licenses, it is likely that these person would have used the flexibility of transferable allocations to consolidate the fleet and quota holdings in the absence of the buyback. In other words, buyback vessels, likely would have been retired from the fisheries in the absence of the buyback. In addition, given the additional consolidation of the fleet and quota holdings that has occurred since the buyback, the buyback likely has had a very limited (if any) effect on the current level of consolidation in the fisheries.

Two aspects of the buyback may have led the buyback to have had minor effects on the rate of consolidation in the fisheries; however, these effects are likely to have been minor and short-lived. First, the buyback provided substantial capital at a favorable interest rate to participants wishing to buy out a portion of the fleet and remain in the fishery. Given the success of these remaining participants to secure additional capital for further consolidation, it is unlikely that this effect is great. Second, the buyback provided an organized means of removing future quota holders and capital from the fisheries. This structured removal of capital and interests from the fisheries may have accelerated the consolidation process.

The buyback may be argued to have contributed to consolidation under the rationalization program, since the buyback removed 25 vessels and licenses from the fisheries. Yet, given the substantial consolidation that occurred subsequent to the buyback in all fisheries affected by the buyback, it is unlikely that the buyback has had a notable effect on consolidation under the program.

5 PROCESSOR SHARE HOLDINGS

Prior to implementation of the rationalization program, processor entry to the crab fisheries was not subject to limit. With the implementation of the rationalization program, participation in program fisheries by processors is limited by PQS and IPQ allocations yielded annually by those PQS. Under the program, IPQ are issued annually in an amount equal to 90 percent of the annual allocation of catcher vessel owner IFQ (or approximately 87.3 percent of the catcher vessel IFQ allocation in each fishery). This section of the paper summarizes the distribution of those processing privileges under the rationalization program.

5.1 Initial allocations by region

Initial allocations of processor quota shares were substantially more concentrated than harvester quota share allocations under the program because fewer processors than vessels were active in the fisheries during the qualifying period (see Table 5-1). As in the harvest sector, concentration of initial allocations of processing privileges varied across fisheries. The Aleutian Islands fisheries, which had the least participation during the qualifying period, were the most concentrated. The Bristol Bay red king crab, Bering Sea *C. opilio*, and Bering Sea *C. bairdi* fisheries, which had the most participants during the qualifying period, were the least concentrated. The regional distribution of shares differed with landing

patterns that arose from the geographic distribution of fishing grounds and processing activities. In the Pribilof red and blue king crab fisheries, most historic processing occurred in the Pribilofs, resulting in over two-thirds of the processing allocations in those fisheries being designated for processing in the North region. Most processing in the St. Matthew Island blue king crab fishery occurred on floating processors near the fishing grounds in the North region. The Bering Sea *C. opilio* fishery allocations are split almost evenly between the North and South regions; while less than 5 percent of the Bristol Bay red king crab PQS is designated for North processing. All qualifying processing in the Eastern Aleutian Island golden king crab fishery occurred in the South region, resulting in all processing shares in that fishery (and in the Western Aleutian Islands red king crab fishery, which was based on the same history) being designated for processing in the South region. All processing allocations Western Aleutian Islands golden king crab fishery were split evenly with half required to be processed in the West region and half undesignated, which can be processed anywhere. Bering Sea *C. bairdi* processing shares are also undesignated.

The relatively low median share holding at initial allocation suggests that a large portion of the historic processing was concentrated among fewer than 10 processors in the large fisheries (the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries). In the smaller fisheries, fewer than 5 processors received a large majority of the initial allocation. The maximum allocation in each fishery was in excess of twenty percent of the pool. In the Western Aleutian Islands golden king fishery, the maximum allocation was in excess of 60 percent of the pool, double the share holdings cap. In the Eastern Aleutian Islands fishery, one allocation of approximately 45 percent of the pool was in excess of one and one-half times the cap. In only one other fishery, the St. Matthews Island blue king crab fishery, did an initial allocation exceed the cap. In that fishery, slightly greater than 30 percent of the quota was allocated to one processor.

Table 5-1 Initial allocation of processing quota shares.

Fishery	Share holdings by region						Across regions			
	Region	Percent of total allocation	QS holders	Mean holding	Median holding	Maximum holding	QS holders	Mean holding	Median holding	Maximum holding
Bristol Bay red king crab	North	2.6	3	0.85	0.23	2.31	17	5.88	1.64	22.98
	South	97.4	17	5.73	1.64	20.68				
Bering Sea *C. opilio*	North	47.0	9	5.22	5.42	15.46	20	5.00	2.08	25.18
	South	53.0	17	3.12	0.38	9.72				
Bering Sea *C. bairdi**	Undesignated	100.0	23	4.35	0.83	24.26	23	4.35	0.83	24.26
Eastern Aleutian Island golden king crab	South	100.0	8	12.50	6.04	45.91	8	12.50	6.04	45.91
Western Aleutian Island golden king crab	Undesignated	50.0	8	6.25	0.41	33.29	9	11.11	1.03	62.98
	West	50.0	9	5.56	0.49	29.69				
Western Aleutian Island red king crab	South	100.0	9	11.11	1.03	62.98	9	11.11	1.03	62.98
St. Matthew Island blue king crab	North	78.3	6	13.06	8.92	29.94	12	8.33	5.06	32.67
	South	21.7	9	2.41	1.76	7.81				
Pribilof red and blue king crab	North	67.5	6	11.26	12.01	23.28	14	7.14	3.17	24.49
	South	32.5	11	2.95	0.98	13.50				

Source: NMFS Restricted Access Management IFQ database, initial allocation of PQS.
Note: These share holdings data are publicly available and non-confidential.
* After the first year of the program the allocation in the Bering Sea *C. bairdi* fishery was divided between the Eastern and Western fisheries

5.2 Transfers

During the first five years of the program, a substantial portion of the processor quota share pools were transferred. As with harvester shares, the extent to which these transfers represent actual market transfers is uncertain, as some restructuring of processing interests occurred. In two instances, merging of significant processing interests has consolidated interests in that sector. In one case, the consolidation did not result in share transfers, but only affects the interests underlying share holdings, so that is not reflected in these data.[24] In the other case, certain shares did change named holder, which explains a large

[24] This merger did result in a processor exceeding the cap in certain fisheries. The divestiture of shares required to comply with use caps was not completed until the summer of 2008 and is not reflected in these data. Since the

part of the transfer of processing share interests shown in these data. This consolidation, however, also resulted in the transfer of a substantial interest in Eastern Aleutian Island golden king crab PQS to a new entrant, as the merged entity was required to divest of shares in that fishery to comply with the processor share holding cap. Although a substantial quantity of shares transferred in the first three years of the program, in the last two years, few shares have transferred.

Table 5-2 Processor quota share transfers (2005 through 2010).

Fishery	2005		2006		2007		2008		2009		2010		Total (as a percentage of the PQS pool)
	Number of units	Percentage of QS pool	Number of units	Percentage of QS pool	Number of units	Percentage of QS pool	Number of units	Percentage of QS pool	Number of units	Percentage of QS pool	Number of units	Percentage of QS pool	
Bristol Bay red king crab	37,557,492	9.4	14,199,170	3.6	2,111,314	0.5	37,476,122	9.4	76,888	0.0			22.9
Bering Sea *C. opilio*	83,536,499	8.3	1,470,884	0.1	1,187,339	0.1	111,614,288	11.1	3,854,430	0.4			20.1
Bering Sea *C. bairdi*	17,743,023	8.9	20,876	0.0									8.9
Eastern Aleutian Islands golden king crab	1,149,483	11.5			92,700	0.9	826,359	8.3					20.7
Eastern Bering Sea C. bairdi			3,676,006	1.8	646,562	0.3	12,152,783	6.1					17.2
Pribilof red and blue king crab	4,050,738	13.5			104,270	0.3							13.9
St. Matthew Island blue king crab	2,342,552	7.8	12,955	0.0	42,074	0.1	468,519	1.6					9.6
Western Aleutian Island golden king crab					2,269,884	5.7	18,921,690	47.3					53.0
Western Aleutian Island red king crab	16,011,075	26.7			3,404,827	5.7	76,485	0.1					32.5
Western Bering Sea C. bairdi			3,676,006	1.8	646,562	0.3	12,152,783	6.1					17.2

Source: RAM data

* Total includes Bering Sea *C. bairdi* transfers

In addition to the transfers of processor quota shares, substantial leases of annual quota (IPQ transfers) occurred in the first five years of the program. As with PQS transfers, in some cases, these leases represent shifting of shares within a corporate structure that may not reflect a true lease; yet, true leasing of interests did occur in cases. Leases are reported to have occurred for a variety of reasons. In some instances, processors elected to exchange shares (without an exchange of money) to realize production efficiencies. In other cases, processors acquired shares to increase production or to serve specific markets. As a result, the extent of leasing is not apparent, but transfer data should be considered an upper limit on leasing (as opposed to a reflection of the amount of leasing that has occurred).

merger did not change the named holder of shares, the consolidation resulting from the merger is also not reflected in the share holdings data from the current year.

Table 5-3. Transfers of individual processing quota (2005-2006 through 2009-2010).

Fishery	2005-6		2006-7		2007-8		2008-9		2009-10	
	Number of units	Percentage of IPQ pool	Number of units	Percentage of IPQ pool	Number of units	Percentage of IPQ pool	Number of units	Percentage of IPQ pool	Number of units	Percentage of IPQ pool
Bristol Bay red king crab	2,638,857	19.2	3,000,003*	25.7	4,415,037	27.5	4,548,131*	29.9	3,364,702	28.2
Bering Sea *C. opilio*	5,870,736	22.0	8,168,240*	31.3	8,533,173	18.9	13,045,755*	31.2	6,764,782	19.7
Bering Sea *C. bairdi*	230,903	19.4	Separated into Eastern and Western fisheries							
Eastern Aleutian Islands golden king crab	410,565*	18.3	129,703	5.8	769,462	18.2	756,808*	32.5	76,953	3.2
Eastern Bering Sea *C. bairdi*	Managed as a single fishery with Western *C. bairdi*		327,962*	23.8	587,924	23.2	699,439*	34.4	250,273	25.2
St. Matthew Island blue king crab	fishery closed								159,656	17.1
Western Aleutian Island golden king crab	50,290	4.4	198,240	17.4	407,101	24.9	246,344*	20.6	31,543	2.6
Western Bering Sea *C. bairdi*	Managed as a single fishery with Eastern *C. bairdi*		186,748*	23.2	371,356	23.2	376,151*	33.3	fishery closed	

Source: RAM data

* Includes transfer of PQS.

5.3 Current holdings

As in the initial allocation, PQS holdings are currently substantially more concentrated than either catcher vessel owner or catcher vessel crew QS holdings (Table 5-4). Comparing current holdings with the initial allocations suggests that some consolidation of PQS holdings has occurred since implementation of the program. Since these data do not show changes in ownership at the individual level, they do not completely describe existing holdings of processor share interests. At least one large merger occurred that is not reflected in these data, since share holdings did not change under the terms of that agreement (and divestiture required to comply with share holding caps were not completed until after these data were produced). As a consequence, consolidation may be underreported by these data. In addition, the absence of a change in ownership patterns in all fisheries except the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries suggest that changes in holdings in other fisheries were as a result of changes in the named holder of shares (which may or may not reflect a change in ownership).

Table 5-4 Current processing quota share holdings by region

pqs

Fishery	Share holdings by region					Across regions			
	Region	QS holders	Mean holding	Median holding	Maximum holding	QS holders	Mean holding	Median holding	Maximum holding
Bristol Bay red king crab	North	3	0.85	0.23	2.31	16	6.25	4.39	22.98
	South	16	6.09	4.39	20.68				
Bering Sea *C. opilio*	North	8	5.87	5.51	15.46	19	5.26	3.42	25.18
	South	17	3.12	0.38	9.72				
Eastern Bering Sea *C. bairdi*	Undesignated	21	4.76	1.85	24.26	21	4.76	1.85	24.26
Western Bering Sea *C. bairdi*	Undesignated	21	4.76	1.85	24.26	21	4.76	1.85	24.26
Eastern Aleutian Island golden king crab	South	10	10.00	5.24	45.36	10	10.00	5.24	45.36
Western Aleutian Island golden king crab	Undesignated	8	6.25	0.97	29.64	10	10.00	3.41	29.98
	West	7	7.14	0.49	26.34				
Western Aleutian Island red king crab	South	8	12.50	4.03	32.99	8	12.50	4.03	32.99
St. Matthew Island blue king crab	North	6	13.06	8.92	29.94	10	10.00	6.87	32.67
	South	7	3.09	2.08	7.96				
Pribilof red and blue king crab	North	6	11.26	12.01	23.28	13	7.69	3.87	24.49
	South	10	3.25	1.09	13.85				

Source: NMFS Restricted Access Management IFQ database, crab fishing year 2009-2010.

Note: These share holdings data are publicly available and non-confidential.

In the second year of the program a processor elected not to apply of its annual allocation of IPQ in a fishery. Under regulation, IPQ were then allocated based on PQS holdings of those PQS holders who

applied for their annual allocations. Although not a transfer of shares, this regulatory issuance has the effect of consolidating IPQ in a fishery. Since no PQS transfer occurred, share caps are not imposed on IPQ allocations. As a result, the allocation of IPQ to one PQS holder exceeded the share cap in the fishery. The Council could question whether this allocation of IPQ is consistent with the intent of the processor share allocations under the program. To the extent that a PQS holder elects not to apply for an allocation (or alternatively to transfer its shares to another person), it is unclear whether the IPQ that would have been issued for the unused PQS are protecting a processor interest as intended by the program.

6 PROCESSING SECTOR

This section reviews processing sector participation in the fisheries (including IPQ use) in the first five years of the program. The section begins with a brief discussion of participation levels before and after implementation of the program and the overall processing. The section goes on to discuss IPQ use and custom processing arrangements, to the extent that those practices are known. The section concludes with a discussion of processing operations and the distribution of processing among the participating plants.

6.1 Processor participation

In the years leading up to the rationalization program, 20 or fewer processors participated in the largest crab fisheries (see Table 4-2).[25] The largest three processors in these fisheries processed less than 15 percent of the fisheries' landings in each year (or between 2 and 3 times the mean). Processing by the median processor was approximately equal to the mean suggesting that processing in the fisheries was dominated by approximately 10 or fewer processors. Between 2 and 6 processors were active in the Aleutian Islands golden king crab fisheries in the years leading up to implementation of the program, limiting the information that may be released concerning processing in those fisheries.

[25] In the early 1990s processor participation was as much as three times higher, but waned with declines in TACs in the two major fisheries.

Table 6-1 Processing in the Bristol Bay red king crab, Bering Sea *C. opilio*, Eastern Aleutian Island golden king crab, and Western Aleutian Island golden king crab fisheries in the years leading up the implementation of the rationalization program

Fishery	Season	Plants processing	Mean		Median		Average processing of top 3 plants	
			pounds processed	as a percent of fishery	pounds processed	as a percent of fishery	in pounds	as a percent of fishery
Bristol Bay red king crab	2001	17	433,230	5.9	381,096	5.2	1,113,502	15.1
	2002	17	498,344	5.9	463,363	5.5	1,169,863	13.8
	2003	20	677,865	5.0	372,667	2.7	1,862,769	13.7
	2004	17	781,547	5.9	513,753	3.9	1,942,253	14.6
Bering Sea *C. opilio*	2002	17	1,643,446	5.9	1,422,515	5.1	4,147,694	14.8
	2003	17	1,447,451	5.9	1,438,688	5.8	3,022,202	12.3
	2004	18	1,181,935	5.6	1,025,185	4.8	2,564,168	12.1
	2005	14	1,571,915	7.1	1,525,714	6.9	3,136,110	14.3
Eastern Aleutian Islands golden king crab	2001 - 2002	4	782,102	25.0	*	*	*	*
	2002 - 2003	4	691,359	25.0	*	*	*	*
	2003 - 2004	4	725,062	25.0	*	*	*	*
	2004 - 2005	4	711,568	25.0	*	*	*	*
Western Aleutian Islands golden king crab	2001 - 2002	6	308,220	16.7	253,814	13.7	592,502	32.0
	2002 - 2003	2	881,793	50.0	*	*	NA	NA
	2003 - 2004	4	498,842	25.0	*	*	*	*
	2004 - 2005	3	624,186	33.3	*	*	NA	NA

Source: ADFG Fish tickets.
* withheld for confidentiality.

Processing distributions by community shows that Dutch Harbor shore plants attracted a majority of landings in the Bristol Bay red king crab fishery and slightly less than a majority in the Bering Sea *C. oplio*. The remainder of landings was divided primarily among Akutan and St. Paul and floaters in the Bering Sea and King Cove and Kodiak on the Gulf. In the two Aleutian Islands golden king crab fisheries, participation fluctuated between 2 and 7 processors during the years leading up to implementation of the program. Dutch Harbor and Adak supported virtually all of the processing in those fisheries (see Table 6-3).

Table 6-2 Number of processors and amounts processed by fishery and community (2001-2004/5)

Fishery	Season	Communities	Number of processors	Pounds processed	Percent of pounds processed
Bristol Bay red king crab	2001	Adak, Akutan, Floaters, King Cove	6	2,663,437	36.2
		Dutch Harbor	5	3,902,545	53.0
		Kodiak	6	798,932	10.8
	2002	Akutan, Floaters, King Cove	7	3,374,438	39.8
		Dutch Harbor	6	4,276,910	50.5
		Kodiak, St. Paul	4	820,497	9.7
	2003	Akutan, Floaters, King Cove, Sand Point	10	5,207,419	38.4
		Dutch Harbor	7	7,131,382	52.6
		Kodiak, St. Paul	5	1,218,494	9.0
	2004	Akutan, King Cove, Floaters, St. Paul, Sand Point	7	5,932,888	44.7
		Dutch Harbor	6	6,504,531	49.0
		Kodiak	4	848,879	6.4
Bering Sea *C. opilio*	2001	Akutan, King Cove, Kodiak	3	1,889,513	9.5
		Dutch Harbor	5	7,916,618	39.9
		Floaters, St. Paul	8	10,034,268	50.6
	2002	Dutch Harbor, King Cove	6	13,008,117	46.6
		Floaters, St. Paul	8	14,292,205	51.2
		Kodiak	3	638,264	2.3
	2003	Akutan, King Cove, Kodiak	3	2,162,245	8.8
		Dutch Harbor	6	10,308,648	41.9
		Floaters, St. Paul	8	12,135,777	49.3
	2004	Akutan, King Cove, Kodiak	4	2,287,481	10.8
		Dutch Harbor	6	8,714,351	41.0
		Floaters, St. Paul	8	10,273,001	48.3
	2005	Akutan, King Cove, Kodiak	3	2,206,008	10.0
		Dutch Harbor	6	9,759,358	44.3
		Floaters, St. Paul	5	10,041,444	45.6

Source: ADFG Fishtickets.

Table 6-3 Processor participation in the Eastern Aleutian Islands golden king crab and Western Aleutian Islands golden king crab fisheries (2001-2002 through 2004-2005)

Fishery	Season	Communities	Number of processors
Eastern Aleutian Islands golden king crab	2001-2002	Adak	1
		Dutch Harbor	3
	2002-2003	Adak	1
		Dutch Harbor	3
	2003-2004	Adak	2
		Dutch Harbor	3
	2004-2005	Adak	2
		Dutch Harbor	3
Western Aleutian Islands golden king crab	2001-2002	Adak	3
		Dutch Harbor	3
		Floater	1
	2002-2003	Adak	1
		Dutch Harbor	1
	2003-2004	Adak	3
		Dutch Harbor	2
	2004-2005	Adak	2
		Dutch Harbor	2

Source: ADFG Fishtickets.

Under the rationalization program, a large portion of the processing (and raw crab purchasing) is vested in the holders of processing shares. To achieve efficiencies in processing, holders of processor shares have used custom processing arrangements to process substantial portions of the landings in the fisheries. Under these arrangements, a share holder contracts for the processing of landings of crab, while retaining all interests and obligations associated with the landed and processed crab. The processor of the crab provides processing services passing on the finished product to the buyer of the crab. The buyer is obligated to pay both the fisherman for the landing, as well as taxes on the landing. Because of the prevalence of these arrangements, this section assesses both plant activities and buyer activities.

Since the rationalization program, the number of processing plants participating in the Bristol Bay red king crab fisheries declined to 11. The average processing by the top 3 plants in fishery increased to approximately 20 percent of the fishery, with the concentration of the different share types slightly higher (suggesting that the largest processors of the different share types differ). In most years, the median amount of Class A IFQ processed (as a percent of the share type) exceeded the median amounts of Class B IFQ and C share IFQ processed suggesting that a few plants dominated the Class B and C share IFQ processing.

Table 6-4 Processing by plants in the Bristol Bay red king crab fishery (2005-2006 through 2009-2010)

BBR

IFQ type	Season	Plants processing	Mean		Median		Average processing of top 3 plants	
			pounds processed	as a percent of type	pounds processed	as a percent of type	in pounds	as a percent of type
Class A	2005 - 2006	10	1,375,757	10.0	1,130,961	8.2	2,931,557	21.3
	2006 - 2007	10	1,158,447	10.0	949,379	8.2	2,485,826	21.5
	2007 - 2008	10	1,527,741	10.0	1,255,323	8.2	3,313,186	21.7
	2008 - 2009	11	1,387,959	9.1	1,067,273	7.0	3,101,270	20.3
	2009 - 2010	9	1,329,295	11.1	1,164,614	9.7	2,556,534	21.4
Class B	2005 - 2006	11	137,180	9.1	59,062	3.9	371,057	24.6
	2006 - 2007	11	116,034	9.1	118,436	9.3	210,795	16.5
	2007 - 2008	12	141,257	8.3	47,155	2.8	431,982	25.5
	2008 - 2009	11	152,048	9.1	90,189	5.4	411,921	24.6
	2009 - 2010	11	119,221	9.1	72,947	5.6	313,015	23.9
C share	2005 - 2006	12	38,265	8.3	22,649	4.9	103,619	22.6
	2006 - 2007	11	35,033	9.1	26,734	6.9	70,515	18.3
	2007 - 2008	11	47,749	9.1	29,198	5.6	125,408	23.9
	2008 - 2009	10	52,217	10.0	23,759	4.6	139,184	26.7
	2009 - 2010	9	45,872	11.1	33,065	8.0	91,859	22.3
All types	2005 - 2006	12	1,310,477	8.3	827,587	5.3	3,100,353	19.7
	2006 - 2007	12	1,103,850	8.3	783,650	5.9	2,760,604	20.8
	2007 - 2008	12	1,458,145	8.3	1,193,875	6.8	3,372,689	19.3
	2008 - 2009	11	1,587,477	9.1	1,314,644	7.5	3,212,444	18.4
	2009 - 2010	11	1,244,358	9.1	1,334,479	9.7	2,681,956	19.6

Source: RAM IFQ database.

In the first four years of the program, between 10 and 12 processors participated in the Bering Sea *C. opilio* fishery, a decline of almost 5 processors from prior to the program (see Table 6-5). While in the most recent season only 9 processing plant participated in the fishery. In general processing is concentrated to a similar level as in the Bristol Bay red king crab fishery, with the leading three plants processing approximately 60 percent of all landings.

Table 6-5 Processing by plants in the Bering Sea *C. opilio* fishery (2005-2006 through 2009-2010)

BSS

IFQ type	Season	Plants processing	Mean		Median		Average processing of top 3 plants	
			pounds processed	as a percent of type	pounds processed	as a percent of type	in pounds	as a percent of type
Class A	2005 - 2006	11	2,400,246	9.1	2,372,329	9.0	3,924,617	14.9
	2006 - 2007	9	2,881,633	11.1	2,331,253	9.0	6,074,034	23.4
	2007 - 2008	9	5,002,827	11.1	4,163,969	9.2	10,068,852	22.4
	2008 - 2009	9	4,625,702	11.1	3,860,179	9.3	8,998,056	21.6
	2009 - 2010	8	4,287,759	12.5	3,144,438	9.2	7,013,718	20.4
Class B	2005 - 2006	12	243,747	8.3	192,240	6.6	555,989	19.0
	2006 - 2007	10	287,619	10.0	254,839	8.9	595,039	20.7
	2007 - 2008	12	416,730	8.3	141,278	2.8	1,155,638	23.1
	2008 - 2009	10	462,971	10.0	238,350	5.1	1,109,841	24.0
	2009 - 2010	9	423,344	11.1	320,663	8.4	818,067	21.5
C share	2005 - 2006	12	75,449	8.3	63,174	7.0	166,724	18.4
	2006 - 2007	10	89,613	10.0	51,791	5.8	214,125	23.9
	2007 - 2008	10	160,149	10.0	63,573	4.0	411,866	25.7
	2008 - 2009	9	165,277	11.1	50,095	3.4	383,359	25.8
	2009 - 2010	9	135,496	11.1	95,322	7.8	291,013	23.9
All types	2005 - 2006	12	2,519,421	8.3	2,698,056	8.9	4,347,366	14.4
	2006 - 2007	11	2,700,638	9.1	2,115,634	7.1	6,210,576	20.9
	2007 - 2008	12	4,302,308	8.3	3,384,599	6.6	10,298,816	19.9
	2008 - 2009	11	4,340,775	9.1	3,965,391	8.3	9,231,757	19.3
	2009 - 2010	9	4,370,182	11.1	3,587,060	9.1	7,765,843	19.7

Source: RAM IFQ database.

Ten or fewer plants participated in processing in the Bering Sea *C. bairdi* fisheries in each year of the program (see Table 6-6 and Table 6-7). Since these fisheries are directly prosecuted by few vessels, the processing is slightly more concentrated than in the two largest fisheries.

Table 6-6 Processing by plants in the Western Bering Sea *C. bairdi* fishery (2005-2006 through 2009-2010)

WBT								
IFQ type	Season	Plants processing	Mean		Median		Average processing of top 3 plants	
			pounds processed	as a percent of type	pounds processed	as a percent of type	in pounds	as a percent of type
Class A	2005 - 2006	10	69,321	10.0	45,337	6.5	154,448	22.3
	2006 - 2007	6	91,470	16.7	62,614	11.4	154,396	28.1
	2007 - 2008	6	70,090	16.7	78,316	18.6	90,131	21.4
	2008 - 2009	6	15,359	16.7	7,337	8.0	27,064	29.4
Class B	2005 - 2006	7	7,815	14.3	8,122	14.8	11,633	21.3
	2006 - 2007	4	12,366	25.0	11,917	24.1	14,007	28.3
	2007 - 2008	3	8,674	33.3	*	*	8,674	33.3
	2008 - 2009	4	3,160	25.0	946	7.5	4,203	33.3
C share	2005 - 2006	6	1,859	16.7	2,133	19.1	3,086	27.7
	2006 - 2007	4	3,283	25.0	3,148	24.0	4,069	31.0
	2007 - 2008	3	3,544	33.3	*	*	3,544	33.3
	2008 - 2009	5	665	20.0	71	2.1	1,088	32.7
All types	2005 - 2006	10	75,907	10.0	49,436	6.5	165,797	21.8
	2006 - 2007	6	101,903	16.7	72,172	11.8	166,025	27.2
	2007 - 2008	6	76,199	16.7	78,316	17.1	102,194	22.4
	2008 - 2009	9	12,013	11.1	3,211	3.0	31,701	29.3

Source: RAM IFQ database.
* withheld for confidentiality

Table 6-7 Processing by plants in the Eastern Bering Sea *C. bairdi* fishery (2005-2006 through 2009-2010)

EBT								
IFQ type	Season	Plants processing	Mean		Median		Average processing of top 3 plants	
			pounds processed	as a percent of type	pounds processed	as a percent of type	in pounds	as a percent of type
Class A	2006 - 2007	6	180,952	16.7	151,177	13.9	290,613	26.8
	2007 - 2008	7	169,461	14.3	129,131	10.9	272,961	23.0
	2008 - 2009	8	162,556	12.5	149,117	11.5	283,518	21.8
	2009 - 2010	6	162,973	16.7	160,037	16.4	199,285	20.4
Class B	2006 - 2007	6	17,263	16.7	14,769	14.3	20,543	19.8
	2007 - 2008	3	48,861	33.3	*	*	48,861	33.3
	2008 - 2009	6	25,281	16.7	15,841	10.4	44,786	29.5
	2009 - 2010	6	18,325	16.7	10,889	9.9	29,661	27.0
C share	2006 - 2007	7	3,673	14.3	3,983	15.5	6,265	24.4
	2007 - 2008	4	8,246	25.0	7,874	23.9	10,696	32.4
	2008 - 2009	7	5,672	14.3	3,298	8.3	11,436	28.8
	2009 - 2010	6	4,802	16.7	3,151	10.9	8,403	29.2
All types	2006 - 2007	7	173,571	14.3	132,478	10.9	316,038	26.0
	2007 - 2008	8	170,725	12.5	134,287	9.8	300,502	22.0
	2008 - 2009	10	149,184	10.0	150,921	10.1	296,496	19.9
	2009 - 2010	7	159,514	14.3	165,744	14.8	215,930	19.3

Source: RAM IFQ database.
* withheld for confidentiality

Five or fewer processors participated in the Eastern Aleutian Island golden king crab and Western Aleutian Island golden king crab fisheries in the first five years of the program, limiting the information that may be released concerning processing in those fisheries (see Table 6-8). In all cases, fewer plants processed deliveries of Class B IFQ and C share IFQ than deliveries of Class A IFQ. Only two plants participated in the St. Matthew Island blue king crab fishery in the one year that fishery was open since implementation of the program. All of these fisheries have relatively small TACs which limit processing opportunities.

Table 6-8 Number of plants active in the Eastern Aleutian Islands golden king crab, Western Aleutian Islands golden king crab, and St. Matthew Island blue king crab fisheries (2005-2006 through 2009-2010)

AG

IFQ type	Season	Plants processing the IFQ type in the		
		Eastern Aleutian Islands golden king crab fishery	Western Aleutian Islands golden king crab fishery	St. Matthew Island blue king crab fishery
Class A	2005 - 2006	4	5	
	2006 - 2007	5	3	
	2007 - 2008	4	3	
	2008 - 2009	5	5	
	2009 - 2010	3	2	2
Class B	2005 - 2006	2	3	
	2006 - 2007	2	2	
	2007 - 2008	3	2	
	2008 - 2009	4	2	
	2009 - 2010	3	2	1
C share	2005 - 2006	3	3	
	2006 - 2007	3	2	
	2007 - 2008	2	1	
	2008 - 2009	2	2	
	2009 - 2010	3	2	1
All types	2005 - 2006	4	5	
	2006 - 2007	5	3	
	2007 - 2008	4	3	
	2008 - 2009	5	5	
	2009 - 2010	3	2	2

Source: RAM IFQ database.

In the first two years of the program, a large portion of the IPQ pool was subject to the "cooling off" provision, which required processing to occur in the community of the processing history that led to the allocation of the underlying PQS. Consequently, few changes in the distribution of processing of Class A IFQ/IPQ landings occurred in the first two years of the program. Also, entities representing the community of origin hold a right of first refusal on any transfer of the PQS and IPQ for use outside the community (see Table 6-9). This right is relatively weak because intra-company transfers are exempt from the right and the right lapses, if the IPQ are used outside of the community of origin for a period of years.

Limited information is available concerning the lapse of rights of first refusal, as no obligation to report a lapse exists. To date, rights of first refusal on PQS are believed to have lapsed in only a few instances (see

Table 6-10). Most notably, the right has lapsed with respect to the shares arising from historic processing in St. George. The St. George harbor and its entrance were damaged by a storm in 2004. In the first two years of the program, that damage was found to have prevented processing in St. George. As a consequence, under the terms specified by the rationalization program the rights of first refusal would have lapsed. However, representatives of Aleutian Pribilof Island Community Development Association, the holder of the right, reached agreements with holders of these PQS to protect the interests of St. George. In one case, PQS were acquired by the right holder. In addition, the holder of the rights on behalf of the City of Kodiak and Kodiak Island borough has also acquired PQS through a negotiated arrangement with original holder of those PQS. In at least one other case, a right holder has consented to an acquisition of PQS by another entity despite its right.

Monitoring of the lapse of community rights of first refusal is complicated by not only the absence of a reporting requirement, but also because electronic landings data do not include the location of processing, for deliveries that are made to floating processors. Instead these landings are reported as "at sea". As a result, it is possible that rights could lapse without knowledge of the community. Once the lapse of the right is established, a community would have no standing to intervene in any subsequent sales of the PQS. The Council is currently considering amendments to the right, including a possible amendment to establish the right indefinitely. Such a provision would obviate the need for information concerning lapses. The amendment, however, does not include provision for information concerning the existence of rights, in the event the Council chooses not to make rights last indefinitely. The information need could be addressed in several ways. Modification of reporting requirements would be the most comprehensive means of ensuring that locational information is available for all landings (not only those in the crab fisheries or those subject to the right of first refusal).[26] Alternatively, a regulation change could be included in any package modifying the rights of first refusal that would require any right of first refusal contract to include a provision for processors to keep communities informed of the location of any processing of IPQ covered by the right. A weak (and likely ineffective approach) could be to rely on communities to negotiate for the requirement that the PQS holder provide this information to the processor.

[26] To effectively provide this information to affected communities might require consideration of confidentiality limitations.

Table 6-9 Initial and current distribution of rights of first refusal by community.

Fishery	Region	Right of first refusal boundary	Percentage of initial PQS pool	Percentage of current PQS pool
Bristol Bay red king crab	North	None	0.0	0.0
		St. Paul	2.5	2.5
	South	Akutan	19.7	19.7
		False Pass	3.7	3.7
		King Cove	12.7	7.4
		Kodiak	3.8	0.2
		None	3.4	12.2
		Port Moller	3.5	3.5
		Unalaska	50.7	50.7
Bering Sea *C. opilio*	North	None	1.0	16.0
		St. George	9.7	0.0
		St. Paul	36.3	30.9
	South	Akutan	9.7	9.7
		King Cove	6.3	6.3
		Kodiak	0.1	0.0
		None	1.8	2.0
		Unalaska	35.0	35.0
Eastern Aleutian Island golden king crab	South	Akutan	1.0	1.0
		None	0.9	7.8
		Unalaska	98.1	91.2
Pribilof red and blue king crab	North	None	0.3	0.3
		St. George	2.5	0.0
		St. Paul	64.8	67.3
	South	Akutan	1.2	1.2
		King Cove	3.8	3.8
		Kodiak	2.9	2.9
		Unalaska	24.6	24.6
St. Matthew Island blue king crab	North	None	64.6	64.6
		St. Paul	13.8	13.8
	South	Akutan	2.7	2.7
		King Cove	1.3	1.3
		None	0.0	0.0
		Unalaska	17.6	17.6

Source: RAM PQS data, 2009-2010

Despite the end of the cooling off period and the ease with which the right of first refusal may be avoided, a large share of the processing of IPQ landings are believed to have continued to be made in the community of origin. Three factors likely contribute to this distribution of processing. First, in many cases, shore-based processing capital was used to develop the history leading the PQS allocation. That capital continues to be used for processing in most of the fisheries by the initial recipient of the PQS allocation. The regionalization of PQS strictly limits the movement of processing across regional boundaries. In addition, to date, most processors have acknowledged a community interest in processing of landings using their IPQ, and report that they have continued to process those landings in the community of origin. Whether this acknowledgement of community interests will persist is not known. In the case of IPQ designated for processing in the North region, processing has effectively been required to occur in St. Paul, the only available location for processing in the North region to date. Further discussion of community effects are contained in the Social Impact Assessment, attached as Appendix A. In addition, the analysis of potential amendments to rights of first refusal currently being considered by the Council contains additional information on rights of first refusal and those possible changes.

Table 6-10. Reported discontinued rights of first refusal (2009-2010).

Fishery	Former beneficiary of the right	Percentage of PQS pool
Bristol Bay red king crab	King Cove*	5.3
	Kodiak*	3.5
Bering Sea *C. opilio*	St. George**	9.7
	St. Paul*	5.4
	Kodiak*	0.1
Eastern Aleutian Islands golden king crab	Unalaska***	6.9
Pribilof Island blue king crab	St. George**	2.5
St. Matthew Island blue king crab	Kodiak*	0.0

Source: RAM PQS data, 2009-2010

* PQS held by former right holder.

** Portion of the PQS held by former right holder.

*** PQS transfer occurred with consent of the former right holder.

Little information concerning the extent of processing in specific communities can be released because of the limited number of processors that participate in the crab fisheries. By aggregating across communities, some information can be gleaned concerning the distribution of processing across communities. In the first year of the program, approximately equal percentages of Class A IFQ, Class B IFQ, and C share IFQ deliveries were processed in Dutch Harbor and Akutan, collectively, and King Cove and Kodiak, collectively; however, in the Bering Sea *C. opilio* fishery, Dutch Harbor and Akutan, collectively, received a substantially greater percentage of Class B IFQ and C share IFQ deliveries than Class A IFQ deliveries. Since deliveries of Bering Sea *C. bairdi* were not subject to the 'cooling off' period landing requirements, the distribution of Class A IFQ/IPQ landings in the first year were not largely predictable. Approximately one-third of the Class A IFQ/IPQ landings in the fishery were processed in Dutch Harbor. A substantially greater share of Class B IFQ and C share IFQ were processed in that community (see Table 6-11).

Table 6-11 Processing by share type and community (2005-2006)

Fishery	Community	Class A IFQ			Class B IFQ			C share IFQ		
		Number of active plants	Pounds of share type processed	Percent of share type processed	Number of active plants	Pounds of IPQ landings processed	Percent of IPQ pool processed	Number of active plants	Pounds of IPQ landings processed	Percent of IPQ pool processed
Bristol Bay red king crab	Akutan	1	8,548,391	62.2	1	958,658	63.5	1	296,099	64.5
	Dutch Harbor	3			3			3		
	Floater	2	*	*	2	*	*	2	*	*
	King Cove	1	3,242,970	23.6	1	370,538	24.6	1	102,567	22.3
	Kodiak	2			2			2		
	Sitka							1	*	*
	St. Paul	1	*	*	1	*	*	1	*	*
Bering Sea *C. opilio*	Akutan	1	12,186,788	45.9	1	1,964,551	67.2	1	688,401	76.0
	Dutch Harbor	4			4			4		
	Floater	4	*	*	3	*	*	3	*	*
	King Cove	1	*	*	1	355,650	12.2	1	116,054	12.8
	Kodiak	1	*	*	2			2		
	St. Paul	1	*	*	1	*	*	1	*	*
E. Aleutian Islands golden king crab	Dutch Harbor	3	*	*	2	*	*	3	*	*
	Floater	1	*	*						
W. Aleutian Islands golden king crab	Adak	1	*	*	1	*	*	1	*	*
	Dutch Harbor	2	*	*	2	*	*	2	*	*
	Floater	2	*	*						
Western Bering Sea *C. bairdi*	Akutan	1	*	*	1	*	*	1	*	*
	Dutch Harbor	4	329,999	27.8	3	32,967	60.3	3	5,016	45.0
	Floater	2	*	*	1	*	*	1	*	*
	King Cove	1	*	*						
	Kodiak	1	*	*	1	*	*			
	St. Paul	1	*	*	1	*	*	1	*	*

Source: RAM IFQ data and RCR permit file.
* withheld for confidentiality.
Note: For Class A IFQ shows percentage of IPQ pool.

In Bristol Bay red king crab fishery in the second year of the program, the percent of deliveries processing of Class B and C share IFQ was slightly lower than the percentage of Class A IFQ deliveries processed in Dutch Harbor and Akutan (see Table 6-12). In addition, the percentage of Class B IFQ and C share IFQ processing in these communities dropped from the previous year. The percentage of Class B and C share IFQ deliveries processed in King Cove and Kodiak exceeded the percent of Class A IFQ deliveries processed in those communities in that year. King Cove and Kodiak appear to have processed Class B and C share IFQ landings lost to Dutch Harbor and Akutan. In the Bering Sea *C. opilio* fishery, processing of Class B IFQ and C share IFQ deliveries exceeded the percentage of Class A IFQ deliveries processed in Dutch Harbor and Akutan, collectively, by approximately one-third. In the Eastern Bering Sea *C. bairdi* fishery, more than one-half of the Class A IFQ/IPQ processing occurred in Dutch Harbor. That community also drew approximately 60 percent of the Class B IFQ processing and approximately 70 percent of the C share IFQ processing. In the Western Bering Sea *C. bairdi* fishery, Dutch Harbor also attracted approximately one-half of the processing of Class A IFQ/IPQ landings.

Table 6-12 Processing by share type and community (2006-2007)

Fishery	Community	Class A IFQ			Class B IFQ			C share IFQ		
		Number of active plants	Pounds of share type processed	Percent of share type processed	Number of active plants	Pounds of IPQ landings processed	Percent of IPQ pool processed	Number of active plants	Pounds of IPQ landings processed	Percent of IPQ pool processed
Bristol Bay red king crab	Akutan	1	7,316,578	62.8	1	740,833	58.0	1	226,044	58.7
	Dutch Harbor	3			4			4		
	Floater	2	*	*	1	*	*	1	*	*
	King Cove	1	2,726,317	23.4	1	421,251	33.0	1	133,047	34.5
	Kodiak	2			3			3		
	St. Paul	1	*	*	1	*	*	1	*	*
Bering Sea *C. opilio*	Akutan	1	12,055,242	46.2	1	2,159,053	75.1	1	629,685	70.3
	Dutch Harbor	3			4			4		
	Floater	2	*	*	2	*	*	2	*	*
	King Cove	1	*	*	1	*	*	1	*	*
	Kodiak	1	*	*	2	*	*	2	*	*
	St. Paul	1	*	*						
E. Aleutian Islands golden king crab	Akutan	1	*	*						
	Dutch Harbor	4	*	*	2	*	100.0	3	*	100.0
W. Aleutian Islands golden king crab	Adak	1	*	*						
	Dutch Harbor	2	*	*	2	*	100.0	2	*	100.0
Western Bering Sea *C. bairdi*	Akutan	1	*	*	1	*	*	1	*	*
	Dutch Harbor	3	280,116	34.9	3	*	*	3	*	*
	Floater	1	*	*						
	King Cove	1	*	*						
Eastern Bering Sea *C. bairdi*	Akutan	1	*	*	1	*	*	1	*	*
	Dutch Harbor	3	615,168	44.8	3	61,085	59.0	4	19,000	73.9
	Floater	1	*	*	1	*	*	1	*	*
	King Cove	1	*	*	1	*	*	1	*	*

Source: RAM IFQ data and RCR permit file.
* withheld for confidentiality.
Note: For Class A IFQ shows percentage of IPQ pool.

In the third year of the program, with the lapse of the 'cooling off' provision requirements, some redistribution of processing of Class A IFQ landings is apparent. Dutch Harbor and Akutan, collectively, attracted slightly more Class A IFQ landings and a substantially larger majority of the Class B and C share IFQ landings than in the two preceding years (see Table 6-13). These landings returned King Cove and Kodiak, collectively, to a percentage of C share IFQ processing observed in the first year of the program, but reduced their processing of Class B IFQ crab to a level lower than the first year level. Akutan and Dutch Harbor also drew a substantial percentage of Class B and C share IFQ in the Bering Sea *C. opilio* fishery in the third year of the program; however, processing of A share IFQ in those communities dropped substantially (by approximately 25 percent) from the previous two years. In the Eastern Bering Sea *C. bairdi* fishery, Dutch Harbor attracted slightly less than one-half of the Class A IFQ/IPQ processing and processed all Class B IFQ and C share IFQ landings.

Table 6-13 Processing by share type and community (2007-2008)

2007-2008										
		Class A IFQ			Class B IFQ			C share IFQ		
Fishery	Community	Number of active plants	Pounds of share type processed	Percent of issued shares processed	Number of active plants	Pounds of share type processed	Percent of landings of share type	Number of active plants	Pounds of share type processed	Percent of landings of share type
Bristol Bay red king crab	Akutan	1	10,141,102	66.4	1	1,395,927	82.4	1	359,073	68.4
	Dutch Harbor	4			4			4		
	Floater	1	*	*	1	*	*	1	*	*
	King Cove	1	2,931,636	19.2	1	204,118	12.0	1	118,397	22.5
	Kodiak	2			3			3		
	St. Paul	1	*	*	1	*	*	1	*	*
Bering Sea *C. opilio*	Akutan	1	15,364,728	34.1	1	4,466,230	89.3	1	1,400,046	87.4
	Dutch Harbor	3			4			4		
	Floater	2	*	*	2	*	*	2	*	*
	King Cove	1	*	*	1	378,219	7.6			
	Kodiak	1	*	*	3			2	*	*
	St. Paul	1	*	*	1	*	*	1	*	*
E. Aleutian Islands golden king crab	Dutch Harbor	4	2,241,690	99.9	3	*	*	2	*	*
W. Aleutian Islands golden king crab	Adak	1	*	*	1	*	*			
	Dutch Harbor	2	*	*	1	*	*	1	*	*
Western Bering Sea *C. bairdi*	Dutch Harbor	2	*	*	2	*	*	2	*	*
	Floater	2	*	*	1	*	*			
	King Cove	1	*	*						
	St. Paul	1	*	*				1	*	*
Eastern Bering Sea *C. bairdi*	Akutan	1	*	*						
	Dutch Harbor	3	695,543	27.5	3	146,584	100.0	4	32,984	100.0
	Floater	2	*	*						
	King Cove	1	*	*						

Source: RAM IFQ data and RCR permit file.
* withheld for confidentiality.
Note: For Class A IFQ shows percentage of IPQ pool.

To the extent that data may be released, the distribution of landings from the Bristol Bay red king crab fishery among communities remained largely unchanged in the 2008-2009 season, with the exception of an increase in C share landings in Dutch Harbor and Akutan (see Table 6-14). Those two communities also attracted a slightly larger share of the landings in the Bering Sea *C. opilio* fishery in the 2008-2009 season.

Table 6-14 Processing by share type and community (2008-2009)

2008-2009										
		Class A IFQ			Class B IFQ			C share IFQ		
Fishery	Community	Number of active plants	Pounds of share type processed	Percent of issued shares processed	Number of active plants	Pounds of share type processed	Percent of landings of share type	Number of active plants	Pounds of share type processed	Percent of landings of share type
Bristol Bay red king crab	Akutan	1	10,167,245	66.6	1	1,409,783	84.3	1	460,873	88.3
	Dutch Harbor	4			4			4		
	Floater	1	*	*	1	*	*	1	*	*
	King Cove	1	*	*	1	*	*	1	*	*
	Kodiak	2	*	*	2	*	*	1	*	*
	St. Paul	1	*	*	1	*	*	1	*	*
Bering Sea *C. opilio*	Akutan	1	12,650,952	30.4	1	3,995,669	86.3	1	1,341,384	90.2
	Dutch Harbor	3			4			4		
	Floater	2	*	*	2	*	*	2	*	*
	King Cove	1	*	*	1	*	*	1	*	*
	Kodiak	1	*	*	1	*	*			
	St. Paul	1	*	*	1	*	*	1	*	*
E. Aleutian Islands golden king crab	Akutan	1	*	*						
	Dutch Harbor	4	*	*	4	258,137	100.0	2	*	*
W. Aleutian Islands golden king crab	Adak	1	*	*	1	*	*			
	Dutch Harbor	3	*	*	1	*	*	2	*	*
	Floater	1	*	*						
Western Bering Sea *C. bairdi*	Akutan							1	*	*
	Dutch Harbor	3	17,537	1.6	3	*	*	2	*	*
	Floater	2	*	*				1	*	*
	King Cove	1	*	*						
	St. Paul				1	*	*	1	*	*
Source: RAM IFQ data and RCR permit file.										
* withheld for confidentiality.										
Note: For Class A IFQ shows percentage of IPQ pool.										

In the 2009-2010 season, Dutch Harbor and Akutan maintained a similar portion of landings in the Bristol Bay red king crab fishery as in the previous seasons (see Table 6-15). The share of the fishery landed in Kodiak and King Cove declined relative to preceding years for which data could be released. In the Bering Sea *C. opilio* fishery, the share of the fishery landed in Dutch Harbor and Akutan decline slightly.

Table 6-15 Processing by share type and community (2009-2010)

2009-2010										
		Class A IFQ			Class B IFQ			C share IFQ		
Fishery	Community	Number of active plants	Pounds of share type processed	Percent of issued shares processed	Number of active plants	Pounds of share type processed	Percent of landings of share type	Number of active plants	Pounds of share type processed	Percent of landings of share type
Bristol Bay red king crab	Akutan	1	7,925,342	66.0	1	1,040,198	79.3	1	284,719	69.0
	Dutch Harbor	3			3			3		
	Floater	1	*	*	1	*	*	1	*	*
	King Cove	1	2,569,847	21.4	1	135,009	10.3	1	85,747	20.8
	Kodiak	2			4			2		
	St. Paul	1	*	*	1	*	*	1	*	*
Bering Sea *C. opilio*	Akutan	1	11,960,763	34.9	1	2,758,259	72.4	1	872,194	71.5
	Dutch Harbor	3			3			3		
	Floater	2	*	*	2	*	*	2	*	*
	King Cove	1	*	*	1	*	*	1	*	*
	Kodiak				1	*	*	1	*	*
	St. Paul	1	*	*	1	*	*	1	*	*
E. Aleutian Islands golden king crab	Dutch Harbor	3	2,353,325	99.9	3	261,701	100.0	3	83,934	100.0
W. Aleutian Islands golden king crab	Dutch Harbor	3	1,134,366	94.7	2	*	*	2	*	*
St. Matthew Island blue king crab	Dutch Harbor	1	*	*	1	*	*	1	*	*
	St. Paul	1	*	*						
Eastern Bering Sea *C. bairdi*	Akutan	1	*	*	1	*	*	1	*	*
	Dutch Harbor	3	437,788	44.2	3	83,414	75.9	3	12,311	42.7
	Floater	1	*	*	1	*	*	1	*	*
	King Cove	1	*	*						
	Kodiak				1	*	*	1	*	*
Source: RAM IFQ data and RCR permit file.										
* withheld for confidentiality.										
Note: For Class A IFQ shows percentage of IPQ pool.										

6.2 Summary of leasing and custom processing arrangements

Short term transfers under leases and custom processing arrangements are the primary means by which PQS holders in the crab fisheries have achieved consolidation under the rationalization program. This section examines the use of leasing and custom processing in the fisheries under the rationalization program.

In each of the first five years of the program, as much as 20 to 30 percent of the IPQ pools in some fisheries were leased (see Table 5-2). The extent of these leases suggests that some holders of PQS chose not to be active in processing in a given year, instead leasing their IPQ to realize benefits of consolidation. In addition to those more traditional leasing transactions, some portion of these leases is believed to be movement of shares to achieve efficiencies among active processors. For example, an IPQ holder operating a plant in the North may choose to exchange its South IPQ for another IPQ holder's North IPQ to achieve efficiencies and consolidate processing of its holdings. Leasing arrangements, however, are not the only means to achieving consolidation in the fisheries.

Custom processing arrangements are particularly attractive to IPQ holders who have identified markets for sales, but wish to achieve efficiencies in processing. Under these arrangements, the IPQ holder can contract for processing services, maintaining its interest in the crab and processed products. Custom processing is particularly appealing for processing in remote regions, where an IPQ holder may have an obligation to process and few fully operational shore plants exist. In these areas, a cost effective means of processing is for IPQ holders to consolidate processing in one or two plants reducing the cost of capital and labor (including the costs of moving crews and supplies to the remote location).

The prevalence of custom processing relationships is evident in comparing the number of active IPQ accounts with the number of active processing plants. In the first year of the program, custom processing of IPQ occurred most prominently in North region of the Bering Sea *C. opilio* fishery (see Table 6-16). Custom processing arrangements in that fishery expanded in the second year of the program and appear to have declined in the third year and remained constant since. The decline may have occurred as relationships between plants and share holders stabilized, with fewer share holders having relationships with more than one plant. Few custom processing arrangements existed in the Bristol Bay red king crab fishery until the third year of the program, when Dutch Harbor plants entered relationships with several buyers. Few custom processing arrangements exist in other fisheries; however, it is possible that extensive custom processing may have occurred under any of those arrangements. Data cannot be revealed on these processing arrangements because of the relatively few processing participants in the fisheries.

Table 6-16 Number of active IPQ holder (buyer) accounts and IPQ processing plants by fishery (2005-2006 though 2009-2010)

Fishery	Region	Community of Plant	2005 - 2006		2006 - 2007		2007 - 2008		2008 - 2009		2009 - 2010	
			Number of active IPQ holder accounts	Number of active plants	Number of active IPQ holder accounts	Number of active plants	Number of active IPQ holder accounts	Number of active plants	Number of active IPQ holder accounts	Number of active plants	Number of active IPQ holder accounts	Number of active plants
Bristol Bay red king crab	North	St. Paul	1	1	1	1	2	1	1	1	2	1
	South	Akutan	1	1	1	1	2	1	1	1	2	1
		Dutch Harbor	3	3	3	3	7	4	7	4	4	3
		King Cove	1	1	3	1	1	1	1	1	2	1
		Kodiak	2	2	2	2	2	2	2	2	2	2
		Floater	2	2	2	2	2	1	2	1	1	1
Bering Sea *C. opilio*	North	St. Paul	1	1	1	1	5	1	5	1	5	1
		Floater	6	3	14	2	3	1	2	1	2	1
	South	Akutan	1	1	1	1	1	1	1	1	1	1
		Dutch Harbor	5	4	7	3	4	3	3	3	4	3
		King Cove	1	1	1	1	1	1	1	1	1	1
		Kodiak	1	1	1	1	1	1	1	1		
		Floater	1	1			3	1	2	1	2	1
E. Aleutian Islands golden king crab	South	Akutan			1	1			1	1		
		Dutch Harbor	3	3	4	4	4	4	4	4	6	3
		Floater	1	1								
W. Aleutian Islands golden king crab	Undesignated	Adak	1	1								
		Dutch Harbor	2	2	2	2	2	2	4	3	4	2
		Floater							1	1		
	West	Adak	2	1	2	1	1	1	2	1		
		Dutch Harbor*									2	1
		Floater	3	2								
Eastern Bering Sea *C. bairdi*	Undesignated	Akutan	Fishery closed		1	1	1	1	1	1	2	1
		Dutch Harbor			5	3	4	3	3	3	5	3
		King Cove			1	1	1	1	1	1	2	1
		Floater			1	1	2	2	4	2	2	1
Western Bering Sea *C. bairdi*	Undesignated	Akutan	1	1	1	1					Fishery closed	
		Dutch Harbor	4	4	5	3	3	2	3	3		
		King Cove	1	1	1	1	1	1	1	1		
		Kodiak	1	1								
		St. Paul	1	1			3	1				
		Floater	4	2	1	1	3	2	3	2		
St. Matthew Island blue king crab	North	St. Paul	Fishery closed								5	1
	South	Dutch Harbor									1	1

Source: RAM IFQ data and RCR permit file.

* Processed under the exemption from regional delivery requirements.

6.3 Processor operations

As with harvesters one of the primary changes in operations under the rationalization program is the distribution of landings among processors and throughout the season. Prior to the rationalization program in the two largest fisheries, deliveries were concentrated in a very short period (see Table 6-17). In the Bristol Bay red king crab fishery, all deliveries were received in a period of one week or less, except in 2003, when a processor received its last delivery approximately 15 days after its first delivery under a special authorization. In four of five seasons leading up to the rationalization program in the Bering Sea *C. opilio* fishery, all landings were completed in fewer than 20 days. In the Eastern Aleutian Islands golden king crab fishery, all landings were completed in less than one month in the seasons leading up to implementation of the program. In the Western Aleutian Islands golden king crab fishery, landings were spread over a substantially longer period in the seasons prior to implementation of the program. In that fishery, the average time between first and last landings for processors was approximately 3 months or more.

Table 6-17 Days between first and last delivery by processor prior to implementation of the rationalization program

Fishery	Season	Number of plants receiving one delivery	Number of plants receiving multiple deliveries	Average days between first and last delivery	Median days between first and last delivery	Maximum days between first and last delivery
Bristol Bay red king crab	2001	3	14	3.2	3.0	7
	2002	2	15	2.9	3.0	5
	2003	0	20	4.3	4.0	15
	2004	1	16	4.6	5.0	7
Bering Sea *C. opilio*	2001	0	16	8.9	7.5	16
	2002	1	16	17.9	20.5	38
	2003	1	16	10.6	9.5	17
	2004	2	16	8.9	8.0	16
	2005	1	13	9.0	10.0	14
Eastern Aleutian Islands golden king crab	2001-2002	1	3	24.0	22.0	28
	2002-2003	0	4	17.3	17.0	24
	2003-2004	0	4	19.5	20.0	22
	2004-2005	0	4	12.8	9.5	25
Western Aleutian Island golden king crab	2001-2002	2	4	91.8	83.5	179
	2002-2003	0	2	173.0	173.0	191
	2003-2004	1	3	85.3	92.0	154
	2004-2005	1	2	97.5	97.5	122

Source: ADFG Fish tickets.
Note: Mean and medians exclude processors receiving a single delivery.

The distribution of landings across a longer time period under the rationalization program is apparent, when considering the number of days between first and last deliveries in each fishery on a processor basis (see Table 6-18). In the Bristol Bay red king crab fishery, most landings continue to be concentrated in a relatively short period in the fall; however, the processing season is considerably longer than prior to the rationalization program. In the North region, the average number of days between first and last deliveries in the first year was approximately one month, but has shortened to less than two weeks in all subsequent years. Given the small allocation required to be landed in the North, this concentration of landings is important to maintaining processing efficiencies in the North. To support that processing crews need to be brought to the Pribilofs specifically to process these landings. Spreading these few landings over an extended period could be costly to the processor that must maintain crews and the plant while waiting to receive deliveries. In the South region, processing occurs over a longer period, with the average processor receiving all deliveries within five weeks. This concentration of landings benefits processors, since lines are not required to be kept sanitized for deliveries for an extended period. Crews in the South also typically work in several groundfish fisheries, aiding processors in achieving efficiencies by using crews in processing activities for the different fisheries (including groundfish and crab) as demands arise.

In the North region of the Bering Sea *C. opilio* fishery, the days between a processor's first and last deliveries has fluctuated since implementation of the program. From the outset, processors operating in the North expressed a strong preference for concentrating deliveries in a short period of time, but several factors, including general lack of familiarity with use of cooperative fishing practices may have contributed to extending processing over a period of between two and three months, in the three of the first five years of the program. In the second year of the program, a processor fire delayed the start of deliveries to the North region. By the time processing capacity came available, a substantial portion of the fleet was ready to make deliveries resulting in processing being concentrated in a relatively short period (less than one month for the average processor and less than two months for the longest operating processor). In the third and fourth years of the program, (when the TAC was substantially larger, processing was concentrated in two plants, and ice conditions delayed fishing and deliveries), the average

time between the first and last landing was between two and three months. Although the larger TACs and the concentration of processing in two plants contributed to the extended processing season, icing delayed operations requiring plants to incur the costs of maintaining inactive crews for a period of time. In the fifth year, harvesters made a coordinated effort to complete landings in the North region early in the season. The result is that processing was completed in one and one-half months. Both sectors likely benefited from this coordination of landings, as harvesters avoided ice conditions that arose later in the season and processors were able to keep crews consistently active for a shorter period. In the South region in the Bering Sea *C. opilio* fishery for the average processor, landings were distributed across a noticeably longer period, when compared to prerationalization years. This distribution of landings over time is less costly to South region processors, which process landings from groundfish fisheries (i.e., pollock and cod) during the early part of the year, when the *C. opilio* fishery is primarily prosecuted.

In the Eastern Aleutian Islands golden king crab fishery in the first five years of the program, processors generally distributed their processing over a period of between two and three months. Since most of the processors in this fishery also participate in the groundfish fisheries, the distribution of landings across a greater period of time is of less importance, as crews need not be transported to the plants exclusively for crab processing.

The average days between first and last delivery in the Western Aleutian Islands golden king crab fishery differs year to year since the rationalization program was implemented. To large extent, this extended period has arisen circumstances related to operations at the Adak plant. With the exception of the first year, that plant has been the only processing capacity in the West region. Yet, the Adak plant operator holds little of the West region PQS pool. Protracted negotiations of custom processing and leasing arrangements between PQS holders and the Adak plant operator are reported to have delayed landings in the first four years of the program. In the fifth year, the operator of the plant declared bankruptcy and was unable to process any landings from the fishery. NOAA Fisheries adopted an emergency rule (after receiving a recommendation from the Council) allowing an exemption from the West region landing requirement for all shares in the fishery. Subsequently, the Council adopted an amendment that would allow for an exemption on the agreement of QS holders, PQS holders, and the communities of Adak and Atka. That amendment should be implemented early in 2012, when the emergency rule is not longer applicable.

Table 6-18 Days between first and last delivery by processor (2005-2006 through 2007-2008)

procdelspd

Season	Fishery	Region	Number of plants receiving deliveries	Number of plants receiving multiple deliveries	Average days between first and last delivery	Median days between first and last delivery	Maximum days between first and last delivery
2005-2006	Bristol Bay red king crab	North	1	1	32.0	32	32
		South	10	9	52.6	43	88
	Bering Sea *C. opilio*	North	3	3	72.3	77	88
		South	9	7	103.1	90	202
	Eastern Aleutian Islands golden king crab	South	4	4	80.5	65	182
	Western Aleutian Island golden king crab	None	2	2	162.0	162	174
		West	3	2	77.5	77.5	116
	Western Bering Sea *C. bairdi*	None	10	9	84.1	71	167
2006-2007	Bristol Bay red king crab	North	1	1	13.0	13	13
		South	11	10	17.0	15	32
	Bering Sea *C. opilio*	North	3	3	29.0	25	60
		South	8	7	86.6	84	144
	Eastern Aleutian Islands golden king crab	South	5	4	59.0	72	82
	Eastern Bering Sea *C. bairdi*	None	7	5	95.4	151	154
	Western Aleutian Island golden king crab	None	2	2	76.5	76.5	78
		West	1	1	18.0	18	18
	Western Bering Sea *C. bairdi*	None	6	5	61.2	45	141
2007-2008	Bristol Bay red king crab	North	1	1	10.0	10	10
		South	10	10	36.3	29	84
	Bering Sea *C. opilio*	North	2	2	107.0	107	108
		South	10	9	81.9	82	119
	Eastern Aleutian Islands golden king crab	South	4	4	56.5	60	94
	Eastern Bering Sea *C. bairdi*	None	8	8	91.5	122.5	150
	Western Aleutian Island golden king crab	None	2	2	146.5	146.5	232
		West	1	1	172.0	172	172
	Western Bering Sea *C. bairdi*	None	6	6	67.7	59.5	115
2008-2009	Bristol Bay red king crab	North	1	1	12.0	12	12
		South	9	9	48.2	38	90
	Bering Sea *C. opilio*	North	2	2	84.5	84.5	108
		South	9	8	76.1	77	121
	Eastern Aleutian Islands golden king crab	South	5	5	66.4	78	106
	Eastern Bering Sea *C. bairdi*	None	9	8	87.4	105	136
	Western Aleutian Island golden king crab	None	4	3	190.3	201	238
		West	1	1	130.0	130	130
	Western Bering Sea *C. bairdi*	None	9	6	42.2	43.5	83
2009-2010	Bristol Bay red king crab	North	1	1	8.0	8	8
		South	10	9	35.2	30	91
	Bering Sea *C. opilio*	North	2	2	45.0	45	46
		South	7	7	78.3	84	149
	Eastern Aleutian Islands golden king crab	South	3	3	74.0	95	104
	Eastern Bering Sea *C. bairdi*	None	7	6	57.3	33	118
	St. Matthew Island blue king crab	North	1	1	31.0	31	31
		South	1				
	Western Aleutian Island golden king crab	None	2	2	181.5	181.5	232

Source: RAM IFQ database.

Note: Region is region of operation of the plant in the fishery. A delivery is all offloads from a vessel on a single day.

The number of deliveries received by each processor during each season also affects efficiencies in the processing sector. Receiving more, smaller deliveries may provide efficiency, if those deliveries are well-timed and spread over a longer period. Using this approach, a processor may operate at a lower level of throughput for a longer period, possibly operating fewer lines or slowing the rate of processing on a line. Yet, poorly timed deliveries over an extended period can cost a processor that must keep crews on hand and ready to receive those deliveries. Consequently, care must be taken in interpreting data concerning the effects of deliveries on processors.

In the years leading up to the program, the average processor received between 10 and 15 deliveries in the Bristol Bay red king crab fishery (see Table 6-19). The processors receiving the most deliveries received between 34 and 40 deliveries. Since the implementation of the rationalization program, deliveries per plant have changed in some fisheries. Since regional processing requirements apply to IPQ, examining the processing by region is important. With the exception of the second year of the program, processors in the South region in the Bristol Bay red king crab fishery took slightly more deliveries on average almost 20 or more deliveries. The single processor operating in the North region in this fishery received at most 10 deliveries each season.

Table 6-19 Deliveries per processor in the Bristol Bay red king crab fishery (2001 through 2009-2010)

BBR					
Season	Region	Number of plants	Average number of deliveries	Median number of deliveries	Maximum number of deliveries
2001	NA	17	13.5	8.0	39
2002		17	14.2	11.0	41
2003		20	13.1	8.0	34
2004		17	15.0	9.0	40
2005-2006	North	1	10.0	10.0	10
	South	10	22.7	23.0	50
2006-2007	North	1	7.0	7.0	7
	South	11	14.8	12.0	35
2007-2008	North	1	9.0	9.0	9
	South	10	21.7	21.0	54
2008-2009	North	1	7.0	7.0	7
	South	9	25.6	25.0	45
2009-2010	North	1	7.0	7.0	7
	South	10	19.0	23.0	38
Sources: ADFG Fish tickets and RAM IFQ database.					
Note: Region is region of operation of the plant in the fishery. A delivery is all					

In the years leading up to implementation of the program in Bering Sea *C. opilio* fishery, the average processor received between 10 and slightly more than 20 deliveries (see Table 6-20). The processors receiving the most deliveries received between 26 and 66 deliveries. Since implementation of the program, the average number of landings at each facility in the North was more than twice the average number of deliveries in the South and substantially exceeded the number of deliveries in years prior to implementation of the program. Since the IPQ in that fishery are split near 50/50 North/South, these numbers of deliveries reflect efforts on the part of processors to consolidate processing activity to achieve efficiencies in the North. In the North, little groundfish processing occurs in the winter. To achieve efficiencies, processors have consolidated processing in few plants, who receive all deliveries designated for that region. In addition, the average number of deliveries at each plant in the South is slightly higher than the average prior to the rationalization program.

Table 6-20 Deliveries per processor in the Bering Sea *C. opilio* fishery (2001 through 2009-2010)

BSS					
Season	Region	Number of plants	Average number of deliveries	Median number of deliveries	Maximum number of deliveries
2001	NA	16	16.1	19	40
2002		17	22.1	25.0	66
2003		17	14.3	17.0	31
2004		18	12.7	14.5	26
2005		14	13.3	13.5	27
2005-2006	North	3	37.0	37.0	39
	South	9	17.1	17.0	37
2006-2007	North	3	30.0	35.0	53
	South	8	17.6	13.0	44
2007-2008	North	2	80.0	80.0	101
	South	10	24.0	24.0	69
2008-2009	North	2	82.0	82.0	132
	South	9	23.3	26.0	41
2009-2010	North	2	54.5	54.5	82
	South	7	24.1	24.0	40
Sources: ADFG Fish tickets and RAM IFQ database.					
Note: Region is region of operation of the plant in the fishery. A delivery is all					

In the two Bering Sea *C. bairdi* fisheries, plants received fewer deliveries on average than in the Bering Sea *C. opilio* or Bristol Bay red king crab fisheries (see Table 6-21). This lower number of average deliveries likely arises from the relatively low TACs in these two fisheries.

Table 6-21 Deliveries per processor in the Eastern and Western Bering Sea *C. bairdi* fishery (2005-2006 through 2009-2010)

Fishery	Season	Number of plants	Average number of deliveries	Median number of deliveries	Maximum number of deliveries
Eastern Bering Sea *C. bairdi*	2006-2007	7	7.4	5.0	21
	2007-2008	8	6.3	5.5	14
	2008-2009	9	5.8	5.0	11
	2009-2010	7	5.0	6.0	8
Western Bering Sea *C. bairdi*	2005-2006	10	6.8	7.0	13
	2006-2007	6	9.2	6.5	27
	2007-2008	6	7.2	7.0	13
	2008-2009	9	5.4	2.0	22
Sources: RAM IFQ database.					
Note: A delivery is all offloads from a vessel on a single day.					

The St. Matthew Island blue king crab fishery has opened only a single season in the past 10 years. Few processors participated in this fishery—one in the North and one in the South (see Table 6-22). The plants received few deliveries as the fishery had a small TAC that was not fully harvested.

Table 6-22 Deliveries per processor in the St. Matthew Island blue king crab fishery (2009-2010)

SMB					
Season	Region	Number of plants	Average number of deliveries	Median number of deliveries	Maximum number of deliveries
2009-2010	North	1	14.0	14.0	14
	South	1	2.0	2.0	2
Sources: RAM IFQ database.					
Note: A delivery is all offloads from a vessel on a single day.					

In the years leading up to implementation of the program in the two Aleutian Islands golden king crab fisheries, the average processor received approximately 10 deliveries, except in the Western Aleutian Island golden king crab fishery in 2002-2003, when only 2 processors were active (see Table 6-23 and Table 6-24). In the Eastern Aleutian Islands golden king crab fishery and in plants outside the West region in the Western Aleutian Islands golden king crab fishery, the number of deliveries per plant has declined, likely representing consolidation of catch in fewer deliveries in the harvest sector. In the 2009-2010 season, landings were consolidated slightly in the Western Aleutian Islands golden king crab fishery, likely as a result of the emergency exemption allowing all landings to take place outside of the West region.

Table 6-23 Deliveries per processor in the Eastern Aleutian Islands golden king crab fishery (2001-2002 through 2009-2010)

EAG				
Season	Number of plants	Average number of deliveries	Median number of deliveries	Maximum number of deliveries
2001-2002	4	11.3	12.5	19
2002-2003	4	10.8	7.0	27
2003-2004	4	9.3	9.0	16
2004-2005	4	8.3	8.5	12
2005-2006	4	7.5	6.5	15
2006-2007	5	5.8	7.0	11
2007-2008	4	7.3	8.0	11
2008-2009	5	5.8	5.0	10
2009-2010	3	9.3	10.0	13
Sources: ADFG Fish tickets and RAM IFQ database.				
Note: A delivery is all offloads from a vessel on a single day.				

Table 6-24 Deliveries per processor in the Western Aleutian Islands golden king crab fishery (2001-2002 through 2009-2010)

WAG					
Season	Region	Number of plants	Average number of deliveries	Median number of deliveries	Maximum number of deliveries
2001-2002	NA	6	10.5	7.0	31
2002-2003		2	22.0	22.0	36
2003-2004		4	9.5	6.0	25
2004-2005		3	10.7	13.0	18
2005-2006	None	2	5.0	5.0	6
	West	3	3.7	4.0	6
2006-2007	None	2	4.0	4.0	5
	West	1	2.0	2.0	2
2007-2008	None	2	6.0	6.0	6
	West	1	5.0	5.0	5
2008-2009	None	4	3.0	3.0	5
	West	1	4.0	4.0	4
2009-2010	None	2	7.0	7.0	10
Sources: ADFG Fish tickets and RAM IFQ database.					
Note: Region is region of operation of the plant in the fishery. A delivery is all					

Clearly, the largest effect of the program on processing operations has arisen from the extended seasons in the fisheries. In some cases (particularly in the South region), processors have operated fewer crab lines and reduced peak operating crews. Use of fewer lines reduces both labor and capital costs associated with opening, configuring, and maintaining lines. Reductions in peak crews allow processors to save on transportation costs associated with bringing in crew for the short crab seasons. In some instances, savings on overtime labor may also be realized. In the North region, these savings are less available as plants in that area typically process only crab during the periods when the crab fisheries are open. In North plants, concentrating processing activity into a short period is needed to achieve efficiencies. With processing consolidated in fewer plants, the processing season is substantially longer, but operations are conducted in a manner similar to before implementation of the program.

Scheduling deliveries around available processing windows is critical to processor efficiencies. The importance and the success of processors in scheduling deliveries have varied across time, location, and fisheries. At times in the first year of the program, harvester/processor relationships were particularly strained by attempts of both sectors to dictate scheduling of deliveries. Although some conflicts have continued to arise, most delivery scheduling issues have been resolved to the satisfaction of both parties. In the case of processors in the North region, scheduling of deliveries is critical to maintaining processing efficiencies under the program. Harvesters are generally sensitive to these circumstances and put some effort into cooperating with processors' operational schedules. In the 2009-2010 season, harvesters put substantial effort into coordinating landings in the North region soon after the New Year. Although this effort was primarily motivated by a desire to use the North region IFQ prior to ice conditions developing in vicinity of St. Paul, North region processors benefited from the consolidation of landings that reduced down times for processing crews. Processors in the South have more latitude to move labor among crab and groundfish species production. Despite this greater flexibility, delivery scheduling occasionally causes tension between the sectors.

Processor efforts to achieve efficiencies in scheduling deliveries may conflict at times with custom processing arrangements. Although custom processing arrangements aid processors through

consolidation, the matching of shares and buyer/cooperative relationships have at times complicated delivery arrangements at plants receiving deliveries for multiple buyers.

6.4 Processing labor

Little information concerning the effects of the program on processing labor is available. The lengthening of seasons and greater distribution of landings across those seasons has reduced peak staff levels in plants in the South during the Bristol Bay red king crab and Bering Sea *C. opilio* processing seasons. Although these changes in delivery patterns, at times, mean less overtime for staff, in some instances, they may allow longer term employment, particularly for crews that work in both groundfish and crab fisheries. In addition, processors may be able to secure better trained or more suitable crews, as short term employment requirements decline. These changes can improve safety and performance in plants.

In the North region of the Bering Sea *C. opilio* fishery, processing patterns have changed under the extended seasons, but processing labor works under terms and conditions similar to those prior to rationalization. Processors attempt to concentrate deliveries to achieve efficiencies. This scheduling means plants operate at set capacity for a period of time with employees working relatively long hours and earning substantial overtime pay. Fewer persons are employed, as processing is consolidated into fewer plants, but those plants tend to operate for an extended period. Although the seasons last a few months (as opposed to a few weeks) work is short term with all employees brought in exclusively for the crab season.[27] In some cases, these employees are relatively long term employees of the processor who work in other plants. In others, they are short term employees hired exclusively for crab processing.

In the other program fisheries, most processing is done by crews that work in both groundfish and crab fisheries, with crews shifting among different species production as demands arise. These crews tend to be longer term employees, working several months for the processor. The change to rationalization has had little affect on processing workers active in these fisheries, but to the extent that rationalization has allowed fisheries to be prosecuted that might otherwise have been closed (e.g., the two Bering Sea *C. bairdi* fisheries) processing workers have benefited from additional employment.

7 CDQ GROUP AND ADAK COMMUNITY GROUP PARTICIPATION IN PROGRAM FISHERIES

Community development quota (CDQ) groups and the community group representing Adak annually receive 10 percent of the TAC of each of the program fisheries prior to allocations being made under the program. The Adak group receives 10 percent of the Western Aleutian Islands golden king crab TAC, while the CDQ groups divide 10 percent of the TAC in the other fisheries. These CDQ and Adak allocations are exempt from the crab rationalization program management and are fished under separate CDQ regulations. In addition, CDQ groups hold interests in shares issued under the program. This section examines the extent of CDQ and Adak holdings under the program and the integration of fishing of CDQ and the Adak allocations with program allocations.

7.1 CDQ and Adak community group share holdings

Both before and after implementation of the rationalization program, CDQ groups made substantial investments in the program fisheries. Three CDQ groups hold PQS directly (see Table 7-1). CDQ groups and the Adak community group have acquired PQS interests recently and may also have indirect holdings

[27] In the case of floaters used in the North region *C. opilio* fishery, some employees may remain with the plant to work in other fisheries in other areas.

of PQS. Share holdings of these groups vary by fishery, with the most substantial holding in the Western Aleutian Island golden king crab fishery, where a single group holds almost 30 percent of the PQS.

Table 7-1 CDQ group direct holdings of PQS

Fishery	CDQ groups holding PQS	PQS units	Percentage of the PQS pool
Bristol Bay red king crab	2	15,754,205	3.9
Bering Sea *C. opilio*	3	115,300,302	11.5
Eastern Aleutian Islands golden king crab	2	826,359	8.2
Eastern Bering Sea *C. bairdi*	2	15,428,486	7.7
Pribilof red and blue king crab	2	738,827	2.5
St. Matthew Island blue king crab	2	1,769,081	5.9
Western Aleutian Island golden king crab	1	12,000,000	30.0
Western Aleutian Island red king crab	0	0	0.0
Western Bering Sea *C. bairdi*	2	15,428,486	7.7

Source: RAM PQS database (2010)

Five of the six CDQ groups had direct holdings of QS during the 2009-2010 season and the sixth has indirect holdings through partnerships and joint ventures. Others are also known to have some indirect holdings. Direct holdings alone show that CDQ groups have substantial interests in most program fisheries. The Adak community group has no direct QS holdings in the program fisheries. CDQ holdings are greatest in the Eastern Aleutian Islands golden king crab fisheries, in which CDQ interests are approximately 30 percent of the QS. CDQ groups also directly hold in excess of 10 percent of the QS in both of the major fisheries (the Bristol Bay red king crab and the Bering Sea *C. opilio* fishery).

Table 7-2 CDQ group direct holdings of QS

Fishery	CDQ group holdings of catcher processor QS			CDQ group holdings of catcher vessel QS			CDQ group holdings of all QS		
	in units	as percent of operation type	as percent of fishery quota	in units	as percent of operation type	as percent of fishery quota	Number of groups holding QS	in units	as percent of fishery quota
Bristol Bay red king crab	3,905,664	22.1	1.0	35,051,013	9.4	9.3	5	38,956,677	10.3
Bering Sea C. opilio	24,764,449	27.9	2.6	85,840,632	9.7	9.1	5	110,605,081	11.7
Eastern Aleutian Islands golden king crab	0	0.0	0.0	2,780,392	30.1	29.5	3	2,780,392	29.5
Eastern Bering Sea C. bairdi	3,598,738	27.5	1.9	15,971,780	8.8	8.5	5	19,570,518	10.4
Pribilof red and blue king crab	0	0.0	0.0	1,570,592	5.4	5.5	4	1,570,592	5.5
St. Matthew Island blue king crab	0	0.0	0.0	2,566,537	8.9	9.0	4	2,566,537	9.0
Western Aleutian Islands golden king crab	0	0.0	0.0	5,132,960	24.6	13.6	3	5,132,960	13.6
Western Aleutian Islands red king crab	0	0.0	0.0	1,412,120	4.0	2.5	4	1,412,120	2.5
Western Bering Sea C. bairdi	3,598,738	27.5	1.9	15,971,779	8.8	8.5	5	19,570,517	10.4

Source: RAM QS database (2010).

Note: Includes only direct holdings of CDQ groups and wholly owned subsidiaries.

7.2 Harvest of CDQ and Adak allocations

CDQ groups may, and do, harvest their allocations using vessels of both operation types (catcher vessel and catcher processor). The distribution of catch between the operation types, however, cannot be shown

because confidentiality limits prevent disclosure of catch information of the few catcher processors that harvest CDQ allocations. The number of vessels of each operation type may be shown (see Table 7-3). As in the program fisheries, few catcher processors have actively harvested CDQ allocations, with some fisheries having no catcher processor participation in some years. In the Western Aleutian Islands golden king crab fishery, the Adak allocation is harvested exclusively by catcher vessels.

In addition, it should be noted that although an allocation of St. Matthew Island blue king crab was made to CDQ groups in 2009-2010, those allocations went unharvested. A large portion of the general allocation in that fishery also was not harvested.

Table 7-3 Participation in program and CDQ fisheries by operation type (2005-2006 through 2007-2008)

cvcdq

Fishery	Season	Participation in program fisheries		Participation in CDQ fisheries	
		by catcher vessels	by catcher processors	by catcher vessels	by catcher processors
Bristol Bay red king crab	2005-2006	88	4	11	2
	2006-2007	79	3	12	1
	2007-2008	72	3	8	2
	2008-2009	75	3	13	2
	2009-2010	69	2	10	1
Bering Sea *C. opilio*	2005-2006	76	4	13	2
	2006-2007	66	4	10	2
	2007-2008	74	4	13	2
	2008-2009	73	4	13	2
	2009-2010	67	2	11	0
Eastern Aleutian Islands golden king crab	2005-2006	6	1	3	0
	2006-2007	5	1	3	0
	2007-2008	3	1	3	0
	2008-2009	3	0	3	0
	2009-2010	3	0	3	0
Eastern Bering Sea *C. bairdi*	2006-2007	33	3	3	1
	2007-2008	19	1	2	1
	2008-2009	20	1	3	0
	2009-2010	16	1	5	0
Western Aleutian Islands golden king crab*	2005-2006	2	1	1	0
	2006-2007	2	1	2	0
	2007-2008	2	1	1	0
	2008-2009	2	1	1	0
	2009-2010	2	1	1	0
Western Bering Sea *C. bairdi*	2005-2006	42	2	6	0
	2006-2007	34	2	7	1
	2007-2008	26	1	5	1
	2008-2009	27	0	4	0

Source: RAM IFQ database.

* Adak allocation.

The integration of the harvest of CDQ allocations with program fishery allocations can be shown by examining the number and quantities of landings that include both program and CDQ allocations. In the

Bristol Bay red king crab fishery, the portion of the annual CDQ harvests landed with harvests from the program fishery allocations has fluctuated between approximately 15 percent and almost 70 percent. In the Bering Sea *C. opilio* fishery, between 25 and 40 percent of the annual CDQ harvests are landed with harvests from the program fisheries. In the other program fisheries, much of the CDQ landings data cannot be revealed because of confidentiality limitations. In most years in those fisheries, more landings comprised of exclusively CDQ harvests have been made than landings that include both CDQ and program fishery harvests. An exception is the most recent season in the Eastern Aleutian golden king crab fishery, in which all landings of CDQ allocations were integrated with program catches. Although the effects of these combined activities do not show the marketing of these landings, they suggest that CDQ groups have actively integrated fishing of their allocations with harvest of program allocations.

Table 7-4 Landings of CDQ group and Adak community group allocations (2005-2006 through 2009-2010)

cvcdq

Fishery	Season	Deliveries of combined CDQ and program harvests				Deliveries of exclusively CDQ harvests			
		Number of vessels	Number of deliveries	CDQ pounds	Percent of CDQ catcher vessel catch	Number of vessels	Number of deliveries	CDQ pounds	Percent of CDQ catcher vessel catch
Bristol Bay red king crab	2005-2006	8	11	601,781	47.3	8	12	671,790	52.7
	2006-2007	11	14	851,690	68.1	5	8	398,629	31.9
	2007-2008	7	13	799,806	51.8	6	11	743,129	48.2
	2008-2009	5	5	278,229	16.4	13	23	1,413,763	83.6
	2009-2010	7	9	566,272	40.2	7	9	841,526	59.8
Bering Sea *C. opilio*	2005-2006	8	10	1,119,106	40.7	8	14	1,631,838	59.3
	2006-2007	8	10	878,973	38.3	6	13	1,416,500	61.7
	2007-2008	8	13	1,122,248	22.9	12	27	3,779,872	77.1
	2008-2009	11	16	1,064,057	22.8	12	28	3,599,349	77.2
	2009-2010	7	12	1,660,258	35.1	10	17	3,073,831	64.9
Eastern Aleutian Islands golden king crab	2005-2006	2	2	*	*	3	4	*	*
	2006-2007	3	5	*	*	1	1	*	*
	2007-2008	2	2	*	*	2	2	*	*
	2008-2009	3	6	*	*	2	2	*	*
	2009-2010	3	7	291,800	100.0	0	0	0	0.0
Eastern Bering Sea *C. bairdi*	2006-2007	2	2	*	*	1	1	*	*
	2007-2008	1	2	*	*	1	2	*	*
	2008-2009	2	2	*	*	2	3	*	*
	2009-2010	4	4	*	*	1	1	*	*
Western Aleutian Islands golden king crab**	2005-2006	1	1	*	*	1	3	*	*
	2006-2007	1	1	*	*	2	4	*	*
	2007-2008	1	2	*	*	1	2	*	*
	2008-2009	1	1	*	*	1	3	*	*
	2009-2010	1	1	*	*	1	2	*	*
Western Bering Sea *C. bairdi*	2005-2006	5	6	94,475	60.1	4	4	62,768	39.9
	2006-2007	3	3	36,376	64.6	4	6	19,901	35.4
	2007-2008	0	0	0	0.0	5	7	21,692	100.0
	2008-2009	0	0	0	0.0	4	10	363	100.0

Source: RAM IFQ database; * withheld for confidentiality; ** Adak allocation.

8 CRAB MARKETS AND PRICES

This section briefly summarizes market conditions in the first five years of the program. A short summary of recent first wholesale prices is also included. Crab harvested in program fisheries is sold in an international market in which landings from high-volume crab producing countries such as Canada and Russia largely determine world prices. Program fisheries have accounted for only a small percentage of the overall supply in their primary markets, Japan and the United States. Consequently, the Alaska crab industry has very limited ability to influence prices for Alaska product (Herrmann and Greenberg 2006).

8.1 Red king crab markets

For the past several years the market and prices for Bristol Bay red king crab have been especially affected by Russian king crab production. In the first season of the program (2005-2006), the Russian supply of red king crab increased substantially, pushing prices for Bristol Bay red king crab down. Prices declined steadily, bottoming out in 2006 as the increase in the crab supply caused by the expansion of Russian crab exports continued. A price increase that started in late 2006 was stimulated by a sharp drop in Russian production, together with a more aggressive Japanese market and growth of king crab as a promotion item by high volume U.S. retailers (Sackton, 2007a). That recovery in prices continued in 2008 due to a persistent lack of Russian product (Urner Barry, 2008). In 2009, prices declined slightly as the effects of the financial crisis affected markets. Prices were bid up at the start of 2010 as demand began to improve and supplies (particularly supplies from Russian fisheries) remained low (Sackton, 2010).

8.2 *C. opilio* markets

In the first season of the program, the demand for Bering Sea *C. opilio* was poor in both the Japanese and U.S. markets, as buyers cut back purchases in response to high prices in 2005. Large inventories of unsold product from 2005 caused prices to plummet in 2006. Disruptions in important tourist markets in late 2004 and early 2005 (such as the unusually destructive hurricanes in the southern United States) contributed to this inventory buildup (Department of Fisheries and Oceans, Canada, 2007). Moreover, increased Canadian shipments of *C. opilio* to the United States from the Gulf of St. Lawrence and Newfoundland and record catches of Dungeness crab on the West Coast added to the downward pressure on Bering Sea *C. opilio* prices. In early 2007, Bering Sea *C. opilio* prices rebounded, stimulated in part by strong demand from U.S. and Japanese retail buyers drawn to the snow crab market by the low prices in the preceding year. In addition, the steadily declining exchange rate between the U.S. and Canadian dollar prompted many Newfoundland *C. opilio* producers to place a portion of their harvests in inventory, in hopes of higher prices in the U.S. market (Sackton, 2007c). Bering Sea *C. opilio* prices remained high in early 2008 as a result of drop in West Coast Dungeness crab production and the cut back on exports of king crab from Russia; however, by the end of that year, prices declined as inventories developed. Prices remained low throughout most of 2009. By the start of the 2010, inventories had declined and continued weak supplies from other areas led to a price increase shortly after the New Year.

8.3 *C. bairdi* markets

The 2005-2006 *C. bairdi* fishery was the first since 1996, causing some uncertainty over whether *C. bairdi* would draw a substantial premium over *C. opilio*, as it had historically. In the first few years of the program, *C. bairdi* prices have generally tracked closely with *C. opilio* prices. Inconsistent quality has likely contributed to most *C. bairdi* drawing a price similar to large *C. opilio* (Sackton, 2007c). In addition, the relatively small TACs of *C. bairdi*, have limited the extent to which its products can develop greater independence from the *C. opilio* market. . Although efforts are made to serve a specialty market, little of the recent catch from the Bering Sea fisheries is large enough to serve that market (Sackton, 2010).

8.4 Golden king crab markets

In the first season of the program, Aleutian Islands golden king crab prices declined substantially, tracking the price for red king crab products. This trend continued into the second season, as an abundance of competing small sized red king crab imports further weakened prices. In the third season, prices for golden king crab recovered, in part because of a decline in the availability of small red king crab from Russia, which competes with golden king crab. This increase in demand for golden king crab continued through the third season of the program (Sackton, 2007b). In 2008, the rise in golden king crab prices, paralleling red king crab prices, persisted. By the end of that year, sales slowed, as the primary

buyer in the market curtailed purchases due to the high price. The subsequent price drop led to increase demand, which has been maintained into the current season Sackton, 2010).

8.5 New market development/changes in existing markets

For many years, the majority of king and snow crab products from Alaska has been brine frozen and blast/plate frozen "sections" or "clusters", e.g. a group of legs and a claw from one side of a crab with the connecting shoulder still attached. Depending on the market, prior to final sale the sections may be separated into individual legs, sized, and graded.

One of the goals of the crab rationalization program is to increase the value of production from the fisheries. Some product development has occurred since the program began. A few processors and brokers have attempted to develop live and fresh crab markets in the U.S. and abroad. Processors, including catcher processors, have also produced more whole frozen crab, a small but possibly growing market. In addition, at least one processor has processed crab by breaking down sections into single legs prior to cooking to increase value and recovery. These market developments have generally focused on red king crab, the crab that is best suitable for development of new high-end markets. While these attempts to develop new markets are encouraging to some observers, overall the progress in market development has been slower than in most fisheries undergoing rationalization.

A few characteristics of the Bering Sea and Aleutian Islands crab fisheries have likely slowed product innovation. First, the requirement that all crab harvested in BSAI fisheries be processed live was in effect before the rationalization program began; consequently, the opportunities to make product quality improvements were less than those commonly observed in the transition to share-based management in other fisheries. Secondly, the distance to markets and less reliable air service in remote processing locations pose challenges to processors attempting to innovate with products with relatively short shelf lives, such as live crab and fresh crab. Thirdly, development of new product forms, such as more heavily processed products, may require significant outlay of capital or increases in labor, which may be more costly in remote Alaska communities where most of the crab from program fisheries is processed. Finally, the recent market price for shellfish sections has been so high that processors may have little incentive to produce anything else. The higher price received for value added products, such as meat, may not offset the yield loss of those products.[28] In addition to fishery-specific factors that may hinder product developments, those developments may be constrained by certain aspects of the arbitration program. These factors are discussed in the section on the arbitration system below.

[28] Product improvement may occur not only through processing practices, but also through more selective harvests or retention. Under the program, allocations are exclusive and discards are not counted against that allocation; therefore, harvesters can discard less desirable crab without risking loss of catch. In the first year of the program, the Bristol Bay red king crab fishery showed high discard rates for legal male crab (Barnard and Pengilly, 2006). It is believed that most of these discards were crab with "old" or "dirty" shells (i.e., shells that are barnacled or show other discoloration). These crab can bring substantially lower market prices, as they are less visually appealing (Sackton, 2007a). Processors, in turn, may pay harvesters less for old shell crab, particularly when this crab exceeds a certain percentage of a delivery. In response to these incentives, discard rates in the first Bristol Bay red king crab fishery under the program were substantially greater than historic discard rates for legal size male crab (Barnard and Pengilly, 2006). In the following year, ADF&G reduced the TAC in the fishery to take into account the bycatch mortality during the previous season. Since that time, discard rates have returned to levels observed prior to rationalization. This reduction in discards is believed to have arisen from processors removing price differentials based on quantities of old shell crab in a delivery and the disincentive created by the downward adjustment of the TAC to account for discards in the second year of the program.

8.6 Ex vessel prices and terms of delivery

Ex vessel pricing structures have changed under the rationalization program. To assess how changes in pricing structure have affected negotiations and pricing, the section begins with a brief discussion of pre-rationalization delivery terms (including ex vessel pricing). After that discussion, this section describes delivery terms under the rationalization program, including those terms for Class A IFQ landings and Class B and C share IFQ landings.

8.6.1 Delivery terms under the LLP

Prior to the rationalization program, harvests in most Bering Sea and Aleutian Islands crab fisheries were consolidated over a short season. Pricing practices differed somewhat between fisheries with relatively short seasons and a relatively high number of participants (such as the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries) and fisheries with fewer participants and longer seasons (such as the Aleutian Islands golden king crab fisheries). These differences in ex vessel pricing across fisheries are highlighted below.

Pricing in the Bristol Bay red king crab and Bering Sea C. opilio fisheries

In the years leading up to implementation of the rationalization program, harvesters in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries coordinated most price negotiations. Since the early 1990s, the Alaska Marketing Association (AMA) represented a substantial share of harvesters in price negotiations in the largest crab fisheries—the Bristol Bay red king crab, the Bering Sea *C. opilio*, and the Bering Sea *C. bairdi* fisheries. Informal discussions indicate that AMA membership has ranged from 25 to 95 percent of all catcher vessel owners participating in these fisheries.

Approximately one month prior to each season opening, AMA representatives met with each of the major crab processors to informally discuss the markets for crab products. Based on these discussions and information gathered through its own market research, AMA representatives would determine an expected price for crab, which it would communicate to the processors. The AMA would then solicit price offers from each processor and submit those offers to its members for a vote. This process of soliciting prices would continue until a price offer acceptable to AMA members was received. Since deliveries were unrestricted, once an acceptable offer was received from a processor all other processors usually matched that offer in order to maintain market share. Prices generally remained constant over the short seasons. In 2001, AMA members created an incentive for higher price offers in the Bristol Bay red king crab fishery by informally agreeing to reward the processor that offered the accepted price with additional deliveries. AMA members made a similar agreement for the 2002 Bering Sea *C. opilio* fishery.

If an acceptable price was not received prior to the seasoning opening, catcher vessels would not begin fishing. For example, in both the 2000 and 2001 Bering Sea *C. opilio* seasons harvesters did not begin fishing until several days after the announced opening because no processor had offered an acceptable price during pre-season price negotiations. Although not all vessel owners were members of the AMA, the entire catcher vessel fleet remained at port until an acceptable price was received by the AMA. Catcher processors, on the other hand, did not abide by these “stand downs” but began fishing at the opening of the season. These boats were unaffected by the price negotiations because they process their own crab. Fishing by catcher processors, however, had the potential to weaken the negotiating position of catcher vessels by reducing the amount of fish available for harvest after a price agreement was reached.

The pricing process in the fisheries typically established two prices—the main price applied to higher value, new shell crab (grade 1) and a secondary, lower price was established for lower value, old shell crab (grade 2). The price differential reflected the differences in prices the two grades brought in wholesale and retail markets. The ex vessel price difference between grades often varied substantially across processors. In general, the price difference averaged approximately 25 percent of the grade 1 price

($1.00 per pound for red king crab and $0.25 for *C. opilio*), but in some instances the price difference was much greater.

Although this informal system established a single price for each grade of crab, price competition among processors existed on a minor scale. Occasionally, some processors offered small bonuses (e.g., $0.05 per pound) or used different grading practices to attract additional vessels. In addition, a few harvesters preferred to handle their own price negotiations rather than be represented by the AMA.

Ex vessel pricing could also vary regionally for a number of reasons. In fisheries where vessels made several deliveries, the availability of goods and services in a delivery location can be important to harvesters. Food, bait, fuel, and good port facilities could make a processor more attractive to vessels wishing to offload harvests. Processors in locations that offer fewer goods and services were at times compelled to pay a price premium to induce harvesters to sell their catch. Processors more distant from grounds might also be required to pay a higher price to compensate harvesters for increased transiting time and costs and higher risk of deadloss (and possibly for time away from the grounds if harvesters made midseason deliveries). Proximity to markets could also influence ex vessel prices. Processors with less access to markets sometimes paid slightly less for crab because they were required to bear a higher cost to transport the crab to markets.

Pricing in the Aleutian Islands golden king crab fisheries

Historically, the Aleutian Island golden king crab fisheries had far fewer participants than the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries. Seasons in these golden king crab fisheries also lasted several months, in contrast to seasons shorter than one month in the Bristol Bay red king and Bering Sea *C. opilio* fisheries. As a result, ex vessel pricing practices differed substantially in the Aleutian Islands golden king crab fisheries.

Longer seasons in the Aleutian Islands golden king crab fisheries allow for substantial in-season price fluctuations, which are uncommon in the short season fisheries. The long seasons with fluctuating prices complicate collective negotiation of ex vessel prices by participants in the Aleutian Islands golden king crab fisheries. Traditionally, harvesters in these fisheries negotiated prices independently. Only in the last few years of LLP management recently did some harvesters use collective action to negotiate ex vessel prices for a portion of the fleet.

8.6.2 Delivery terms under the rationalization program

Several aspects of the structure of the program have affected delivery terms and pricing under the program. The different catcher vessel IFQ types (Class A IFQ v. Class B and C share IFQ) may bring different prices because of the different limitations on use of those shares and the effects of the arbitration program on Class A IFQ landing prices. Class A IFQ must be delivered to a holder of unused IPQ and are subject to the arbitration system, which guides both delivery negotiations and price formation. Class B and C share IFQ may be marketed and sold freely. Moreover, negotiations of prices and terms of delivery are likely to occur independently for the different share types to avoid potential infractions of the statute that prohibits processors from using IPQ to leverage Class B IFQ deliveries. That statute specifically provides:

> *If the Secretary determines that a processor has leveraged its Individual Processing Quota shares to acquire a harvester[']s open-delivery 'B shares', the processor's Individual Processor Quota shares shall be forfeited.*

For these reasons, the price setting and delivery terms for Class A IFQ are discussed separately from those for Class B and C share IFQ. This section begins with a detailed discussion of pricing of Class A

IFQ landings (including the arbitration system). The section concludes with a discussion of landings of Class B and C share IFQ and distributional issues related to the use of those shares. Where relevant, the interactive effects of the IFQ types on the distribution of benefits between harvesters and processors are discussed. Beginning in 2006, NOAA Fisheries collected data that show price by share type. These data, and input from fishery participants, are used to examine differences in ex vessel price by share type.

During the first five years of the rationalization program a number of outside factors created significant challenges for program fishery participants. In the first two years of the program, prices for red king crab, *C. opilio* crab, and golden king crab products were considerably lower than in the preceding years. The relatively poor market for crab economically stressed all participants in the fisheries, contributing to contentious price negotiations and lowering the financial returns of all participants. Although prices have recovered, overall economic conditions have continued to be challenging for crab markets. Shortly after the program's implementation, marine fuel prices escalated sharply, thereby substantially driving up vessel operating costs. In addition, the Bering Sea *C. opilio* fishery experienced a few specific difficulties: heavy ice at times in seasons since implementation have disrupted fishing and deliveries of landings to the Pribilofs, and a fire on a processing platform in January of 2007 disabled the facility for approximately one month. In assessing the performance of the program, these various events should be kept in mind, as they significantly affected negotiations between the fleet and processors during the initial years of the program.

8.7 Pricing and terms of Class A IFQ/IPQ deliveries

This section describes the pricing and terms of delivery of Class A IFQ landings in the first five years of the program. The arbitration system defines a procedure for matching Class A IFQ to IPQ, and the binding arbitration procedure that is available to IFQ holders who are unable to negotiate terms of delivery (including prices) for Class A IFQ/IPQ deliveries. As such, the arbitration system effectively defines the ex vessel prices of Class A IFQ landings (and has a great influence on other delivery terms). Consequently, this section largely focuses on the workings of the arbitration system.

8.7.1 Description of the arbitration system

The arbitration system serves several important purposes in the program, including dissemination of market information to facilitate negotiations, the coordination of matching Class A IFQ held by harvesters to IPQ held by processors, and a binding arbitration process to resolve terms of delivery.

The arbitration process begins with the two sectors (harvesters and processors) jointly selecting a "market analyst," who produces a market report, a "formula arbitrator," who develops a price formula specifying an ex vessel price as a portion of the first wholesale price, and a pool of "contract arbitrators," who preside over any binding arbitration proceedings. The market report and formula price are required to be released at least 50 days prior to the season opening. The market analyst and formula arbitrator (who may be the same person) generate the market report and formula price, respectively, based on any relevant information.[29] Neither the market report nor the formula price has any binding effect. Rather, they are intended to provide baseline information concerning the market and a signal of a reasonable price.

[29] The Council adopted an amendment that, if approved by the Secretary of Commerce, will allow the arbitration organizations to determine the timing and content of the market report. The amendment will allow the report and any supplements to be prepared mid-season to provide current market information. The report may rely only on publicly available information to ensure that it is not used for anticompetitive purposes. Under the current rule, private information may be used provided the information is at least three months old at the time the report is published and is aggregated from at least five independent entities.

Matching of Class A IFQ with IPQ is facilitated through a process of share commitments and dissemination of information concerning available shares. For a 5-day period starting when IFQ and IPQ are issued, shares are matched only by mutual agreement of share holders. After that period has expired, shares may be matched either by agreement or by unilateral commitment of the IFQ holder. Throughout, holders of uncommitted IPQ are required to report the amount of uncommitted shares held to holders of uncommitted IFQ (updating that report within 24 hours of any change). Although this share matching process may aid in establishing commitments to deliver and receive Class A IFQ landings, the terms of those transactions may be disputed (i.e., the commitments need not define the terms of the delivery). If the parties are unable to negotiate terms, the binding arbitration procedure may be used to resolve those terms.

An IFQ holder that is not able to resolve all terms of delivery with a processor to whom it has committed deliveries may unilaterally initiate an arbitration proceeding. Once a proceeding is initiated, harvesters that are party to the proceeding select an arbitrator to preside over the specific proceeding from the pool of arbitrators jointly selected earlier. The window for initiating arbitration is 10 days long, beginning 5 days after the allocation of IFQ and IPQ. The starting point for initiating arbitration coincides with the start of the period during which harvesters may unilaterally commit IFQ to a processor. Once an arbitration proceeding is initiated with an IPQ holder, any holder of IFQ that has committed shares to that IPQ holder may join the arbitration proceeding. This ability to join is critical because the system limits each processor to a single arbitration proceeding. A last opportunity to make use of arbitration is available for harvesters that choose not to join a proceeding. After arbitration is completed, any holder of uncommitted IFQ can bind the IPQ holder to the terms of the proceeding by committing deliveries to the IPQ holder.

Binding arbitration proceedings are conducted on a “last best offer” basis. Under this system, each party to the proceeding submits a “last best offer”. The role of the arbitrator is to select one offer from each of the two competing offers. In binding arbitration involving two or more harvesters, each harvester may either submit an independent offer or join a collective offer (as part of a Fishery Collective Marketing Act (FCMA) cooperative). The processor submits a single offer. For each harvester offer, the arbitrator’s role is to select either that harvester’s offer or the processor’s offer (which applies to all harvesters).

Since the full effects of the program on the timing of fishing and marketing activities were not predictable, the arbitration system allows participants to modify the arbitration timeline. This “lengthy season” approach allows IFQ and IPQ holders that have committed deliveries to negotiate a modified schedule for arbitration. If the parties are unable to agree on the lengthy season approach, they may arbitrate whether to adopt that approach and the timing of the proceeding. Agreements to use the lengthy season approach to arbitration must be entered into prior to the opening of a program fishery.

An important aspect of the arbitration system is the flow of information among the parties. To effectively participate in the program, holders of uncommitted IFQ need timely updates on the availability of uncommitted IPQ, the initiation of arbitration proceedings, and the outcome of these proceedings. Equally (or more) important are limitations placed on the flow of information in order to prevent potential collusive behavior. Allowing price and share holdings information, which is necessary for IFQ holders to participate in the system, to flow to IPQ holders could enable some IPQ holders to unfairly leverage their position in the limited landings market.

The arbitration program is administered through a series of contracts among share holders and arbitration organizations formed by share holders in the fisheries. These organizations are responsible for establishing the administrative aspects of the arbitration system, including selecting arbitrators, coordinating the dissemination of information concerning uncommitted shares among the participants, ensuring confidentiality of sensitive information, and collecting payments that are disbursed to cover

program costs. All share holders from both sectors are required to join an arbitration organization by May 1st of each year.[30] NOAA Fisheries will not issue IFQ or IPQ in a program fishery until arbitration organizations representing enough QS and PQS holders to account for at least 50 percent of the QS and 50 percent of the PQS issued for a fishery select the market analyst, formula arbitrator and a pool of contract arbitrators, and notify NOAA Fisheries of their selection. This requirement is intended to ensure that the arbitration system is in place prior to the start of the fishery. Separate organizations are required for harvest share holders and processing share holders. Holders of harvest shares that are affiliated with holders of processing shares are required to join an arbitration organization for purposes of facilitating share matching and administration. Due to antitrust concerns, these "affiliated harvesters" are not permitted to join an organization that includes unaffiliated harvesters and are not permitted to use a binding arbitration proceeding to settle terms of delivery.

To ensure predictability and fairness, the arbitration system sets forth standards to be followed by formula arbitrators and contract arbitrators. The specific standards applicable to the two different arbitrators follow (with substantive differences bolded):[31]

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(2) **The contract with the Formula Arbitrator must specify that:**

(i) The Formula Arbitrator will conduct a single annual fleet-wide analysis of the markets for crab to establish a Non-Binding Price Formula under which a fraction of the weighted average first wholesale prices for crab products from the fishery may be used to set an ex-vessel price; and

(ii) The Non-Binding Price Formula shall:

(A) Be based on the historical distribution of first wholesale revenues between fishermen and processors in the aggregate based on arm's length first wholesale prices and ex-vessel prices, taking into consideration the size of the harvest in each year; and

(B) Establish a price that preserves the historical division of revenues in the fishery while considering the following:

(1) Current ex-vessel prices, including ex-vessel prices received for crab harvested under Class A, Class B, and CVC IFQ permits;

(2) Consumer and wholesale product prices for the processing sector and the participants in arbitrations (recognizing the impact of sales to affiliates on wholesale pricing);

(3) Innovations and developments of the harvesting and processing sectors and the participants in arbitrations (including new product forms);

(4) Efficiency and productivity of the harvesting and processing sectors (recognizing the limitations on efficiency and productivity arising out of the management program structure);

(5) Quality (including quality standards of markets served by the fishery and recognizing the influence of harvest strategies on the quality of landings);

(6) The interest of maintaining financially healthy and stable harvesting and processing sectors;

(7) Safety and expenditures for ensuring adequate safety;

(8) Timing and location of deliveries; and

(9) The cost of harvesting and processing less than the full IFQ or IPQ allocation (underages) to avoid penalties for overharvesting IFQ and a mechanism for reasonably accounting for deadloss.

(C) Include identification of various relevant factors such as product form, delivery time, and delivery location.

(D) Consider the "highest arbitrated price" for the fishery from the previous crab fishing season, where the "highest arbitrated price" means the highest arbitrated price for arbitrations of IPQ and Arbitration IFQ which represent a minimum of at least 7 percent of the IPQ resulting from the PQS in that fishery. For purposes of this process, the Formula Arbitrator may aggregate up to three arbitration findings to collectively equal a minimum of 7 percent of the IPQ. When arbitration findings are aggregated with 2 or more entities, the lesser of the arbitrated prices of

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[30] Holders of exclusively catcher processor shares are exempt from the requirement of arbitration organization membership because they are not subject to the processor landing requirements. In addition, C share holders are exempt from the requirement because the IPQ landing requirements do not apply to C shares.

[31] In the regulation, "Arbitration IFQ" refers to Class A IFQ held by harvesters that are not affiliated with a PQS holder. These "Arbitration IFQ" are the only IFQ for which delivery terms may be arbitrated.

the arbitrated entities included to attain the 7 percent minimum be considered for the highest arbitrated price. 80 CFR 680.20(g)(2)

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(4) Basis for the Arbitration Decision.

The contract with the Contract Arbitrator shall specify that the Contract Arbitrator will be subject to the following provisions when deciding which last best offer to select.

(i) The Contract Arbitrator's decision shall:

(A) Be based on the historical distribution of first wholesale revenues between fishermen and processors in the aggregate based on arm's length first wholesale prices and ex-vessel prices, taking into consideration the size of the harvest in each year; and

(B) Establish a price that preserves the historical division of revenues in the fishery while considering the following:

(1) Current ex-vessel prices, including ex-vessel prices received for crab harvested under Class A IFQ, Class B IFQ, and CVC IFQ permits;

(2) Consumer and wholesale product prices for the processing sector and the participants in the arbitration (recognizing the impact of sales to affiliates on wholesale pricing);

(3) Innovations and developments of the harvesting and processing sectors and the participants in the arbitration (including new product forms);

(4) Efficiency and productivity of the harvesting and processing sectors (recognizing the limitations on efficiency and productivity arising out of the management program structure);

(5) Quality (including quality standards of markets served by the fishery and recognizing the influence of harvest strategies on the quality of landings);

(6) The interest of maintaining financially healthy and stable harvesting and processing sectors;

(7) Safety and expenditures for ensuring adequate safety;

(8) Timing and location of deliveries; and

(9) The cost of harvesting and processing less than the full IFQ or IPQ allocation (underages) to avoid penalties for overharvesting IFQ and a mechanism for reasonably accounting for deadloss.

(C) Consider the Non-Binding Price Formula established in the fishery by the Formula Arbitrator. 80 CFR 680.21(h)(4)

As set out, the standards applicable to the two different arbitrators are both intended to "establish a price that preserves the historical division of revenues in the fishery" while considering several factors. The findings of both arbitrators should be based on the historical division of "first wholesale revenues between fishermen and processors in the aggregate based on arm's length first wholesale prices and ex-vessel prices, taking into consideration the size of the harvest each year." Within the context of this primary standard, the arbitrator is directed to take into account the listed factors.

The differences between the standards applicable to the formula arbitrator's non-binding formula and the contract arbitrator's last best offer finding do not appear to substantively change the general approach to be applied. Both arbitrators must consider a number of common factors. In addition, the formula arbitrator is required to identify relevant factors, such as product form, delivery time, and location. This direction suggests that the arbitrator has the latitude to distinguish among product forms, delivery locations, and delivery times in the pricing formula, if appropriate. The formula arbitrator is required to consider the "highest arbitrated price" from the previous season. To ensure that the price is generally applicable, it must apply to at least 7 percent of the IPQ in the fishery. In turn, the contract arbitrator is required to consider the non-binding price formula produced by the formula arbitrator in deciding a contract in a last best offer proceeding. These two requirements effectively create a feedback between the non-binding arbitration of the formula arbitrator and the binding arbitration of the contract arbitrator. By providing the formula arbitrator with the submissions from the binding proceedings, the formula arbitrator can provide some guidance on factors at issue in the prior year's binding proceedings. Less structured than a formal record of opinion from a binding process, this informal feedback creates a flexible system under which the application of the standard is both adaptive and predictable.

Both formula and contract arbitrators are instructed to consider any relevant information presented by the parties. In this context, the standards appear to direct the arbitrators to establish a price that preserves the historical division of first wholesale revenues, while at the same time allowing them to consider other relevant information, including information relevant to the listed considerations.

8.7.2 The market report and non-binding formula arbitration

Certain aspects of the arbitration system operate regardless of whether participants in the fisheries use the system to directly resolve terms of delivery. All share holders are required to join an arbitration organization. These organizations are parties to the contracts that define and govern the share matching and arbitration system. Since the arbitration organizations serve primarily an administrative function, share holders are able to achieve efficiencies through joining a common organization without compromising their competitive position or operational aspects of their businesses. In the first year of the program, two unaffiliated organizations formed. One organization consisted mostly of Aleutian Islands golden king crab harvest share holders; the other organization represented most share holders in the Bristol Bay red king crab, Bering Sea *C. opilio*, and Western Bering Sea *C. bairdi* fisheries. After this first year all unaffiliated harvesters joined a single organization. In each of the first five years of the program, a single organization formed for processor share holders and a single organization formed for processor-affiliated harvester share holders.

8.7.3 The market report and formula price

An annual market report and pricing formula are required to be generated for each program fishery at least 50 days prior to the opening of the season. The market analyst and formula arbitrator who prepare these documents are selected by mutual agreement of arbitration organizations representing at least 50 percent of the non-affiliated QS holders and at least 50 percent of the PQS holders in a fishery. To ensure that market report information is timely, an amendment to the program will allow the market report and supplements to be produced at any time agreed by the arbitration organizations, including in-season. The amendment, approved by the Council in February 2008, will take effect on approval of the Secretary of Commerce.

In the first five years of the program, the person (or team) that prepared the market report for a fishery also prepared the non-binding price formula. Participants in the program fisheries generally believe that using a single source for both reports has reduced both the direct costs of the report and the time costs of providing information to the analysts. In the first year of the program, the market report and price formula for the Aleutian Island golden king crab fisheries were prepared by one team of analysts, while the market report and price formula for the Bristol Bay red king crab, Bering Sea *C. opilio* and the Bering Sea *C. bairdi* fisheries were prepared by a different analyst. After the first year, a single analyst prepared all market reports and price formulas.

The relatively late issuance of QS and PQS during the first year of the program, together with the need for participants to organize into arbitration organizations and select an analyst, contributed to the market reports and price formulas for the various fisheries being prepared on a short timeline.[32] Participants and analysts have since been able to follow the regulatory schedule for developing these reports. To the extent

[32] The Council amended two aspects of the arbitration system that concern the non-binding formula. First, the Council adopted a procedure that would allow arbitration organizations to forgo the production of the non-binding formula for fisheries that are unlikely to open (provided the organizations have an agreement for the production of the formula, in the event that the fishery does open). Second, it modified the timeline for producing the formula for the Aleutian Islands golden king crab fisheries, so that the formula is due 30 days prior to the season opening. By postponing the due date for this report by 20 days, the revised timeline ensures that the formula arbitrator will have access to the price information in the preceding year's Commercial Operators Annual Reports.

that the market report and price formula have served as the starting point for price negotiations, these reports have met the expectations of the Council (NPFMC, 2004).

The market report

To some extent, crab price volatility has prevented a preseason market report from being an ideal tool for setting ex vessel prices. For example, by the time fishing typically begins in the Bering Sea *C. opilio* fishery, the market report is four months old, while the information it contains is approximately seven months old. To address the staleness of the market report, the Council approved an amendment to the program (currently under Secretarial review) that would allow arbitration organizations to time the preparation of the market report as they deem appropriate. In addition, the amendment would allow the report to be supplemented throughout the season by agreement of the organizations. The report (and any supplements) would be based only on publicly available market information, including information from subscription services, in order to prevent information in the report from being used for anticompetitive purposes.[33]

The added flexibility provided by the amendment should improve the usefulness of the market reports to participants. In general, past reports have identified market volatility as a major impediment to forecasting prices. As a consequence, the reports have chosen to identify factors most likely to influence prices and gauge the possible effects of those factors in the coming year. With expanded authority to supplement the market report under the amendment, the arbitration organizations could agree to provide participants with current, publicly available market information, in addition to the market analysis contained in past reports. Given the contentious price negotiations in the crab fisheries in recent years, the opportunity for unbiased, up to date market information may be beneficial to negotiations.

Use of this market information in negotiations will require some care. Under the arbitration standard (which establishes ex vessel prices as a share of first wholesale revenues while considering several factors), the relevance of periodic market information to an appropriate ex vessel price is nuanced. No single price reported in these market reports should determine the ex vessel price (unless specifically agreed to by the parties to that transaction). Instead, periodic price information, along with other relevant information concerning market prices, should be interpreted in the broad scope of the markets to arrive at an appropriate ex vessel price. The application of the arbitration standard is further discussed later in this section.

The price formula

The price formula is the most important of the preseason reports because this formula is intended to inform negotiations and the binding arbitration process by a general application of the arbitration standard. Many participants view the formula as not only the starting point for negotiations, but the driver of delivery terms for Class A IFQ landings in the program fisheries. As might be expected given its importance, at times, the development of the price formula has been contentious; however, in more recent years, the price formula has become settled in most fisheries.

In the first year of the program, the price formula report for Aleutian Islands golden king crab recommended a staged price setting process. Under this approach, harvesters receive an advance, guaranteed minimum price at the time of landing based on prevailing market prices at the time of the report. At the end of the season, a price adjustment is made based on average first wholesale prices for the year. This formulation was suggested to put market risk on processors, who were said to be more capable of absorbing that risk than harvesters because of the relative scales of their operations. The report

[33] Under the original provision defining the market report requirement, the reports were limited to historical information to prevent the distribution of market data that could be used in an anticompetitive manner (Arnold & Porter, 21-22). This risk is avoided by using only publicly available information.

suggested that this starting price would present a risk of loss to processors only in years of very steeply declining market conditions. This approach to pricing has been followed in negotiations in most program fisheries to date, but has not been suggested in any of the other non-binding price formulas. The approach has also not been part of any binding arbitration proceeding. Instead, harvesters have negotiated for a minimum price paid at landing prior to beginning fishing.

The formulas in the different fisheries generally attempt to derive the average historic division of first wholesale revenues from price information from 1990 until the season preceding the implementation of the rationalization program (2004 in all fisheries except the Bering Sea *C. opilio* fishery which had a 2005 season under the LLP management). The formulas generally define a historic ex vessel price as a percentage of the historic first wholesale value after consideration of certain criteria. In each of the formulas, the analyst has included a discussion of relevant criteria under the standard (e.g., efficiency and financial stability). The discussion of these criteria is at times intertwined with the discussion of the more mechanical generation of the formula based on available data.

The methodology for development of the formula has evolved over time and is now generally settled in all fisheries, with the exception of the golden king crab fisheries. In the first year of the program, the non-binding price formula for both Bristol Bay red king crab and Bering Sea *C. opilio* noted that the ex vessel price as a percentage of first wholesale price varied over time. The analyst noted, however, that the change in the percentage from year to year was related to the direction of the market. The analyst used the preceding year's relationship, but applied an adjustment based on the direction of the market. Using this adjusted relationship (together with a minor adjustment for rising fuel costs), the analyst generated an ex vessel price as a percent of the first wholesale price for the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries. The analyst noted that the closure of the Bering Sea *C. bairdi* fishery in recent years created uncertainty about the market for this species and the appropriate formula. To overcome this uncertainty, the *C. bairdi* formula was based on the *C. opilio* formula, with adjustments that could be applied in the event of unexpectedly low first wholesale prices or lower than expected price premiums relative to *C. opilio*.

In the second year of the program (with considerably more time available to develop the formula), the analyst focused on demonstrating a relationship between the historic average first wholesale prices and average ex vessel prices. To overcome data shortcomings in the Bristol Bay red king crab fishery, the market analyst relied on November and December Japanese wholesale price data to generate first wholesale prices. These data were perceived to be more reliable than Commercial Operator Annual Report (COAR) data, which are collected on a calendar year basis and include winter sales after the New Year in the data for the subsequent year. A simple linear regression was adopted with ex vessel price as a function of first wholesale price. In the third year of the program, Japanese wholesale price data represented first wholesale prices, while Alaska Business Tax data was used to generate some ex vessel prices. These data were used in a regression to establish the relationship between these historic first wholesale prices and ex vessel prices. As both sectors have generally consented to this methodology, the formula has been unchanged since the third year.

In the *C. opilio* fishery, similar formulas were developed in the second and third years; however, separate formulas were developed for North region deliveries, South region deliveries, and all deliveries combined. The generated ex vessel prices in the North differed from those in the South by as much as $0.09. The basis for different regional estimations is controversial within industry, as there is debate over whether prices have historically differed across the two regions. At relatively low ex vessel prices, prices in the North have tended to be lower than South prices and vice versa. This pattern is consistent with the observation in the formula report that TACs can affect the price differential, as prices in the North may be lower than South prices in low TAC years, when the harvester operational advantage of delivering to the North is greater. As expected, the price generated by combining landings from both regions falls between

the two region-based estimates, but is typically closer to the North estimate. An additional consideration in the price formulation was the arbitrated prices from the preceding season. Under the arbitration standard, the arbitrator is required to consider the highest arbitrated price that applies to greater than 7 percent of the fleet. Because harvesters prevailed in an arbitration proceeding in the first year of the program, the arbitrated price increased the ex vessel price generated by the price formula in the second year. How the arbitrated price was considered is unclear in the report. In the third year of the program, the same methodology was used for generating the formula. The arbitrator elected to use Alaska Business Tax data for some ex vessel prices, as was done in the Bristol Bay red king crab formula. As in the Bristol Bay king red king crab fishery, both sectors have generally agreed to the formula, leaving it unchanged to date.

In the second and third year of the program, the *C. bairdi* formula relied on data from the Bering Sea *C. bairdi* fishery from 1990 to 1996 and the Kodiak *C. bairdi* fishery from 2001 to 2004. Because the Bering Sea fishery was closed for several years leading up to the rationalization program, the arbitrator looked beyond the fishery for establishing the historic relationship between ex vessel prices and first wholesale prices. These fisheries also have retained the same formula, since the third year of the program.

The pricing formula in the Aleutian Islands golden king crab fishery is slightly less settled than the pricing formula in other fisheries. The most recent formula relies on both data from the golden king crab fishery and the Bristol Bay red king crab fishery, citing the use of red king crab data as need to overcome some anomalies that arise, if only golden king crab COAR data are used. In particular, the report notes that, at certain first wholesale prices, a formula based solely on golden king crab data would result in higher prices for golden king crab, than red king crab. This result is said to run counter to experiences of fishery participants and market characteristics. The formula that draws on both golden king crab COAR data and the settled red king crab formula has not achieved acceptance from industry to date. It is likely that a few more iterations will be needed before both sectors come to accept a formula.

Table 8-1 through Table 8-3 show the first wholesale prices and ex vessel prices in the Bristol Bay red king crab, Bering Sea *C. opilio*, and Aleutian Islands golden king crab fisheries from 1997 to 2009. Ex vessel prices were obtained from Commercial Operator's Annual Reports and fish tickets. Fish tickets typically show payments at the time of landing, while COAR data generally include post-landing bonuses. In the COAR database, the location of the processor that purchased the fish is recorded by ADFG regulatory area, but harvest location is not reported. Crab harvested in one regulatory area may be sold to a processor in another area. Consequently, data for the Aleutian Islands golden king crab and red king crab include deliveries from the Norton Sound red king crab fishery and relatively small fisheries in southeast Alaska. The Bering Sea *C. opilio* fishery is the only *C. opilio* fishery in the state; therefore, those data are solely from the Bering Sea fishery. The tables also show the ex vessel price as a percentage of first wholesale price generated by the formula arbitrator. The tables display only first wholesale prices for shellfish sections, which is consistent with the methodology followed by the formula arbitrator. Focusing on shellfish sections simplifies the analysis, as the prices of other products would have to take into account differences in recovery rates. In addition, shellfish sections represent a large majority of the production from program fisheries (both historically and currently) and generally provide a good overall measure of the change in markets for crab. A future change in product types could require a change in application of the price formula.

Table 8-1 First wholesale prices and ex vessel prices in the Bristol Bay red king crab fishery (1997-2009)

Fishery	Season	GHL/TAC[a]	First wholesale price[b]	COAR ex vessel price[c]	COAR ex vessel percentage of first wholesale price	Percentage from formula arbitrator's report
Bristol Bay	1997	7.0	6.18	3.27	53.0%	53.1%
Red King Crab	1998	15.8	5.52	2.63	47.7%	47.6%
	1999	10.1	11.25	6.25	55.6%	55.7%
	2000	7.7	9.11	4.74	52.0%	52.7%
	2001	6.6	8.93	4.83	54.0%	55.1%
	2002	8.6	11.58	6.21	54.0%	53.5%
	2003	14.5	9.82	5.14	52.0%	52.5%
	2004	14.3	9.25	4.69	50.7%	51.4%
	2005	16.5	8.52	4.50	53.0%	
	2006	15.5	7.49	3.85	51.4%	
	2007	18.3	8.60	4.42	51.4%	
	2008	18.4	9.77	5.11	52.3%	
	2009	14.4	8.96	4.67	52.1%	

[a] Guideline Harvest Level (Total Allowable Catch from 2005 forward) in millions of pounds for Bristol Bay fishery only.
[b] Source: ADFG Commercial Operator's Annual Reports. Wholesale price is reported for shellfish sections and includes all Red King Crab fisheries because COAR reports do not indicate harvest location.
[c] Source: ADFG Commercial Operator's Annual Reports. Prices are for all RKC fisheries combined because COAR reports do not indicate harvest location.

Table 8-2 First wholesale prices and ex vessel prices in the Bering Sea *C. opilio* fishery (1997-2009)

Fishery	Season	GHL/TAC[a]	First wholesale price[b]	COAR ex vessel price[c]	COAR ex vessel percentage of first wholesale price	Percentage from formula arbitrator's report
Bering Sea	1997	117.0	2.13	0.79	37.2%	37.1%
C. opilio	1998	225.9	2.03	0.57	27.9%	28.1%
	1999	186.2	2.92	0.98	33.7%	33.6%
	2000	26.4	4.16	1.85	44.5%	44.5%
	2001	25.3	3.73	1.55	41.6%	41.3%
	2002	28.5	3.58	1.39	38.9%	38.6%
	2003	23.7	4.40	1.85	42.0%	42.0%
	2004	19.3	4.79	2.07	43.1%	43.2%
	2005	19.4	3.85	1.81	47.0%	47.0%
	2006	36.6	2.89	1.15	39.8%	
	2007	56.7	3.83	1.74	45.4%	
	2008	52.8	4.05	1.77	43.6%	
	2009	43.2	3.43	1.45	42.2%	

[a] Guideline Harvest Level (Total Allowable Catch from 2005 forward) in millions of pounds.
[b] Source: ADFG Commercial Operator's Annual Reports. Wholesale price is reported for shellfish sections.
[c] Source: ADFG Commercial Operator's Annual Reports.

Table 8-3 First wholesale prices and ex vessel prices in the Aleutian Islands golden king crab fisheries (1997-2009)

Fishery	Season	GHL/TAC[a]	First wholesale price[b]	COAR ex vessel price[c]	COAR ex vessel percentage of first wholesale price	Percentage from formula arbitrator's report
AI Golden	1997	5.9	4.79	2.26	47.1%	46.9%
King Crab	1998	5.7	4.24	1.97	46.5%	45.0%
	1999	5.7	6.89	3.15	45.8%	46.6%
	2000	5.7	7.20[e]	3.31	46.0%	58.9%
	2001	5.7	6.95	3.37	48.4%	48.1%
	2002	5.7	7.58	3.46	45.6%	46.2%
	2003	5.7	7.89	3.62	45.9%	45.7%
	2004	5.7	6.02	3.15	52.3%	52.2%
	2005	5.7	6.00	2.89	48.2%	46.4%
	2006	5.1	4.35	2.18	50.1%	
	2007	5.1	5.55	2.43	43.8%	
	2008	5.4	6.94	3.70	53.3%	
	2009	5.4	5.37	2.68	49.9%	

[a] Guideline Harvest Level (Total Allowable Catch from 2005 forward) in millions of pounds for E. and W. Aleutian Islands.
[b] Source: ADFG Commercial Operator's Annual Reports. Wholesale price is reported for shellfish sections and includes all Golden King Crab fisheries, because COAR Reports do not indicate harvest location.
[c] Source: ADFG Commercial Operator's Annual Reports. Includes all GKC fisheries, because COAR reports do not indicate harvest location.

Table 8-4 and Table 8-5 show the first wholesale prices and ex vessel prices in the Bering Sea *C. opilio* North and South regions from 1997 to 2005. The data show some variation across the two regions, with South region prices slightly higher in some years. Whether these price variations are significant enough to differentiate prices in the formula is a matter that may be considered by the arbitrator. Data since the program was implemented are not available because of confidentiality limitations.

Table 8-4 First wholesale prices and ex vessel prices in the North region of the Bering Sea *C. opilio* fishery (1997-2005)

Fishery	Season	GHL/TAC[a]	First wholesale price[b]	Ex vessel price[c]	COAR ex vessel percentage of first wholesale price	Percentage from formula arbitrator's report
Bering Sea	1997	117.0	2.24	0.78	34.8%	34.8%
C. opilio	1998	225.9	2.01	0.56	27.9%	27.9%
Northern[d] Region	1999	186.2	2.94	0.97	33.1%	33.0%
	2000	26.4	4.29	1.85	43.0%	43.1%
	2001	25.3	3.68	1.55	42.0%	42.1%
	2002	28.5	3.79	1.40	37.0%	36.9%
	2003	23.7	4.48	1.84	41.1%	41.1%
	2004	19.3	4.84	2.05	42.5%	42.4%
	2005	19.4	3.85	1.81	47.0%	47.0%

[a] Guideline Harvest Level (Total Allowable Catch from 2005 forward) in millions of pounds.
[b] Source: ADFG Commercial Operator's Annual Reports. Wholesale price is reported for shellfish sections.
[c] Source: ADFG Commercial Operator's Annual Reports.
[d] For purposes of price calculations, Northern District includes COAR processor areas Q, T, and W (Pribilof Islands, St. Matthew's Island, Bristol Bay, Kuskokwim).

Table 8-5 First wholesale prices and ex vessel prices in the Southern region of the Bering Sea *C. opilio* fishery (1997-2005)

Fishery	Season	GHL/TAC[a]	First wholesale price[b]	Ex vessel price[c]	COAR ex vessel percentage of first wholesale price	Percentage from formula arbitrator's report
Bering Sea	1997	117.0	2.11	0.82	38.7%	38.9%
C. opilio	1998	225.9	2.04	0.57	28.1%	27.9%
Southern[d] Region	1999	186.2	2.89	1.00	34.7%	34.6%
	2000	26.4	4.10	1.86	45.3%	45.4%
	2001	25.3	3.75	1.54	41.1%	41.1%
	2002	28.5	3.47	1.38	39.9%	39.8%
	2003	23.7	4.36	1.85	42.5%	42.4%
	2004	19.3	4.77	2.07	43.5%	43.4%
	2005	19.4	3.85	1.81	47.0%	47.0%

[a] Guideline Harvest Level (Total Allowable Catch from 2005 forward) in millions of pounds.
[b] Source: ADFG Commercial Operator's Annual Reports. Wholesale price is reported for shellfish sections.
[c] Source: ADFG Commercial Operator's Annual Reports.
[d] For purposes of price calculations, Southern District includes COAR processor areas E, F, H, K, L, M, and O (Gulf of Alaska from Prince William Sound west).

Application of the arbitration standard in development of the price formula[34]

The arbitration standard applicable to the development of the price formula has four general components to it. First, the formula arbitrator is required to establish a price that preserves the historic division of first wholesale revenues between harvesters and processors. Second, in developing this price, the arbitrator must consider several factors, including current ex vessel, consumer, and wholesale prices, innovations and developments, efficiency and productivity, quality, and financial health and stability. Third, the arbitrator must identify factors relevant to price determination, including delivery timing and location; however, the arbitrator is not required to consider these factors in setting the price. Fourth, the arbitrator is required to consider the "highest arbitrated price" from the previous season.

Given the array of directions that an arbitrator is given in establishing a price formula, it is not surprising that some confusion arose in the early interpretation and application of the standard. However, a review of the record of the standard's development indicates that establishing a price that preserves the historical division of revenues was a primary consideration. At the time the Council was formulating the standard, it considered allowing an arbitrator to identify a price based on all relevant factors, including historic ex vessel prices and division of first wholesale revenues. Instead, the Council identified the principal role of the arbitrator as determining a price that preserves the historic division of first wholesale revenues in program fisheries (see options in NMFS/NPFMC, 2004b). The primacy of preserving this historic division is also suggested by the EIS, which states that:

[34] As noted above, the differences between the standards applicable to the formula arbitrator's non-binding formula and the contract arbitrator's last best offer finding do not appear to substantively change the general approach to be applied by both arbitrators. Consequently, much of this discussion also applies to the application of the standard by the contract arbitrator.

> *Assuming no change in the total benefits derived from the fishery, this standard would preserve the historic distribution of benefits for A share landings* (NPFMC/NMFS, 2004a, p. 4-162).

The EIS also suggests that, under the standard, improvements in returns from program fisheries should be shared according to the contribution to those changes:

> *If processed product revenues are improved through product improvements or developments (capturing greater rents), both sectors could share those additional rents. The arbitration standard would likely provide for the sharing of these revenues between the sectors with the division influenced by the contribution of the parties to the product developments and improvements* (NPFMC/NMFS, (2004a) at 4-162).

The report of the workgroup that developed the arbitration program also supports interpreting the standard as preserving the historic division of revenues, while considering other relevant factors. The report states:

> *[The preferred standard] provides additional definition by directing the arbitrator to decide a price that maintains the historical division of revenues in the fishery, while considering other relevant factors. These additional factors would include product developments and efficiency gains, the benefits of which should generally be distributed to each sector based on the contribution of the sector to those benefits. The committee favors [the preferred standard] because of the additional guidance the historical division of revenues provides to the arbitrator. Retaining the historical division of revenues is thought to be a fair method of preserving the balance of interests of the two sectors in the fisheries* (Workgroup on Binding Arbitration, 2002a).

The workgroup report suggests that adjustments to the price that preserve the historic division of revenues would allow the different sectors to receive the benefit of their respective contributions to improvements in the fisheries. This interpretation of the standard suggests that future changes in program fisheries cannot be predicted, but that the arbitrator might be justified in adjusting the price on equity grounds as changes in the fisheries and their production occur after implementation of the program. Over the first few years of the program, the price formula has evolved, and little confusion over interpretation of the arbitration standard remains.

Application of the last component to be considered by the arbitrator—the "highest arbitrated price" from the previous season—also requires some interpretation. This "highest arbitrated price" will have been derived from binding arbitration proceeding between a specific harvester (or group of harvesters) and a specific processor in the previous season. The arbitrated price will likely depend on several factors, including not only the historic division of revenues, but also the specific circumstances and terms of delivery. As such, the price should not necessarily be viewed as a reflection of the overall conditions in the fishery and markets.

Perhaps the greatest concern with the application of the arbitration standard to price setting is the potential disincentive for processors to aggressively market their products. As the formula arbitrator has observed, if the formula is applied by solely dividing the first wholesale revenues between harvesters and processors the incentive for a processor to take risks associated with more costly market opportunities (such as developing new markets or holding product to time sales most advantageously) will be diminished greatly, and possibly fully removed. For example, if a formula returns only 30 percent of the first wholesale revenues to a processor, a processor would realize no additional return from a product that costs 30 additional cents to produce and sells for an additional dollar. At the extreme, a processor could pre-sell all of its production (i.e., contract for its sale prior to the season) to remove all risk. Although this

practice may seem inappropriate, in some circumstances it may benefit all parties (i.e., if market prices fall, a pre-season sale could bring the best price). Yet, the potential distortion of market incentives displayed by these types of sales may be problematic in some circumstances. Given the uncertainty concerning the application of the standard to these and similar circumstances, a processor may be deterred from making additional investments to serve higher risk or cost markets, in the absence of an agreement with a harvester concerning the division of any revenues from sales.[35] Consequently, in the absence of agreements of the participants in both sectors concerning efforts to serve new markets or take market risks they developments may not take place. While participants in both sectors have expressed a willingness to consider these types of arrangements, none are known to have developed to date.[36]

Overall, the arbitration workgroup intended the standard as contributing to economic stability in the program fisheries by effectively "preserving the balance of interests" between the harvesting and processing sectors (Workgroup on Binding Arbitration, 2002). It is reassuring that in the first five years of the program, the formula has stabilized, as both the method and result of the arbitrator's application of the standard become acceptable to the parties. Yet, it is unclear whether the formula (as driven by the standard) can (or should) be adapted to address variability of prices across processors, inventory holding times, and product and market development and whether an adaptation would be accepted by participants in the fisheries.

Procedure for development of the price formula

A second aspect of the price formula that was problematic at the outset was the process by which it is developed. To produce the formula, the arbitrator considers information submitted by participants in both sectors. However, the process by which these submissions should be conducted is not specified in regulation (although certain limitations on the sharing of information are specified).[37] Beginning in the second year of the program, the formula arbitrator followed a process for submission of comments and interactions with the arbitrator. This process has evolved somewhat over time. For example, the arbitrator now responds in writing to each written comment to convey the rationale behind the formula and has developed a process for the consideration of any new data proposed to be considered in establishing the historic division of first wholesale revenues. Despite continuing concerns of each sector that the other may derive a competitive advantage, the process largely satisfies participants.

8.7.4 Share matching and initiation of binding arbitration

A critical aspect of the program is the process by which Class A IFQ/IPQ are matched and binding arbitration proceedings are initiated. The one-to-one relationship between Class A IFQ and IPQ raises the importance of making available information concerning uncommitted shares and establishing an efficient

[35] It is possible that an arbitrator may, in light of the circumstances, make a determination that provides the processor with its costs associated with the market development prior to dividing first wholesale revenues. Yet, with no certainty concerning an arbitrator's application of the standard to the circumstance, processors are far less likely to take risks in the market. In the long run, as the fisheries evolve the formula arbitrator may be able to give additional attention be given to other factors, beyond the historic division of first wholesale revenues, such as product developments. At this stage, whether such evolution of the formula will occur is not certain. The distribution of the benefits from these developments is important, in and of itself, but also for its effect on incentives and disincentives for innovation.

[36] It should be noted that the cooperative structure of the harvest sector under the program could be either beneficial or detrimental to the development of these arrangements. The cooperative structure allows for better coordination, which could be used to facilitate better landings arrangements, if needed to serve the markets. On the other hand, the cooperative structure that involves a large share of the fleet (including deliveries to several processors) could have some resistance to developments that might only benefit a few members.

[37] For example, the arbitrator/analyst is not permitted to disclose non-public information or the source of that information. In addition, information must be on activities that occurred at least 3 months prior to submission 80 CFR 680.20(e) and (f).

system for matching those shares and initiating arbitration, in the event a negotiated settlement of delivery terms cannot be reached. This section evaluates the operation of the system for matching shares and initiating arbitration under the program.

The system of negotiated and unilateral matching of shares is intended to facilitate the orderly commitment of Class A IFQ deliveries to processors holding IPQ. The process for initiating a binding arbitration proceeding is coordinated with share matching. The regulatory process for matching Class A IFQ to IPQ begins on the issuance of those shares. For the first 5 days after shares are received, holders of Class A IFQ can, by negotiated agreement, commit their shares to holders of unused IPQ. A commitment need not settle all terms of delivery, but prevents either share holder from committing their shares to a different person. After this period of negotiated commitments, holders of Class A IFQ may unilaterally commit their shares to the holder of uncommitted IPQ. In addition, at any time during the first 10 days after the period of negotiated commitments, a holder of Class A IFQ that has committed those shares to an IPQ holder may unilaterally initiate an arbitration proceeding to settle outstanding terms of delivery.[38] Alternatively, the parties may agree to take a 'lengthy season approach' to arbitration, under which any arbitration proceeding is delayed until a specific time during the season. The lengthy season approach must be adopted prior to the season opening (which under the current timelines for some fisheries occurs prior to the end of the period for initiating arbitration). If the parties disagree on whether to adopt the lengthy season approach (or on the timing of arbitration under that approach) the parties may arbitrate either of those issues. By the end of the 10-day period, if a holder of Class A IFQ has not either initiated a proceeding or adopted the 'lengthy season approach,' the ability to access the arbitration system is effectively forfeited.[39] To date, arbitration has been used twice to resolve issues related to the use of the lengthy season approach. These procedural actions have involved eligibility for arbitration under the lengthy season approach and the timing of arbitration under the lengthy season approach.

The short time period during which shares must be matched and arbitration actions initiated has raised concerns among some participants. Table 8-6 shows the compressed time frame under which share holders are required to either negotiate terms of deliveries or arbitrate those terms under the current TAC setting schedule.[40] Within this time frame, harvesters and processors must match shares and either settle

[38] This structure, under which a harvester may unilaterally commit deliveries and initiate arbitration, effectively allows a Class A IFQ holder to compel an IPQ holder to accept deliveries at the arbitrated price. IPQ holders cannot either compel an IFQ holder to commit to deliveries or initiate arbitration. Some processing sector participants contend that this unilateral structure is inequitable, particularly in light of the harvesters' use of a large collective entity for negotiations and arbitration. On the other hand, it is likely that a processor could compel a harvester to initiate arbitration by simply not agreeing to terms or not making payment. Such an approach comes with some risk and may affect a processor's negotiating position.

[39] During the first year of the program, an inconsistency between the allocation of IFQ and IPQ and the timeline in the regulations for share matching and initiation of arbitration prevented participants in the program fisheries from using the arbitration system as intended. In the original regulation, the timeline for share matching and initiation of arbitration proceedings was relative to the season opening in a fishery. Holders of Class A share IFQ could unilaterally commit landings to a holder of uncommitted IPQ any time less than 25 days prior to the season opening. In addition, IFQ holders were required to initiate binding arbitration between 25 days and 15 days before the season opening. To allow the incorporation of annual survey data to be incorporated into the annual stock assessment and TAC setting processes, the TAC announcements in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries were made fewer than 15 days prior to the season opening. This late issuance of IFQ and IPQ prevented participants from share matching and initiating arbitration within the specified time periods. IFQ holders and IPQ holders addressed this shortcoming by agreeing to delay the arbitration process under the "lengthy season approach". By the end of the first year, the Council had amended the timeline to allow unilateral share matching any time more than 5 days after the issuance of IFQ and IPQ and to permit initiation of arbitration any time more than 5 days and less than 15 days after the issuance of IFQ and IPQ.

[40] It should be noted that due date for the market report and formula in the golden king crab fisheries will be moved to 30 days prior to the season opening under an amendment that has yet to be implemented.

terms of delivery for those landings or commence arbitration for all Class A IFQ and IPQ in the two primary fisheries (the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries) and several small secondary fisheries (the Western and Eastern Bering Sea *C. bairdi* fisheries and the St. Matthew Island blue king crab and Pribilof red and blue king crab fisheries).[41] In considering these time pressures, it should be borne in mind that most of the fishing and processing activity in the king crab fisheries occurs in late October and November. Consequently, not only must participants concern themselves with share matching and negotiations, but they also must prepare facilities, vessels, gear, processing lines and position vessels and crews for those fisheries.

Table 8-6 Approximate schedule for share matching and arbitration.

Fishery	Due Date for Market Report and Price Formula	TAC Announcement	IFQ/IPQ Issuance/Start - negotiated commitment period	End - negotiated commitments/Start - unilateral IFQ commitments/Start - initiation of arbitration actions	Season opening - End period to agree to lengthy season approach	End - arbitration initiation period
Bristol Bay red king crab	August 26	September 29	October 6	October 11	October 15	October 21
Bering Sea *C. opilio*	August 26	September 29	October 6	October 11	October 15	October 21
Eastern Bering Sea *C. bairdi*	August 26	September 29	October 6	October 11	October 15	October 21
Western Bering Sea *C. bairdi*	August 26	September 29	October 6	October 11	October 15	October 21
Aleutian Islands golden king crab	June 26	July 18	August 6	August 11	August 15	August 21

To aid in meeting the share matching timeline, the harvester arbitration organization has developed an internet-based system for matching shares—sharematch.com—to facilitate real time commitment of shares and the timely exchange of information concerning uncommitted shares. This system has benefited participants by creating a single forum for commitment of shares.

In the first five years of the program, all participants who have used the binding arbitration process have relied on the lengthy season approach, whereby arbitration proceedings are delayed until a time during the the crab fishing year. To date, all proceedings have occurred at the earliest in the late spring or summer, more than 6 months after the original deadline for initiation of arbitration proceedings in these fisheries. In two cases, the proceeding was delayed well into the following season. Use of this approach has relieved the time pressure under the standard arbitration timeline and has allowed participants to negotiate with more complete market information. On the other hand, some processors contend that the reliance on the lengthy season approach (particularly, if arbitration is delayed beyond the season end) unduly burdens processors by preventing them from timely reconciling their books.

8.7.5 Contract Arbitration

During the first year of the program, two binding arbitration proceedings occurred. Both concerned deliveries in the Bering Sea *C. opilio* fishery, with one proceeding also resolving terms for landings in the Bering Sea *C. bairdi* fishery. In the second year of the program, three arbitration proceedings were brought to resolve terms for landings in the Bering Sea *C. opilio*, Bering Sea *C. bairdi* and Bristol Bay red king crab fisheries. In the third and fourth years of the program, no proceedings were brought. In the fifth year three proceedings were brought, two in the Western Aleutian Island golden king crab fishery and one in the Bering Sea *C. opilio* fishery.

[41] The Bering Sea *C. bairdi* fishery is divided into two fisheries, one east of 166° W longitude (the Eastern Bering Sea *C.bairdi* fishery) and one west of 166° W longitude (the Western Bering Sea *C. bairdi* fishery).

In all the proceedings, harvesters were represented by the Inter-Cooperative Exchange.[42] Processors participating in arbitration must act independently. Results of arbitration proceedings cannot be reported, but it can be reported that harvesters have prevailed in most (but not all) arbitration proceedings concerning ex vessel prices.

Application of the arbitration standard in binding arbitration

As discussed above, the arbitration standard delineates the principal objective of both the formula arbitrator and contract arbitrator as establishing an ex vessel price that preserves the historic division of revenues in the fishery; however, the respective roles of the arbitrators in meeting that common objective differ. The formula arbitrator's role is to apply the standard to the overall relationship between harvesters and processors in the fishery; the contract arbitrator's role is to apply the standard to a delivery or set of deliveries from one or more specific harvesters to a specific processor.

As with the formula arbitrator, the contract arbitrator is directed to consider other relevant factors when establishing a price that preserves the historic division of revenues. The complexity (and multidimensionality) of delivery terms and negotiations together with the broad list of considerations in the standard create some uncertainty in the application of the standard. In the first five years of the program, participants in both sectors and arbitrators have worked to interpret the standard and its application to their circumstances. The novelty of the arbitration system and the absence of information from the few binding proceedings that have occurred have contributed to this anxiety.[43] Over time, representatives of participants in both sectors have been nonplussed by outcomes. The uncertainties arising from both multidimensional delivery terms and a relatively inclusive arbitration standard contribute to the uncertainty in outcomes. For example, most participants continue to question the wholesale price to which the historical division of revenues should be applied. Arguments can be made that the price should be applied to an average first wholesale price from the entire fishery or to the average first wholesale price of the specific processor. Others question the degree to which costs associated with production should be considered in making an arbitration finding. Although the arbitration standard provides for consideration of these issues, it does not prescriptively weight their effects on an outcome. Notwithstanding this situation, the arbitration system provides a great degree of stability and certainty to participants in both sectors.

Process for binding arbitration

This section describes the process used once an IFQ holder has initiated a binding arbitration proceeding. The first step in that process occurs simultaneously with the initiation of the arbitration proceeding. At that time, the IFQ holder that initiated the proceeding selects a contract arbitrator to preside over the arbitration from the pool of jointly selected contract arbitrators.[44]

The regulation provides that the arbitrator should meet with the participants as soon as possible after the arbitration is initiated to schedule the proceeding (50 CFR 680.20(h)(3)(vii)). In addition, the regulation directs the contract arbitrator to meet with the parties to determine the terms that must be included in the last best offer submissions, which may be collectively submitted by harvesters that are members of an

[42] Under the rationalization program, IFQ holders may form "harvest cooperatives" that serve the exclusive purpose of coordinating catch of the allocations of their members. Under antitrust law, harvesters that intend to negotiate ex vessel prices collectively must comply with the requirements of the FCMA. Because of their different purposes, the limitations on and requirements for forming cooperatives under the FCMA differ from those of the rationalization program. As a result, IFQ holders in different harvest cooperatives have been able to organize under the FCMA to collectively negotiate prices by meeting the requirements of the FCMA.

[43] Under the arbitration system no information from the arbitration proceedings can be shared among non-participants.

[44] As noted earlier, only IFQ holders are permitted to initiate arbitration proceedings.

FCMA cooperative (50 CFR 680.20(h)(3)(viii) and (xi)).[45] The arbitrator is limited to selecting from the two last best offers (50 CFR 680.20(h)(3)(viii) and (xi)). The arbitrator's finding must be delivered to the parties within 5 days of submission of the offers (or within 10 days of submission, if the arbitration takes place at least 15 days prior to the season opening, which is an impossibility under the current timelines) (50 CFR 680.20(h)(3)(xi)). Beyond these specific requirements, the arbitration procedure is undefined by the regulation. In development of the arbitration system, the Council sought to provide industry with a flexible system that could be efficiently administered by participants (through the arbitration organizations who represent them). The Council reinforced this principle in a recent action to amend the regulations to specifically provide the arbitration administrators (i.e., arbitration organizations, arbitrators, and third party data providers) with the authority to adopt procedures and make administrative decisions in addition to those specified in the regulations, provided those procedures and decisions are not inconsistent with any regulations. With the exception of quality and performance disputes, which may be arbitrated, participants in the fishery are expected to seek remedies only through civil law. Furthermore, the regulations do not provide a process for appealing an arbitration decision.

Although many of the participants in the program share the opinion that the arbitration has effectively resolved pricing issues, some participants in each sector have expressed reservations. Some harvesters believe that the system cannot achieve the results (either in ex vessel price payments or in competition in product markets) that would be achieved by a competitive market for landings. Some processors believe the rules of the arbitration (including the unilateral authority of harvesters to initiate arbitration unfairly disadvantage processors). While these concerns may be worth considering, it is not clear that adjustments to the arbitration system (even minor ones) are possible without disrupting the stability that it provides.

8.7.6 Additional Delivery Negotiation Issues

This section reviews issues related to price negotiations under the program that do not fall clearly into one of the above sections that should be considered in assessing whether the program is meeting expectations.

Delivery Timing

During the first five years of the program, participants have generally resolved delivery schedule issues without resorting to the arbitration system. The resolution of these issues has occurred despite contentious negotiations concerning delivery timing. Timing of deliveries (particularly in remote locations) and its effects on processing and fishing operations has caused great concern among the fleet and processors. With the expansion of the fishing season from a few days or weeks to several months, timing of deliveries has become critical to realizing production efficiencies for both sectors. Positioning vessels and crews for harvesting and processing in the fisheries, who then may be required to sit idle, can add substantially to the operational costs. Particularly in the first year or two of the program, some processors adopted negotiation positions that would penalize deliveries outside of identified windows (or, from another perspective, reward harvesters for deliveries within those identified windows) to control production efficiency losses. Although in some instances these positions have been thought to be heavy-handed, they are a reflection of the reality that extending operations over a longer period of time can add substantially to costs, particularly in plants in the North region with little opportunity to process catch from non-crab fisheries during the crab season. More recently, the parties have generally resolved these issues through improved coordination between those working on the grounds and in the plants.

[45] The regulation identifies several price structures that may be included in the terms of last best offers (see 80 CFR 680.20(h)(3)(viii)). The rule also refers to the last best offers as defining the "terms of delivery" (see 80 CFR 680.20(h)(3)(ix)). This statement that the last best offers define the terms of delivery, together with the breadth of factors that must be considered under the standard, clearly imply that any and all terms of delivery may be specified in an offer and decided in an arbitration proceeding.

Complicating delivery schedules is the dependence of harvesters and processors on other fisheries. Many of the large processors in the crab fisheries also have interests in the Bering Sea pollock fisheries. Since the roe season in that fishery coincides with the Bering Sea *C. opilio* fishery, processors have had to juggle production across the two fisheries. In some instances, crab fishermen have been less than satisfied with the priority given crab landings. On the other side, many crab fishermen also participate in Pacific cod fisheries. At times of high cod prices, these crab fishery participants have used the flexibility offered by the share allocations in the rationalization program to increase participation in the fall and winter Pacific cod fisheries, to the frustration of some processors.[46] Although these conflicts with other fisheries may persist, both sectors are reported to have worked to reduce conflicts.[47]

In the each of the first five years of the program, the challenge of achieving coordination has been exacerbated because of uncontrollable events. In all years of the program, unanticipated ice conditions slowed fishing in the Bering Sea *C. opilio* fishery. Both sectors were burdened by the costs of standing by until conditions improved. In the second year, a fire that disabled one processing platform intended to operate in the North region caused substantial rescheduling of landings. Although the fire affected only a single platform, almost all processors were affected because of custom processing arrangements and attempts to move landings at other platforms in both the North and South to mitigate added operational costs. These processing capacity problems were compounded by ice conditions in the fishery. Difficulties redistributing deliveries have been compounded by the rigidity of the regionalized Class A IFQ/IPQ matching requirements and the application of those limitations to such a large portion of the harvest share pool. Given the share matching structure, movement of a landing between regions requires the vessel operator (in conjunction with the intended processor) to access both available Class A IFQ and available IPQ with the appropriate regional designations or the harvester to use Class B IFQ. Given that the system requires full share matching in the preseason to accommodate the arbitration structure, redistributing deliveries using Class A IFQ must involve both the holder of the substituting Class A IFQ and the holder of the substituting IPQ. Greater consolidation of harvest shares in cooperatives provides greater opportunities for harvesters to achieve this coordination. In the absence of access Class A IFQ and matching IPQ, Class B IFQ could be used to resolve these delivery coordination conflicts; however, use of Class B IFQ for this purpose could obviate their use by harvesters for additional negotiating leverage or to achieve operational efficiencies.

To help alleviate the complications arising from unforeseen circumstances preventing deliveries in a region, the Council is considering alternatives allowing an exemption from the regional delivery requirements. The alternatives use civil contracts between harvesters, processors, and regional or community representatives to define the terms of the exemption from the regional landing requirement. The civil contracts are intended to facilitate, clarify and streamline the process that may result from NOAA Fisheries administration of the exemption.

Complexity, Cooperatives, and the Inter-Cooperative Exchange

In the first few years after implementation, some participants (particularly harvesters) expressed concern with the complexity of the program. The extent to which this complexity is attributable to any particular aspects of the program is uncertain. The information needs for effective price negotiations in the fisheries would increase under any rationalization program, as participants resolve delivery and market timing issues, which are absent in limited entry derby fishery. Some participants perceive that the arbitration system adds to these information demands through an arbitration standard dependent on first wholesale

[46] At times, some harvesters who do not participate in the cod fisheries have questioned whether delays in completing crab negotiations were used strategically to allow other harvesters time to complete cod harvests prior to the fleet beginning crab fishing.

[47] In at least one instance, a processor has expressed some concern that the harvester was able to control the delivery schedule, since the processor could not initiate arbitration (or performance arbitration) to resolve a dispute.

market pricing, as well as a variety of other delivery characteristics. In the first few years of the program, many harvesters addressed these complexities by organizing their harvest activities in cooperatives, with much of the communications concerning fishing schedules and price negotiation being undertaken by the cooperative leadership.[48] In addition, most independent harvesters have participated in the Inter-Cooperative Exchange.[49] Information sharing is one of the primary roles served by these coordinated efforts. Participants in the Inter-Cooperative Exchange are permitted to exchange information obtained from negotiations with each individual processor. Consequently, the Inter-Cooperative Exchange is likely to have more comprehensive information about competing processors' activities than the processor with whom it is negotiating. Costs of acquiring information and negotiation are also reduced by consolidation of this activity in a single entity. In addition, it is likely that most harvesters have more information available to them through this coordinated system than they might have under a less structured program (i.e., one that did not include such an arbitration system).

Costs of Cooperatives and Arbitration

Some participants have expressed concern that the costs of participation in the arbitration system are excessive. Arbitration administration costs, cooperative membership fees, costs associated with the Inter-Cooperative Exchange, and arbitration organization fees all add costs to participants in program fisheries.

Over the first five years of the program, the annual costs of the arbitration organizations and arbitration administration have declined as the administrative aspects of the arbitration system have become more established and consolidated. The arbitration organization for harvesters that have no processor affiliation (i.e., independent harvesters) charges each member $500.[50] Costs of membership for the processor and affiliated harvester organization are not known, but are likely to be greater on a per member basis because the sector has fewer share holders over which to disburse costs.

By regulation, arbitration administrative expenses are split evenly between the harvester and processing sectors. Processors advance the costs, recouping the harvesters' half of the expenses through an assessment on landings. In the first year of the program, harvesters were assessed a penny per pound to cover their half of the expenses (approximately $225,000), which combined with an equal contribution by processors resulted in approximately $450,000 to cover the arbitration administration costs. These charges greatly exceeded the first year actual arbitration administration costs (approximately $162,000). The remainder was applied to the second year's arbitration administration costs; therefore, no fee for arbitration administrative expenses was collected that year. In the third year, a landing charge of one-half penny per pound was assessed on all harvests. This amount (together with excess funds from previous seasons) was adequate to cover the costs of the arbitration system in the third year. In the fourth and fifth years no charges on lands were charged as the fees collected exceeded costs. Considering the first five years' experiences, it is likely that administrative costs of the arbitration program will remain below one cent per pound (including processor contributions) in the future.[51]

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[48] Some harvesters have expressed concern that delivery scheduling within the fleet is complicated by efforts of some harvesters (and cooperatives) to use scheduling to gain a competitive advantage over other members of the fleet.

[49] For the first four years of the program, the Inter-Cooperative Exchange acted exclusively as a marketing and price negotiating entity for its member cooperatives. In the fifth year of the program, the Inter-Cooperative Exchange modified its structure, becoming a cooperative under the program. This new structure allows the Inter-Cooperative Exchange to directly administer the IFQ harvests of its members (including any intra-cooperative exchanges of shares).

[50] Because of the different information needs of non-affiliated harvesters and the need to limit flow of that information to affiliated harvesters, separate arbitration organizations are mandated by regulation.

[51] Processors are not permitted to participate collectively in arbitration. Consequently, each processor must fully fund its own participation in arbitration.

Cooperative memberships have also increased costs for a large portion of the fleet. These groups are likely beneficial under any rationalization for coordination of harvest activity. Yet, a portion of the activities (and costs) of cooperatives in this program arise from the added need to match Class A IFQ to IPQ. Information concerning these costs are currently unavailable on the magnitude of these costs is available at this time.[52]

In addition to harvest cooperatives, many harvesters bear indirect costs through their cooperative's memberships in the Inter-Cooperative Exchange. Many harvesters view participation in the Inter-Cooperative Exchange as necessary and beneficial at this time. Membership is reported to be stimulated by both the complexity of the arbitration system and the relatively large portion of the harvest allocation that is subject to the IPQ landing requirements and arbitration. Many fishermen believe that accountants and lawyers are necessary to guide negotiations due to the complexity of the system and the expense of gathering market information needed for effective negotiation. The structure of the Inter-Cooperative Exchange has helped distribute its costs through general membership dues based on share holdings. Members are charged these dues regardless of whether their shares are subject to specific negotiation disputes or arbitration.[53] The exact level of these charges is confidential; however, considering the relatively small landing fees that fund the arbitration system's administration, it seems reasonable for harvesters to join the Inter-Cooperative Exchange (at its current membership level) if they believe the organization increases ex vessel prices by even a few cents per pound.

8.8 Pricing and terms of Class B IFQ and C share IFQ deliveries

Since 90 percent of the annual IFQ allocation is made up of A shares, the distribution of benefits between harvesters and processors under the rationalization program has in large part depended on the distribution of benefits from landings of Class A IFQ. In developing the program, however, the Council included 10 percent of the annual catcher vessel owner IFQ allocation as B shares, which may be landed with any processor. To ensure that the benefit of the B share allocation to independent harvesters is not diminished by vertical integration, B shares are issued only to QS holders to the extent of their independence of processor affiliation.[54] In addition, C share IFQ, available to be held by active crew in the fisheries, are free from processor share landing requirements.

In the first year of the program, harvesters had some difficulty adjusting to the IPQ landing requirements on Class A IFQ. These complications led many harvesters to use Class B IFQ to address logistical complications arising because of the landing limitations on Class A IFQ.[55] Since that time, many

[52] Economic data reports include information on cooperative costs. Once issues concerning the quality and confidentiality of data in those reports have been adequately addressed, information concerning cooperative costs may be available.

[53] Given the negotiation strategy of using one processor's offer to induce other processors to match the price, this distribution of charges is generally perceived as fair and beneficial by Inter-Cooperative Exchange members. The incentive to arbitrate, in turn, is likely affected if costs are shared by persons who are not party to the arbitration. To the extent that success in arbitration boosts prices from other processors (either through the feedback of the price formula in the following year or through the cooperative's reputation for successful negotiation), non-parties who are members of the Inter-Cooperative Exchange likely benefit from those proceedings.

[54] Affiliation under the regulation exists in the case of either functional control of the QS holder or common ownership in excess of 10 percent (50 CFR 680.2). QS holders receive Class A IFQ in an amount equal to the IPQ allocation of their affiliates, with any remainder subject to the Class A IFQ/Class B IFQ split.

[55] In some cases, harvesters landed small amounts of Class B IFQ with deliveries of Class A IFQ, effectively rounding out the trip. These harvesters believed that it is more efficient to fully harvest and deliver their Class A IFQ allocations with a minor overage that is covered by Class B IFQ, rather than risk an minor underage that might require an additional delivery to a processor. Harvesters clearly gain some efficiencies from this practice, but it does limit their ability to competitively market Class B IFQ landings. In other cases, harvesters used almost exclusively

harvesters have adapted to the program and used their cooperative associations to pool Class B IFQ to be marketed separately from Class A IFQ. As a result, it is believed that most harvesters have been able to develop some competition for their Class B IFQ landings.

Data distinguishing ex vessel prices by IFQ type, as well as anecdotal evidence, suggest that harvesters have been able to gain a premium on landings of Class B and C share IFQ catch over landings Class A IFQ catch (see Table 8-7). [56] These premiums vary across participants and time, averaging between 5 cents and 10 cents.[57] Premiums are thought to fluctuate with market conditions, which vary within and across years. When crab product markets are particularly weak, processors are thought to be generally less willing to buy crab to add to existing inventories. Although price data do not show noticeable differences, competition for Class B and C share IFQ is believed to have been at its lowest in the first year of the program, when harvesters were least prepared to market landings and crab prices were particularly low. Harvesters, who have since become more familiar with the program, were less prepared to coordinate activities to generate competition for Class B and C share IFQ catches. Since that time, harvesters are said to have become better organized, stimulating more competition for Class B and C share IFQ landings. Premiums are thought follow a few patterns. Specifically, premiums are thought to be raised when a processor has identified a specific market for its product.

Table 8-7 Average landings prices by share type in the Bristol Bay red king crab, Bering Sea C. opilio, and Bering Sea C. bairdi fisheries (2006 through 2009 - annual data).

Fishery	Year	Class A IFQ landings			Class B IFQ landings			C share IFQ landings		
		Revenue	Pounds	Price	Revenue	Pounds	Price	Revenue	Pounds	Price
Bristol Bay red king crab	2006	43,204,549	11,330,881	3.813	11,066,488	2,855,527	3.875	2,003,144	528,689	3.789
	2007	65,323,237	14,730,496	4.435	15,766,650	3,502,205	4.502	2,232,231	487,674	4.577
	2008	70,197,669	13,796,804	5.088	21,098,077	4,100,529	5.145	1,719,372	332,681	5.168
	2009	53,856,252	11,615,840	4.636	14,229,047	3,022,906	4.707	2,148,870	451,832	4.756
Bering Sea *C. opilio*	2006	29,383,117	26,346,823	1.115	6,582,021	5,757,362	1.143	984,460	858,784	1.146
	2007	42,982,091	25,149,087	1.709	9,522,130	5,442,174	1.750	1,409,742	837,659	1.683
	2008	73,364,358	42,596,568	1.722	20,729,104	11,513,265	1.800	2,888,953	1,559,611	1.852
	2009	58,563,857	40,284,632	1.454	14,426,795	9,931,193	1.453	1,987,301	1,261,385	1.575
Bering Sea *C. bairdi*	2006	952,885	633,227	1.505	347,285	215,946	1.608	22,391	15,466	1.448
	2007	3,122,336	1,784,579	1.750	466,261	255,640	1.824	42,002	24,708	1.700
	2008	2,890,985	1,558,198	1.855	1,078,376	553,377	1.949	70,074	36,233	1.934
	2009	2,955,173	1,548,135	1.909	854,372	460,747	1.854	109,361	59,051	1.852

Source: EDR data

In addition to anecdotal and collected price information, other sources of evidence suggest that harvesters have developed competition for Class B and C share IFQ landings. In many cases, harvesters have been able to make deliveries of crab harvested exclusively with Class B and C share IFQ (see Table 8-8 and Table 8-9). The data suggest that, through the first four years of the program, harvesters increased their coordination of the harvest of allocations to allow deliveries of Class B and C share IFQ harvests

Class B IFQ to cover deadloss. Both of these practices are believed to have declined since the first year of the program.

[56] Care should be taken in interpreting data concerning price differences across share type. Since these data are annual, vessel level data, substantial premiums received by a vessel for a landing may be obscured, if that same vessel made landings without any premium. Similarly, examining price fluctuations in relationship to the market is not possible for two reasons. First, price data are reported on an annual basis. Second, the pricing agreements often do not coincide with deliveries and may be reached before, during, or even after the season.

[57] The difference between ex vessel prices for Class A IFQ landings and Class B and C share IFQ landings are likely the best available information for valuing IPQ and PQS. The value of an annual IPQ pound is the difference between the Class A IFQ/IPQ landings price and Class B and C share IFQ landings price. The value of PQS is the discounted stream of savings on the yielded IPQ ex vessel price payments as compared to price payments for the same quantity of Class B or C share IFQ landings. As with QS, PQS values may be discounted from these levels to accommodate TAC and market uncertainties.

independent of harvests of Class A IFQ in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries, as approximately two-thirds of the pool of those shares were landed independent of Class A IFQ in the third and fourth years of the program. In the fifth year of the program, the portion of the Class B and C share IFQ pools landed independently of Class A IFQ declined to between 45 percent and 50 percent of the pool of Class B and C share IFQ in those two fisheries. Yet, it is notable that the average delivery of exclusively B and C share IFQ increased to approximately 90,000 pounds. The increase in the size of these deliveries suggest that harvesters are achieving greater efficiency in the harvest of these shares and that harvesters have been able to negotiate separate delivery terms for these shares in some cases.

Table 8-8 Deliveries of crab harvested exclusively with Class B and C share IFQ in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (2005-2006 through 2009-2010).

Fishery	Season	Total number of deliveries	Total pounds landed	Total B/C IFQ* landed	Deliveries of B/C IFQ exclusively					
					Number of deliveries	Percent of deliveries	Total pounds delivered	Percent of B/C IFQ pool	Average delivery	Median delivery
Bristol Bay red king crab	2005-2006	228	15,725,723	1,968,154	25	11.0	593,484	30.2	23,739	15,282
	2006-2007	168	13,248,036	1,663,571	22	13.1	488,638	29.4	22,211	6,109
	2007-2008	219	17,497,740	2,220,327	33	15.1	1,360,461	61.3	41,226	38,209
	1008-2009	224	17,462,247	2,194,695	39	17.4	1,483,396	67.6	38,036	36,363
	2009-2010	191	13,687,936	1,724,281	22	11.5	762,311	44.2	34,651	19,494
Bering Sea *C. opilio*	2005-2006	257	30,233,056	3,830,350	19	7.4	1,202,393	31.4	63,284	31,301
	2006-2007	228	29,710,449	3,775,748	33	14.5	2,345,567	62.1	71,078	57,299
	2007-2008	392	51,627,697	6,602,252	59	15.1	4,693,859	71.1	79,557	69,718
	1008-2009	363	47,748,526	6,117,206	54	14.9	4,008,860	65.5	74,238	64,252
	2009-2010	276	39,331,636	5,029,562	28	10.1	2,539,847	50.5	90,709	75,255

Source: RAM IFQ landings database.

* includes Class B IFQ and C share IFQ landings.

In the other fisheries, data cannot be released showing the poundage of landings of Class B and C share IFQ that were landed separately from Class A IFQ. The data in these fisheries, however, suggest that harvesters have managed to segregate the harvest of Class B and C share IFQ to some degree.

Table 8-9 Deliveries of crab harvested exclusively with Class B and C share IFQ in the Bering Sea *C. bairdi,* Aleutian Island golden king crab, and St. Matthew Island blue king crab fisheries (2005-2006 through 2009-2010).

Fishery	Season	Total number of deliveries	Number of deliveries of B and C shares exclusively	Percent of deliveries that were deliveries of B and C shares exclusively
Eastern Aleutian Islands golden king crab	2005-2006	28	2	7.1
	2006-2007	24	2	8.3
	2007-2008	27	1	3.7
	1008-2009	26	3	11.5
	2009-2010	26	6	23.1
Eastern Bering Sea *C. bairdi*	2006-2007	51	8	15.7
	2007-2008	50	7	14.0
	1008-2009	50	9	18.0
	2009-2010	32	6	18.8
Western Aleutian Islands golden king crab	2005-2006	19	2	10.5
	2006-2007	9	0	0.0
	2007-2008	16	3	18.8
	1008-2009	14	1	7.1
	2009-2010	13	1	7.7
Western Bering Sea *C. bairdi*	2005-2006	68	17	25.0
	2006-2007	55	12	21.8
	2007-2008	43	5	11.6
	2008-2009	49	14	28.6
St. Matthew Island blue king crab	2009-2010	16	1	6.3

Source: RAM IFQ landings database.

Examining buyers of Class B and C share IFQ catches and the extent to which buyers purchase larger portions of the Class B and C share IFQ catches than Class A IFQ catches suggest that some processors are competing for landings of Class B and C share IFQ catch (see Table 8-10). In the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries, more persons have purchased Class B and C share IFQ catches than Class A IFQ catches. This difference suggests both competition for Class B and C share IFQ landing and the entry to the fisheries of persons through purchases of Class B and C share IFQ landings. Examining processors who purchased a greater share of the Class B and C share IFQ landings than Class A IFQ landings also suggests that a few buyers have competed for these landings. In both the Bristol Bay red king crab and the Bering Sea *C. opilio* fisheries, a large portion of the Class B and C share IFQ catches have been purchased by a few buyers who have purchased a small share of the Class A IFQ catches. Only in the 2008-2009 Bristol Bay red king crab season has the poundage of Class B and C share IFQ landings exceeded the purchases of Class A IFQ landings by these buyers. Also, it is notable that in the most recent Bering Sea *C. opilio* season landings with processors that purchased more of the Class B and C share IFQ catches that Class A IFQ catches appears to have decreased suggesting a decrease in competition for these landings (which is also suggested by relative absence of a price differential for these shares); however, overall, the differential in the distribution of landings suggests that harvesters have been able to stimulate competition for these Class B and C share IFQ catches.

Table 8-10 Purchases of IFQ landings by share type in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (2005-2006 through 2009-2010).

Fishery	Season	Class A IFQ landings		B/C* IFQ landings		Buyers purchasing a greater percent of B/C IFQ pool than of the Class A pool				
		Number of buyers	Total pounds landed	Number of buyers	Total pounds landed	Number of buyers	Pounds of Class A IFQ landings purchased	Percent of Class A IFQ pool purchased	Pounds of B/C IFQ landings purchased	Percent of B/C IFQ pool purchased
Bristol Bay red king crab	2005 - 2006	9	13,757,569	10	1,968,154	4	2,505,097	18.2	1,226,332	62.3
	2006 - 2007	10	11,584,465	12	1,661,730	5	3,200,529	27.6	902,304	54.3
	2007-2008	13	15,277,413	15	2,220,327	6	2,838,886	18.6	1,928,226	86.8
	2008-2009	12	15,267,552	14	2,194,695	6	1,456,709	9.5	1,668,013	76.0
	2009-2010	11	11,963,655	13	1,724,281	6	3,494,991	29.2	1,338,976	77.7
Bering Sea *C. opilio*	2005 - 2006	9	26,402,706	10	3,830,350	5	8,579,616	32.5	2,281,550	59.6
	2006 - 2007	12	25,934,701	14	3,772,320	5	3,454,996	13.3	2,782,536	73.8
	2007-2008	11	45,025,445	15	6,602,252	7	5,914,751	13.1	4,699,000	71.2
	2008-2009	10	41,631,320	12	6,117,206	4	5,436,982	13.1	4,645,602	75.9
	2009-2010	9	34,302,074	10	5,029,562	3	4,446,019	13.0	2,930,986	58.3

Source: RAM IFQ database.
* includes Class B IFQ and C share IFQ.

In the smaller fisheries, data concerning the differences in purchases of Class B and C share IFQ catches and Class A IFQ catches cannot be revealed because of confidentiality protections; however, the number of buyers of catches by share type can be revealed. With few exceptions, the same number of persons have purchased catches of the different share types. The absence of buyers of only Class B and C share IFQ catches does not mean that harvesters have not generated competition for these landings, but raises the question of whether persons who do not have IPQ will have the ability to enter these small TAC fisheries. In all of these fisheries, a few buyers have purchased a greater percentage of the Class B and C share IFQ catches than Class A IFQ catches. These numbers suggest that to some extent harvesters have directed landings to persons willing to pay the most for those catches in these fisheries.

Table 8-11 Buyers of catches by share type and fishery in the Bering Sea *C. bairdi,* Aleutian Island golden king crab, and St. Matthew Island blue king crab fisheries (2005-2006 through 2009-2010).

Fishery	Season	Class A IFQ		B/C* IFQ	
		Number of buyers	Total pounds landed	Number of buyers	Total pounds landed
Eastern Aleutian Island golden king crab	2005-2006	4	2,134,076	4	308,474
	2006-2007	5	2,245,212	5	320,223
	2007-2008	3	2,241,690	3	322,581
	2008-2009	5	2,355,260	5	339,649
	2009-2010	6	2,353,325	6	346,635
Eastern Bering Sea *C. bairdi*	2006-2007	7	1,085,709	8	129,288
	2007-2008	6	1,186,228	7	179,568
	2008-2009	7	1,300,447	9	191,389
	2009-2010	10	977,839	11	138,761
Western Aleutian Island golden king crab	2005-2006	4	1,102,941	4	163,226
	2006-2007	4	718,180	4	162,106
	2007-2008	3	962,837	3	163,214
	2008-2009	6	910,312	6	165,820
	2009-2010	4	1,134,366	4	167,374
Western Bering Sea *C. bairdi*	2005-2006	7	693,212	7	65,861
	2006-2007	8	548,820	8	62,597
	2007-2008	7	420,540	7	36,653
	2008-2009	5	92,153	7	15,964
St. Matthew Island blue king crab	2009-2010	6	439,512	6	21,347

Source: RAM IFQ database.

* includes Class B IFQ and C share IFQ.

In addition to data shortcomings, several other factors complicate any consideration of the degree to which the 10 percent Class B IFQ and 3 percent C share IFQ allocations create a competitive market. In considering the extent of competition for Class B and C share IFQ landings, it is important to recognize that the predominance of Class A IFQ/IPQ landings in the fisheries. As should be anticipated, with a large majority of the catch subject to the IPQ landing limitations (and potentially the arbitration system), it is possible that available markets for landings of Class B and C share IFQ are limited. Three factors could contribute to this reduction in competition: choices of IFQ holders to use Class B and C share IFQ to achieve harvester production efficiencies (instead of attempting to market those IFQ competitively), any loss of incentive to pursue product market opportunities arising from the Class A IFQ/IPQ allocations and arbitration system, and any disincentive for entry arising from the magnitude of the Class A IFQ/IPQ allocation.

Although less prevalent since the first year of the program, some harvesters are believed to have elected to use Class B and C share IFQ to improve harvesting production efficiencies, making those IFQ unavailable for competitive marketing. Driven by IFQ holders' decisions, this use of shares will limit the extent of competition for landings of Class B and C share IFQ. Harvesters may realize efficiencies in harvesting by using Class B and C IFQ harvests to supplement a partial delivery of Class A IFQ harvests, reducing the need for an additional trip to harvest (and independently market) the Class B and C IFQ catch. Also, when making Class A IFQ harvests, some harvesters use Class B and C share IFQ to avoid underages that would require an additional trip, knowing that Class B and C shares can be used to cover any Class A IFQ harvest overage. These uses of Class B and C share IFQ clearly benefit harvesters, but

detract from the use of Class B and C shares to pursue competitive markets. Yet, harvesters adopting this practice may be better off, particularly with Class A IFQ landings bringing prices relatively close to Class B and C share landings.

The Class A IFQ/IPQ share allocations effects on processor entry could also reduce competition for Class B and C share IFQ landings. To enter a fishery at all a processor likely must purchase some minimum level of landings. With the large share of the TAC committed to IPQ holders as Class A IFQ, it is possible that some potential entrants view the Class B and C share IFQ pool as too small to support their entry. In other words, although some processors have entered the fishery through purchase of Class B and C share IFQ landings, that pool of landings may be too small to support entry by all processors that wish to enter. So, it is possible that Class B and C share IFQ ex vessel prices are somewhat dampened by the election of potential processors not to enter the market for these landings. It is important to consider that this reduction in entry and competition is an expected effect that arises from the Class A IFQ/IPQ allocations. The Class A IFQ/IPQ pool is intended to protect investments of existing processors, in a manner similar to the protection of harvester investments by IFQ. In addition, entry to processing in the crab fisheries is challenging in any case and is likely limited by the nature of the fisheries. The remote processing locations and limited TACs require that a processor have processing activities in other fisheries (including groundfish fisheries) to support processing investments. So, reductions in competition for Class B and C share IFQ landings arise not only from the Class A IFQ allocations in the fishery, but also from the characteristics of the fisheries themselves.

Competition for Class B and C share IFQ landings may also be inhibited to the extent that the allocations under the program inhibit product developments. A few competing factors shed light on whether the program's share allocations have inhibited product developments. In the second and third years of the program, one processor that holds no PQS has been active in the processing sector through the purchase of Class B and C share IFQ landings and has leased IPQ. This processor developed relatively high quality red and golden king products, choosing to separate legs during primary production, rather than producing bulk packs of sections that are later separated during secondary processing. The development of these products exclusively by a processor without PQS could be interpreted to suggest that PQS may be inhibiting product development. On the other hand, these production developments might be most efficiently adopted by an entering processor; and the advantage of an entering processor may be greatest when the market is relatively small. The entering processor may be able to have all of its production go to this small market, whereas an existing processor with larger production amounts may need to maintain two lines of production to adapt to a small niche market. Juggling production and personnel across two lines by an existing processor could increase production costs. An entering processor may be able to configure its production line from scratch. Modification of existing lines may be more costly and may not be worth the tradeoff for a larger processor with an existing line and larger scale production, particularly for development of a small niche market. In addition, examining world markets sheds light on whether the product developments are lagging in the program fisheries. If products are being developed elsewhere that are neglected here, the share allocations under the program may be creating a disincentive for innovation. To date, no evidence of such a lag has been suggested. In addition, after the third year, the entering processor failed, closing its operations. This failure likely resulted from a drop in cod prices, as the processor had been very active in that market. Consequently, the failure may not suggest an absence of potential for new markets and crab production. On the other hand, the company's departure demonstrates the importance of having a relatively stable, broad-based operation that includes products from outside of the crab fisheries.

9 ENTRY OPPORTUNITIES

This section examines entry opportunities to the crab fisheries and how those opportunities changed under the rationalization program. The section begins with a brief discussion of harvester entry opportunities under the License Limitation Program, which preceded the rationalization program, which is followed by a discussion of entry opportunities under the rationalization program. The section then goes on to discuss entry to the processing sector under the LLP and the rationalization program.

9.1 Entry to the harvest sector under the LLP

Entry into the fisheries under the LLP occurred primarily in two ways. Some persons with access to considerable capital were able to enter through the purchase of an LLP license and vessel. Since the fisheries were greatly overcapitalized, some lenders were reluctant to extend financing for entry to the fisheries. In addition, historically low GHLs in the early 2000s, made investments to the fishery less attractive. The nature of the fisheries also increase the risk associated with entry. In brief derby seasons of a few days or weeks, poor catch rates and vessel breakdowns could result in no or little revenues for the season. New entrants dependent on revenues from the fisheries for their vessel payments faced greater risks under this derby management as they competed with others for a share of the GHL.

In the years leading up to the rationalization program, the cost of full scale entry of this sort was generally dependent on the history associated with the license and vessel purchase. Most persons anticipated the history-based harvest allocations under the rationalization program (and under the buyback), so prices of licenses and vessels were typically dependent on catch histories. Few transactions occurred in the years leading up to the program, as many persons sought to retain holdings until the rationalization program was implemented (see Table 9-1).

Table 9-1 Transfers of crab LLP licenses (2002-2004).

Year	Number of transfers							
	Total	Bristol Bay red king crab	Bering Sea *C. opilio* and *C. bairdi*	Pribilof red and blue king crab	St. Matthew Island blue king crab	Aleutian Island red king crab	Aleutian Island golden king crab	Catcher processor
2002	1	1	1	0	1	0	0	0
2003	3	3	3	1	0	1	2	2
2004	1	1	0	0	0	0	0	0

Source: NMFS RAM LLP license file.
Includes only transfers with change of named license holder.

An alternative method of entry was open to some captains and crew in the fisheries. The typical progression in the fisheries was for crewmembers to work their way up to become skippers. With most vessels employing approximately 5 deck crew, the opportunity for advancement to skipper was limited. Some long term captains who sought to enter the fisheries were able to convince the vessel owner/license holders they worked for to sell them an interest in the operation. Persons entering the fishery in this manner, typically had strong long term relationships with their employers (i.e., the vessel owners) and shared in the oversight of annual maintenance and upkeep of the vessel. This progression from skipper to vessel owner was also available only to a few skippers, who had strong relationships with a vessel owner who was interested in sharing an interest in the vessel. Some vessel owners were unwilling to accept investments in the years leading up to the rationalization program, anticipating history based allocations under the program. As a consequence of the distribution of harvest privileges and stock conditions in the fisheries, entry opportunities were limited under the LLP.

9.2 Entry to the harvest sector under the rationalization program

Since the crab fisheries were greatly overcapitalized on implementation of the rationalization program, any absence of entry to the fisheries to date should be fully expected. The restructuring of harvest privileges under the rationalization program has changed the nature of entry opportunities substantially. Entry can occur through the purchase of harvesting QS without ownership of an interest in a vessel or a supporting license. Annual IFQs can then be fished liberally through leasing arrangements. Since QS are divisible, gradual entry into the program fisheries is permitted. The cost of entry is determined by QS prices, which depend on TACs, crab markets and other factors.

QS can be purchased directly from QS owners or through brokers. The market for crab QS has tended to be less fluid than that for sablefish or halibut QS because crab QS holdings are more concentrated with a relatively smaller number of known participants in the market. Since much of the share concentration resulted from the initial allocation of QS, the thin market is largely a reflection of the historic distribution of interests in the fisheries. The more industrial nature of the fishery, with larger investments in vessels, has also contributed to concentration of interests. With this concentration, few transactions take place and most transactions for owner QS have tended to be large, requiring substantial access to capital (see Table 9-2). Until the most recent year, the annual average priced transaction for owner QS (based on available price information and the average transfer size) exceeded $300,000 in the Bering Sea *C. opilio* fishery and the Bristol Bay red king crab fishery. At the extreme, in the second year of the program, the average owner QS transaction in the Bristol Bay red king crab fishery was approximately $1 million. In these fisheries, the average owner share transaction has been for nearly one-tenth of one percent of the QS in the fishery (an amount substantially less than the average annual vessel harvest). Although these large QS purchases are subject to risks associated with TAC fluctuations, they have substantially less risk than the purchase of licenses and vessels under the derby-style LLP fishery.

Full scale entry requires ownership of a vessel in addition to this quota acquisition. Yet, cooperative harvest of IFQ and leasing create an opportunity for a more gradual entry without a vessel. A person can lease IFQ yielded by held QS over a period of years, then acquire a vessel to achieve full scale entry. This method of entry has created greater entry opportunities than existed under LLP management.

Alternatively, the separation of accessible harvest privileges from vessel ownership allows persons to enter by purchasing a vessel without QS. Through the leasing market such a person can access IFQ without substantial QS holdings; however, such an approach to entry to the fishery is relatively high risk and may have little return. The entering vessel owner comes to the lease market with relatively high demand for IFQ and must lease enough IFQ to support the vessel's operation and mortgage payments. Given the prerationalization overcapacity in the fishery, it is not surprising that persons choosing to enter the fishery in this manner have had difficulty. Because of this glut of vessels (most of which are owned by persons who received substantial initial allocations of QS), those entering the fisheries by purchasing a vessel without access to substantial amount of QS will face a costly lease market. In such a circumstance, the entering vessel owner is likely to find small margins on leases. The specific circumstances of a vessel owner may determine whether entry is successful. If the vessel is engaged in other activities outside of the crab fisheries (such as cod fisheries or tendering), the potential for success is likely greater. As under the LLP, full scale entry opportunities to the fisheries are limited and remain costly. Yet, the divisibility of interests in the rationalization program allows more paths of entry and may reduce risk depending on the method of entry chosen.

Table 9-2 QS transfers and estimated transfer costs (2005 to 2010)

Fishery	Sector	Year	Number of priced transfers	Total number of priced shares transferred	Average share price	Average cost of a transfer	Average portion of quota share pool transferred
Bristol Bay red king crab	Catcher vessel crew	2005	20	1,167,992	0.75	43,686	0.015
		2006	24	1,130,330	0.68	32,257	0.012
		2007	10	525,490	0.65	34,303	0.013
		2008	10	522,640	0.81	42,408	0.013
		2009	9	427,846	0.75	35,879	0.012
	Catcher vessel owner	2005	12	5,109,609	0.78	330,542	0.106
		2006	27	24,420,200	1.20	1,084,922	0.225
		2007	21	7,144,784	1.17	399,207	0.085
		2008	29	15,859,554	1.10	601,410	0.136
		2009	12	4,525,837	0.90	339,745	0.094
		2010	14	1,304,924	0.87	81,286	0.023
Bering Sea *C. opilio*	Catcher vessel crew	2005	25	2,793,091	0.24	27,341	0.011
		2006	33	2,589,187	0.19	15,100	0.008
		2007	12	821,969	0.26	17,753	0.007
		2008	10	757,824	0.42	31,589	0.008
		2009	15	1,121,203	0.28	20,804	0.007
	Catcher vessel owner	2005	23	25,473,247	0.38	419,732	0.110
		2006	36	48,984,237	0.26	350,501	0.135
		2007	26	24,751,778	0.47	445,936	0.095
		2008	21	19,426,276	0.56	518,192	0.092
		2009	14	6,452,415	0.34	155,133	0.046
Bering Sea *C. bairdi*	Catcher vessel crew	2005	14	400,790	0.19	5,545	0.014
	Catcher vessel owner	2005	10	5,403,408	0.31	169,137	0.269
Eastern Bering Sea *C. bairdi*	Catcher vessel crew	2006	17	394,012	0.05	1,117	0.012
		2007	5	178,143	0.07	2,662	0.018
	Catcher vessel owner	2006	17	6,577,526	0.07	25,414	0.193
		2007	9	3,030,918	0.26	86,601	0.168
		2008	17	7,206,331	0.21	88,902	0.211
		2009	5	832,229	0.06	9,888	0.083
Western Bering Sea *C. bairdi*	Catcher vessel crew	2006	15	349,891	0.04	817	0.012
		2007	5	178,143	0.04	1,585	0.018
	Catcher vessel owner	2006	22	8,511,781	0.08	31,788	0.193
		2007	8	2,948,045	0.08	31,294	0.184
		2008	18	7,264,683	0.08	33,549	0.201
		2009	5	832,229	0.03	5,809	0.083

Notes: Includes only priced transfers for share types of which 5 or more non-nominally priced transactions occurred in a years. All transfers of Bering Sea *C. bairdi* occurred prior to division of those allocations into two areas and therefore include transfers of both Eastern and Western Bering Sea *C.bairdi*. A portion of these transfers included accompanying IFQ for the current season.

Source: Restricted Access Management, NOAA Fisheries.

While large scale entry is challenging, C share QS have opened new avenues for small scale entry by eligible crew. C share QS typically sell for less than owner QS, in part, because of the active participant requirements applicable to C shares. The relatively low caps on C share QS holdings and the small percentage of the total harvest share allocation made up of C shares limit the ability of persons to

consolidate large C share QS holdings. As a result, C shares transfers must be of relatively small amounts of QS, which are likely to be more affordable, particularly to crew, who may have less access to capital. Available transfer information from the first five years of the program suggests that the average transfer in each fishery is for approximately one-hundredth of the QS pool and is valued at less than $50,000. Notwithstanding these relatively small scale transactions, some crew report that access to capital remains problematic, as the planned federal loan program has yet to be launched.

One way to examine entry to the harvest sector is to estimate the acquisition of QS by persons who did not receive an initial allocation. Two types of entrants could be considered: entrants who acquired shares in a fishery in which they hold no shares and entrants who acquired shares who hold shares in none of the program fisheries. Considering owner QS first, data suggest that entrants of either type have acquired over 10 percent of the owner QS in all fisheries, over 20 percent in the two major fisheries, and over 40 percent in the Eastern Aleutian Islands golden king crab fishery (see Table 9-3). Almost 60 new holders, who did not receive an initial allocation in any fishery, have acquired QS in the first five years of the program. Yet, given that many persons hold owner QS indirectly, through corporations or partnerships, it is likely that a portion of this suggested entry is simply restructuring of holdings of persons who received allocations.

Table 9-3 New holders of owner QS since the initial allocation

owner qs

Fishery	New QS holder in the fishery			New QS holder in all fisheries		
	Number of entrants	QS units acquired	Percent of QS pool acquired	Number of entrants	QS units acquired	Percent of QS pool acquired
Bristol Bay red king crab	71	88,775,336	22.8	59	76,583,985	19.6
Bering Sea *C. opilio*	64	215,880,299	22.1	53	193,046,536	19.8
Eastern Aleutian Islands golden king crab	7	4,036,693	41.6	4	3,768,575	38.9
Eastern Bering Sea *C. bairdi*	46	37,165,677	19.1	46	37,165,677	19.1
Pribililof red and blue king crab	31	5,885,636	20.1	22	4,972,631	17.0
St. Matthew Island blue king crab	43	7,540,301	25.6	33	5,569,191	18.9
Western Aleutian Islands golden king crab	4	4,856,969	12.5	4	4,856,969	12.5
Western Aleutian Islands red king crab	9	10,246,983	17.6	5	9,619,962	16.5
Western Bering Sea *C. bairdi*	46	37,165,679	19.1	46	37,165,679	19.1

Source: RAM QS database.

Since C share QS may only be held by individuals, C share data may better illustrate the extent of new entry (see Table 9-4). Yet, since some entering C share holders may hold owner QS indirectly, estimates of entry may be misleading. Although C shares improve the opportunity for entry, few persons have entered the fisheries through C share acquisition since the initial allocation. Those few that have entered have acquired relatively large holdings of C shares, with the average entrant in most fisheries exceeding one-half of one percent of the C share QS pool. In the two Aleutian Islands golden king crab fisheries, the new entrants have on average acquired in excess of 7 percent of the C share QS pool. Given that only a few vessels participate in that fishery, the relatively large share acquisitions are not surprising.

Table 9-4 New holders of C share QS since the initial allocation

C qs						
Fishery	New C share QS holder in the fishery			New C share QS holder		
	Number of entrants	QS units acquired	Percent of QS pool acquired	Number of entrants	QS units acquired	Percent of QS pool acquired
Bristol Bay red king crab	20	1,836,311	15.3	12	1,091,400	9.1
Bering Sea *C. opilio*	18	3,958,427	13.1	12	2,595,125	8.6
Eastern Aleutian Islands golden king crab	3	62,155	20.7	1	39,591	13.2
Eastern Bering Sea *C. bairdi*	11	371,695	6.2	10	363,080	6.0
Pribililof red and blue king crab	2	63,116	7.0	0	0	0.0
St. Matthew Island blue king crab	12	166,438	18.3	4	59,101	6.5
Western Aleutian Islands golden king crab	2	218,347	18.2	1	142,704	11.9
Western Aleutian Islands red king crab	0	0	0.0	0	0	0.0
Western Bering Sea *C. bairdi*	11	371,695	6.2	10	363,080	6.0

Source: RAM QS database.

9.3 Entry to the processing sector

Unlike the harvest sector, entry to the processing sector was not limited under the LLP. As a result, processor participation fluctuated greatly in the years leading up to the implementation of the rationalization program. In the early 1990s more than 50 processors operated in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries. Under lower GHLs in the late 1990s and early 2000s, processing participation dropped to fewer than 20 plants in those fisheries.

Both prior to and since implementation of the rationalization program, entry to the processing sector as only a crab processor was very challenging. Processors that also process groundfish are able to keep plants operating for a greater period of time, spreading capital costs across larger scale production. Consequently, entry to the processing sector is affected by a processor's potential to enter groundfish fisheries and secure a portion of that production. With groundfish processing fully capitalized, entry opportunities in the crab processing sector are also limited. In addition, to the extent that other management programs (such as the AFA Bering Sea pollock cooperative program, Bering Sea and Aleutian Island cod sector allocations, and the Amendment 80 cooperative program) directly or indirectly limit the ability of processors to enter those fisheries, entry to the crab fisheries is more constrained, regardless of the limits on entry created by the crab management program.

Share holdings data suggest that a few processors have entered the fisheries, since implementation of the program, in some cases with development of substantial holdings. In the Western Aleutian Islands golden king crab fishery, a majority of PQS is now held by entering processors, while over 20 percent of the PQS in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries are held by entering processors. In some instances, this suggested entry has arisen from simple changes in the structure of holdings. In at least one case, however, a substantial interest has been acquired by a new entrant. Although that entrant has not processed landings directly, the lease of those shares has supported processing by an entering processing platform.

Table 9-5 New holders of PQS since the initial allocation

pqs						
Fishery	New PQS holder in the fishery			New PQS holder in all fisheries		
	Number of entrants	QS units acquired	Percent of QS pool acquired	Number of entrants	QS units acquired	Percent of QS pool acquired
Bristol Bay red king crab	6	91,420,986	22.7	5	88,647,884	22.1
Bering Sea *C. opilio*	6	201,703,287	20.1	5	200,098,929	20.0
Eastern Aleutian Islands golden king crab	5	2,191,667	21.7	4	2,098,967	20.7
Eastern Bering Sea *C. bairdi*	5	22,898,503	11.5	4	22,877,627	11.5
Pribililof red and blue king crab	2	4,893,835	16.3	1	738,827	2.5
St. Matthew Island blue king crab	4	4,169,060	13.9	3	1,782,036	5.9
Western Aleutian Islands golden king crab	4	21,191,574	53.0	3	21,036,411	52.6
Western Aleutian Islands red king crab	3	37,492,387	62.5	2	21,248,567	35.4
Western Bering Sea *C. bairdi*	5	22,898,503	11.5	4	22,877,627	11.5
Source: RAM PQS database.						

In addition to entry as PQS or IPQ holders, processors may also enter the fishery through purchases of landings of Class B or C share IFQ crab. Entry as a processor acquiring IPQ annually or purchasing landings of Class B or C share IFQ crab can reduce risk, since acquisitions are annual (representing no longer term investment as PQS). These annual purchases will not subject the new entrant to risks such as annual TAC changes or long term changes in product markets.

In a few instances, processors are believed to have entered the fishery through purchases of Class B and C share IFQ landings (see Table 8-11). This entry has been relatively small scale, as Class B and C share IFQ represent a relatively small portion of the IFQ pool. In some cases, these entering processors are known to have been active in other fisheries, supplementing those activities with processing of crab. The potential of any of these entrants to expand operations depends on their willingness to continue to compete for Class B and C share IFQ landings and to acquire PQS to sustain that participation.

10 MANAGEMENT AND ENFORCEMENT

The system of share-based fishing established by the program includes several fishing privileges and obligations that must be overseen by NOAA Fisheries managers and enforcement agents. Several aspects of participation in the program must be administered and monitored to ensure compliance with the regulatory requirements. These requirements present extensive and unique challenges to NOAA Fisheries Restricted Access Management and Office of Law Enforcement.

Two structural aspects of the program have created issues with annual allocations since the program was implemented. First, in two recent seasons the timeliness of applications for annual allocations by holders of substantial portions of the owner QS and PQS pools have been uncertain. In both cases, participants were ultimately issued their respective IFQ and IPQ allocations, but not until appeals were processed. In the event that any finding is not finalized (i.e., the finding is under appeal with agency administers or in courts), administrators are required to set aside a portion of the IFQ or IPQ pool to satisfy a possible judgment in favor of the applicant. In a traditional IFQ program, such a set aside would affect other fishery participants indirectly by decreasing their annual harvest share allocations proportionally and could result in the reserved allocation remaining unharvested. Under the crab program's processing share structure, reserving the allocation creates an additional effect – a mismatch between the Class A IFQ and IPQ pools. This mismatch effectively prevents a share holder (either Class A IFQ holder or IPQ holder) from using shares, as equal amounts of both share types are required for the harvest and landing of crab. In other words, if IPQ are withheld, a portion of the Class A IFQ (equal to the amount of unissued IPQ)

will be stranded. If Class A IFQ are withheld, the holder of an equal amount of IPQ will be unusable. The specific person whose IFQ or IPQ are stranded will depend on matches made by participants after the issuance of IFQ and IPQ.

Resolution of any such matching issue is dependent on the finalization of all application findings. Although making the deadline for application earlier may provide additional time for resolution of administrative findings, changing the application date will not solve the problem entirely, as administrative and judicial appeals often require substantial amounts of time. Another suggestion (which may be implemented without Council action) would be to provide improved information to participants to monitor applications. It is suggested that providing up-to-date information showing applications received by RAM would allow cooperative managers and organizations to monitor applications of members to ensure that deadlines are not neglected. Although, on its face, such a change may seem simple, the tendency of most participants in the fisheries to file in the last day or two before the deadline may make the provision of the information very difficult and the effort ineffective. Currently, applications are entered in the order submitted. With most applications submitted very close to the deadline, a backlog develops that would prevent RAM from maintaining current information for participants; consequently, without substantially restructuring the system for submission of applications, it is unlikely that this additional information could be provided. A system of electronic submissions might address this backlog, but development of such a program may not be possible as a result of the procedural and administrative issues that must be addressed.[58] In the harvest sector, it is possible that cooperatives could internally monitor their own members' applications. It is possible that processors could be included in some of these communications, as share matching is commonly discussed prior to the season opening. Better self-policing of the application process in this manner may allow better tracking of applications, without regulatory or governmental administrative actions (or costs).

An additional issue arises from the limitation on the issuance of Class B IFQ to PQS holders and their affiliates. Since affiliation information is included in annual applications, administrators do not receive information needed to apply these administrative rules until all IFQ applications are received. In addition, correction of any errors in issuances requires reissuance of all IFQ in the fishery (effectively requiring all participants in the fishery to reinitiate matching of Class A IFQ to IPQ). A fixed ratio of Class A and Class B allocations to all participants in the fisheries (including processors and their affiliates) would remove this complication, but would alter the distribution of Class B IFQ to unaffiliated QS holders. Some participants believe that the balance of interests established by the current distribution mechanism is critically important and outweigh any associated administrative burden.

In addition to the specific issues cited above, some other aspects of the program create substantial management and enforcement burdens. Several sets of accounts authorizing fishing and processing activities must be monitored. Using plant observers and electronic reporting, landings can be attributed to the appropriate accounts. To date, only a few, minor overages have occurred under the program (see Table 4-4). Overall, managers and enforcement believe that fishing and processing activities are in compliance with the allocation of privileges for those activities as intended by the program.

Beyond oversight of fishing and processing activities, several other aspects of the program and its allocations must be monitored by NOAA Fisheries. Limits are imposed on harvester share holdings, the amount of shares that may harvested by a single vessel, and the amount of shares that may be held by or

[58] For example, electronic submissions may not be possible with a prior paper submission establishing the authority of the submitter to use the electronic system. Such a system would entail a new application process, with its own deadlines and requirements (for both the initial authority and reauthorization for future periods). It is clear that such a system would create new administrative burdens for both program administrators and users of the system. Yet, it is not clear that the system would provide a substantial improvement over the current system of paper applications.

processed by a processor. Overseeing these limitations can pose several challenges to managers and enforcement personnel. Correctly applying limits on owner QS and PQS requires full knowledge of all indirect holdings of those shares. Ownership of interests in the crab fisheries is often indirect with many persons holding overlapping interests in a variety of different fisheries. These overlapping indirect interests create a complex web that must be fully assessed to ensure compliance with limits on share holdings. Similarly, to fully ensure compliance with limits on processing activity and processing share holdings requires that use of shares and plant level processing activity be fully monitored. With the prevalence of custom processing in the fisheries, full monitoring requires tracking of production, as well as knowledge of indirect ownership of both shares and plants. These interests in share holdings and use (which includes ownership of processed products), and processing plants require a multifaceted approach to monitoring use caps in the processing sector. Monitoring of activities and share holdings in a relatively static environment is extremely challenging; periodic changes in interests of persons, adds to the task of maintaining currency in the monitoring of accounts requiring ever greater time and staffing investments. Although the limited number of participants in the crab fisheries helps reduce the burden of these tasks, monitoring of the different limitations on ownership interests is a formidable challenge for NOAA Fisheries. C share IFQ active participation requirements also present a monitoring challenge. These requirements are monitored through a system of affidavits. Verification of affidavits could be problematic, in the event that assertions in those affidavits are questioned.

The program also contains spatial limitations on landing of catch and processing. Current record keeping requirement for floating processors may not adequately track locations for purposes of ensuring complete monitoring of these requirements. Regional processing requirements limit processing of certain IPQ to designated geographic areas. On a finer scale, community rights of first refusal are triggered by the use of IPQ outside the community protected by that right. Although no controversies or disputes have arisen over whether processing of IPQ has complied with regional requirements or has triggered the right of first refusal, no formal record of processing location is made that could be used to establish the location of processing. In the absence of these records, monitoring compliance with the requirements is more challenging.

Some aspects of the program have effectively created systems of self monitoring that have relieved monitoring and enforcement burdens. The arbitration system is administered through a series of contracts that are subject to civil enforcement by the participants in that system. Participants and their representatives are required to comply with application, record keeping, and record submission requirements under the arbitration system. Despite the complexity of the system, to date, participants have generally complied with these various requirements, allowing those aspects of the program to function as intended. The system of harvest cooperatives has also reduced monitoring burdens by consolidating annual IFQ allocations into fewer accounts, effectively shifting a portion of the oversight of those accounts to harvest sector share holders. Cooperative allocations also reduce NOAA Fisheries' transfer administration burden since intra-cooperative transfers are managed within the cooperative. to the extent that these systems are intended to relieve monitoring burdens, they have largely been effective. Yet, the program continues to pose many management and oversight challenges.

11 MANAGEMENT COSTS AND COST RECOVERY

Under the Council motion adopting the program, NOAA Fisheries collects fees to pay for the costs of management (including enforcement) arising out of the program. These costs are the incremental costs that are incurred due to the implementation of the program. The fee is charged as a percentage of the ex vessel value of each landing. The fee is split equally between harvesters and processors, with processors responsible for collecting the fee and making payment to NOAA Fisheries. Catcher processors, who catch and process their catch, do not split the fee, but pay the full amount directly to NOAA Fisheries.

Fees are limited to no more than 3 percent of the ex vessel value of the fishery in a crab fishing year. At the start of each season, NOAA Fisheries publishes a fee percentage in the Federal Register, based on the previous year's ex vessel prices and management and enforcement costs. NOAA Fisheries typically publishes the fee percentage in July or early August, in time for participants in the Aleutian Islands golden king crab fishery to collect fees on their first landing.

Market and stock uncertainties, as well as variation in management costs, mean that the fees may not precisely cover management costs. TAC announcements for the largest fisheries (Bristol Bay red king crab, and Bering Sea *C. opilio*) are not made until after the fee percentage is set. In addition, ex vessel prices will fluctuate with market conditions, so the basis that the fee percentage is applied to will change throughout the season. Further uncertainty arises because the fee percentage must be set before fees have been fully paid for the prior season. Fees are due by June 30 (the end of the crab fishing year) but many processors delay payment for at least one month. NOAA Fisheries cannot assess penalties until at least 30 days after a payment is due. For example, although NOAA Fisheries collected more than the amount required to cover program costs for the 2007-2008 season, the specific amount of fees collected was not fully known prior to the publication of the fee percentage notice for the 2008-2009 season. Because of these uncertainties, a formulaic approach to setting the fee percentage is used. Regulations require that NOAA Fisheries establish the fee percentage based on the prior year's costs and ex vessel values, instead of projections which can be highly subjective.

Although NOAA Fisheries cannot adjust the fee percentage at the end of a season, regulations require that any debit or credit to the fee collection account must be carried forward and applied toward the fee percentage calculations for future years. Because fee collection for the 2007-2008 and 2008-2009 seasons exceeded the respective seasonal costs, NOAA Fisheries subtracted the remaining balances from the estimated costs for the subsequent season, prior to calculating the fee percentage. These resulted in the lowering of the fee percentage for the 2008-2009 season to 1.05 percent of ex vessel value and the removal of the fee in its entirety in the 2009-2010 season. Lower costs were realized through staffing vacancies, multi-year contracts included in prior year costs, and more efficient use of staff time as NOAA Fisheries staff developed familiarity with the program. Although some program costs have fluctuated in the first five years of the program, most categories of management costs have declined (see Table 11-1).

Table 11-1 Management costs and cost recovery fees (2005-2006 through 2009-2010).

Office	Restricted Access Management	Sustainable Fisheries	Operations Management and Information	General Counsel	Appeals	Office of Law Enforcement	Office of Law Enforcement and Joint Enforcement Agreement	ADF&G (State)	Alaska Fisheries Science Center	Pacific States Marine Fisheries Commission	Total
Primary source of expenditures	Quota management	Regulations	Cost accounting	Legal guidance	Appeals	General Enforcement	Joint enforcement (with State of Alaska)	Extended Jurisdiction/ Observers/ CDQ	Economic Data Reporting	Economic Data Reporting/Joint Electronic Reporting	
2005/2006	$ 945,969	$ 912,615	$ 8,580	$ 89,077	$ 6,800	$ 398,502	$ 516,519	$ 864,614	$ 83,703	$ 444,500	$ 4,270,881
Percent of total costs	22.15%	21.37%	0.20%	2.09%	0.16%	9.33%	12.09%	20.24%	1.96%	10.41%	100.00%
Fees for cost recovery (3% fee)											$ 3,124,999
% of costs recovered											73%
2006/2007	$ 541,158	$ 189,519	$ 35,848	$ 34,536	$ 122,547	$1,602,073	$ 162,608	$ 824,008	$ 106,397	$ 321,148	$ 3,939,841
% of total costs	13.74%	4.81%	0.91%	0.88%	3.11%	40.66%	4.13%	20.91%	2.70%	8.15%	100.00%
recovery (3% fee)											$ 3,045,344
% of costs recovered											77%
2007/2008	$ 233,146	$ 94,310	$ 34,117	$ 30,642	$ 47,466	$ 568,647	$ -	$ 725,405	$ 111,725	$ 288,300	$ 2,133,758
% of total costs	10.93%	4.42%	1.60%	1.44%	2.22%	26.65%	0.00%	34.00%	5.24%	13.51%	100.00%
Fees for cost recovery (3% fee)											$ 6,517,204
% of costs recovered											305%
2008/2009	$ 177,671	$ 132,869	$ 44,225	$ 23,537	$ 34,488	$ 661,136	$ 647,256	$ 958,650	$ 188,276	$ 231,883	$ 3,099,991
% of total costs	5.73%	4.29%	1.43%	0.76%	1.11%	21.33%	20.88%	30.92%	6.07%	7.48%	100.00%
Fees for cost recovery (1.05% fee)											$ 2,028,968
% of costs recovered											100 % (Past & current collections)
2009/2010	$ 225,454	$ 147,037	$ 49,851	$ 15,616	$ 36,334	$ 705,519	$ 203,912	$ 705,428	$ 164,303	$ 128,955	$ 2,382,409
% of total costs	9.46%	6.17%	2.09%	0.66%	1.53%	29.61%	8.56%	29.61%	6.90%	5.41%	100.00%
Fees for cost recovery (0 % fee) Covered by past years											N/A
% of costs recovered											N/A

12 FISHING VESSEL SAFETY

The Council cited the need for safety improvements in the crab fisheries as a prime motivation for adoption of the rationalization program in its purpose and need statement used in the development of the program. This review assesses the effect of the program on safety in a separate appendix to this document (see Appendix B).

13 BIOLOGICAL MANAGEMENT ISSUES

This section discusses the effects of the crab rationalization program and resulting changes in fishing patterns on crab mortality and population sustainability, and the biological management of the crab stocks.

13.1 Crab fishery harvest

Catch in excess of the harvest targets was difficult to prevent in the derby-style fisheries that predated the crab rationalization program. Even with good in-season assessment and catch reporting, catches can change rapidly. A large efficient fleet can quickly surpass a harvest target when they locate high concentrations of crab. Between 2000 and 2004, the guideline harvest level for Bristol Bay red king crab was exceeded in two out of five years; the GHL for Bering Sea *C. opilio* was exceeded in five out of six

years; and the GHL for Aleutian Islands golden king crab was exceeded in two out of five years (NPFMC 2007). Since the implementation of the crab rationalization program, the total allowable catch (TAC) for these target fisheries has never been exceeded (Table 13-1). The Bering Sea *C. bairdi* fishery has not been open for directed fishing since 1996, and the fishery was under a rebuilding plan from 1999 through the 2005 season. Only the western portion of the fishery opened in 2005-2006, as the TAC calculated under the harvest strategy was below the minimum threshold TAC for the eastern portion. Since then, IFQs have been separately allocated to the Eastern and Western *C. bairdi* fisheries. Both fisheries were open, except in 2009-2010 when the Western fishery remained closed. The St. Matthew Island blue king crab fishery was closed all recent seasons until the most recent season, when the fishery reopened for the first time in 12 years.

Table 13-1 Guideline harvest level, or total allowable catch, and harvest, for crab fisheries, 2000 through 2009-2010, in millions of pounds

Season	Bristol Bay red king crab		Bering Sea *C. opilio*		Aleutian Islands golden king crab		Bering Sea *C. bairdi*		St. Matthew Island blue king crab	
	GHL/TAC	Harvest	GHL/TAC	Harvest	GHL/TAC	Harvest	GHL/TAC	Harvest	GHL/TAC	Harvest
2000	7.7	7.5	26.4	30.8	5.7	6.0	Closed		Closed	
2001	6.6	7.8	25.3	23.4	5.7	5.9				
2002	8.6	8.9	28.5	30.2	5.7	5.5				
2003	14.5	14.5	23.7	26.2	5.7	5.7				
2004	14.3	14.1	19.3	22.2	5.7	5.6				
2005	no season		19.4	23	no season					
2005 - 2006	16.5	16.5	33.5	33.3	5.1	5.0	1.6	1.0	Closed	
2006 - 2007	13.9	13.9	32.9	32.7	5.1	4.7	3.0	2.1		
2007 - 2008	18.3	18.3	56.7	56.7	5.1	4.9	5.1	1.9		
2008-2009	18.4	18.3	52.8	52.7	5.4	5.1	3.9	1.7		
2009-2010	14.4	14.3	43.2	43.2	5.4	5.3	1.2	1.2	1.1	0.5

For seasons prior to 2005-2006, seasons are designated by the year in which they opened prior to rationalization.
All GHL/TACs and harvests are for general fishery, excluding CDQ.
Source: NPFMC 2010.

13.2 Deadloss

Deadloss is the amount of dead crab landed at the dock. All deadloss is discarded, because it cannot be sold. As long as all deadloss is landed, it is an economic problem rather than a biological problem, because deadloss is deducted from the TAC. Deadloss is exacerbated when vessels are not able to off-load quickly, due to longer trips or backups at the dock, and fewer crab survive the wait in the tank.

Deadloss in the Bristol Bay red king crab and the Aleutian Islands golden king crab fisheries has decreased post-rationalization, compared to the seasons immediately preceding implementation of the program (Table 13-2). In the Bering Sea *C. opilio* fishery, the rate of deadloss is comparable to that which occurred in the two most recent years before rationalization. In the first year of fishing after being closed for more than 10 years, deadloss in the St. Matthew Island blue king crab was slightly more than 2 percent of catch. Since deadloss is counted against IFQ allocations, this deadloss presents no biological risk, but is high relative to the other fisheries.

Table 13-2 Deadloss in the crab fisheries, 2000 through 2009-2010.

Fishery	Season	Catch** (in pounds)	Deadloss* (in pounds)	Deadloss per pound of catch
Bristol Bay red king crab	2000	7,468,240	32,118	0.004
	2001	7,681,106	57,294	0.007
	2002	8,770,348	32,177	0.004
	2003	14,237,375	228,270	0.016
	2004	13,889,047	160,563	0.012
	2005 - 2006	16,472,400	77,507	0.005
	2006 - 2007	13,887,531	98,720	0.007
	2007 - 2008	18,324,046	131,954	0.007
	2008-2009	18,288,881	160,812	0.009
	2009-2010	14,337,782	111,467	0.008
Bering Sea *C. opilio*	2001	22,940,704	429,884	0.019
	2002	29,609,702	585,288	0.020
	2003	25,410,122	662,409	0.026
	2004	21,939,493	224,377	0.010
	2005	22,655,777	224,139	0.010
	2005 - 2006	33,248,009	322,594	0.010
	2006 - 2007	32,699,911	379,132	0.012
	2007 - 2008	56,722,400	500,156	0.009
	2008-2009	52,687,374	402,679	0.008
	2009-2010	43,193,971	500,049	0.012
Bering Sea *C. bairdi*	2005-2006	791,315	14,563	0.018
	2006 - 2007	1,900,183	27,449	0.014
	2007 - 2008	1,906,711	19,796	0.010
	2008-2009	1,662,884	15,231	0.009
	2009-2010	1,189,573	7,122	0.006
Eastern Aleutian Islands golden king crab	2000 - 2001	3,086,890	55,999	0.018
	2001 - 2002	3,128,409	50,030	0.016
	2002 - 2003	2,765,436	55,425	0.020
	2003 - 2004	2,900,247	76,006	0.026
	2004 - 2005	2,846,273	43,576	0.015
	2005 - 2006	2,569,209	23,791	0.009
	2006 - 2007	2,692,009	31,311	0.012
	2007 - 2008	2,690,377	21,042	0.008
	2008-2009	2,823,773	24,117	0.009
	2009-2010	2,832,932	31,622	0.011
Western Aleutian Islands golden king crab	2000 - 2001	2,902,518	53,158	0.018
	2001 - 2002	2,693,221	43,519	0.016
	2002 - 2003	2,605,237	32,101	0.012
	2003 - 2004	2,637,161	49,321	0.019
	2004 - 2005	2,639,862	43,560	0.017
	2005 - 2006	2,382,468	26,500	0.011
	2006 - 2007	2,002,186	19,768	0.010
	2007 - 2008	2,246,040	23,183	0.010
	2008-2009	2,252,111	22,802	0.010
	2009-2010	2,478,313	33,069	0.013
St. Matthew Island blue king crab	2009-2010	460,859	10,484	0.023

Sources: *ADFG Annual Management Report and **fishtickets and **NMFS RAM catch data (for 2005-2006 through 2009-2010)

13.3 Crab bycatch and discards

The rationalization program has had a few effects on bycatch and discards in the crab fisheries.

13.3.1 High grading

High grading is the sorting through legal crab for the most valuable (typically the largest and cleanest) crab, and discard of the remaining legal crab to ensure that only the highest-priced portion of the catch is landed and counted against the IFQ. Some of this discarded crab dies. This can lead to additional fishing mortality of legal males in excess of IFQ allocations. Highgrading is an environmental concern because it may alter stock composition and hinder the reproductive capabilities by removing only the largest, cleanest crab. The large, clean crab are thought to be the most successful at mating. High grading may also affect mortality of female and sublegal crab, if more pot lifts are required to catch the TAC. High grading is driven by market forces and preferences for clean-shelled crab, as processors may pay less for or refuse to accept dirty crab. Also, fishermen discard damaged crab that may die in the tank, because the dead crab decrease the survival rate of the live crab around them.

During the first year under rationalization in the Bristol Bay red king crab fishery, the number of legal male crabs captured during the fishery and subsequently discarded was dramatically higher than discard rates in previous years (Table 13-3), and represented approximately 20 percent of legal male red king crab caught. ADF&G identified concerns about resource sustainability under their harvest strategy, given these levels of discards. The discards were linked to the shell condition of the crab (Barnard and Pengilly 2006); the 2005 NOAA Fisheries survey found a notably higher proportion of old shell condition crab (40 percent) than had occurred in previous years. A high incidence of old shell crab in the catch (and the lower price that crab would fetch) was likely a key contributor to the widespread high grading.

In an effort to address the biological concerns raised by ADF&G, industry instituted a number of voluntary proposals to address the issue of discards. Under the organization of the Pacific Northwest Crab Industry Advisory Committee (PNCIAC), a number of proposed solutions were offered in a discussion paper, and subsequently adopted by PNCIAC members (PNCIAC 2006). Crab industry harvesters, processors, and cooperative members agreed to improve retention of legal size crab to the level of the pre-rationalized fishery in the years 1999-2004, and to reduce bycatch of females and sublegal males. In addition, beginning in the 2006-2007 season, most harvesters and processors changed their pricing structure to reflect their support for a full retention policy, and moved to a single price that does not distinguish for shell condition, in order to remove the incentive to high grade.

ADF&G reacted to the 2005-2006 discard issue by downwardly adjusting the TAC determination for the 2006-2007 season, thus resulting in an economic penalty for the share holders in that season. As discarding of legal males did not occur on a similar scale in 2006-2007, no further downward adjustment was made for the 2007-2008 season (Vining and Zheng 2008). No adjustment has been made since.

High grading and discard rates have not been an issue, other than the 2005-2006 Bristol Bay red king crab season (Table 13-3). Discard rates for legal males has been slightly higher in the *C. opilio* fishery in some years under the program, but have not increased to level that has required adjustments in the TAC setting process. New shell condition is particularly important in the Bering Sea *C bairdi* and Bering Sea *C. opilio* fisheries, and in addition the *C. opilio* fishery has a strong selectivity for males with a 4 inch or greater carapace width, due to processors standards for delivered crab, although the legal size is 3.1 inch carapace width. However, the harvest strategies for both fisheries account for these selectivities and the resulting bycatch in setting the harvest rate (NMFS 2004).

Table 13-3 Bycatch in the crab fisheries, 2000 through 2010-2009 (Bristol Bay red king crab, Bering Sea *C. opilio*) and 2005-2006 though 2009-2010 (Aleutian Islands golden king crab, Bering Sea *C. bairdi*)

Fishery	Season	Total bycatch (in pounds)		
		Legal, non-retained	Sublegal	Female
Bristol Bay red king crab	2000	24,773	3,985,628	439,745
	2001	67,022	3,759,015	1,190,144
	2002	138,355	4,707,986	71,016
	2003	247,602	9,393,910	3,377,311
	2004	160,724	4,033,506	1,373,949
	2005 - 2006	4,602,011	8,543,364	3,543,455
	2006 - 2007	94,905	1,853,035	221,506
	2007 - 2008	45,651	3,554,052	830,882
	2008-2009	56,000	4,100,000	812,000
	2009-2010	77,960	2,691,438	332,154
Bering Sea *C. opilio*	2001	6,248,154	112,440	5,546
	2002	7,473,653	99,376	3,742
	2003	15,923,087	297,104	32,580
	2004	19,989,353	384,528	9,670
	2005	5,398,033	85,558	3,475
	2005 - 2006	10,434,115	196,584	12,826
	2006 - 2007	17,777,807	507,809	10,272
	2007 - 2008	21,820,036	549,861	157,270
	2008-2009	18,234,000	245,000	164,000
	2009-2010	9,545,655	240,915	97,548
Eastern Aleutian Islands golden king crab	2005 - 2006	17,691	202,329	118,969
	2006 - 2007	19,210	219,463	202,924
	2007 - 2008	20,697	199,897	127,616
	2008-2009	32,000	205,000	142,000
	2009-2010	27,194	252,678	173,464
Western Aleutian Islands golden king crab	2005 - 2006	11,881	301,343	257,468
	2006 - 2007	6,012	256,059	281,018
	2007 - 2008	4,614	335,255	414,134
	2008-2009	3,000	299,000	330,000
	2009-2010	10,072	193,186	210,708
Bering Sea *C. bairdi*	2005 - 2006	3,926	540,582	69,206
	2006 - 2007	22,225	1,348,877	392,236
	2007 - 2008	39,517	5,270,165	370,532
	2008-2009	14,700	1,950,000	185,000
	2009-2010	4,854	104,998	8,472
St. Matthew Island blue king crab	2007 - 2008	39,517	5,270,165	370,532

Sources: NPFMC 2007 (2000-2005); Barnard and Burt 2007 (2005/2006); Barnard and Burt 2008 (2006/2007); ADFG (2007/2008 through 2009/2010)

13.3.2 Rail dumping

Rail dumping is the practice of emptying captured pots at the rail before they can be brought on deck and sorted. Because the catch is not brought on deck, it is not possible to track the contents of rail dumped pots in terms of the number, size, and sex of the captured crab. Pre-rationalization, rail dumping would occur when vessels were left with pots soaking after the season had ended, which was legally permitted only if fewer than 24 hours notice of a closure was provided. These short notices occurred occasionally in the Bristol Bay red king crab fishery prior to implementation of the program. On those occasions, it is believed that the number of fishing pots left on the grounds that were rail dumped were at least comparable to current rail dumping levels. Under the rationalization program, rail dumping has been practiced by some vessels when retrieving their pots in order to avoid the risk of exceeding their available IFQ, and the penalties that would result from such overages.

Rail dumping has occurred in all of the crab fisheries. Observers attempt to estimate the number of rail dumped pots, although they cannot directly track their contents. The proportion of rail dumped pots, as compared to total harvested pot lifts, ranges from 0.3 percent to 2.6 percent, and is variable by season within each fishery (Table 13-4). Although it is not possible to know the contents of the emptied pots, as they are not observed, an estimate could be made using the average annual catch per unit effort and crab weight for the fishery. For the Bristol Bay red king crab fishery in 2006-2007, if an average catch per unit effort (34 crab per pot) and crab weight (6.3 pounds) is applied to each pot, the total amount of legal male crab dumped would equal approximately 375,000 pounds. For legal male crab that are brought on deck and then discarded, a 20 percent mortality rate is assumed for purposes of assessment and calculated in the TAC setting process. The mortality rate for rail dumped crab could well be lower, however, as the crab are not subject to additional handling on deck. Because rail dumped crab are not brought on deck and accounted for, any mortality associated with the practice is not currently considered in the stock assessment or TAC setting process. The large amount of gear used in the Aleutian Islands golden king crab fisheries likely contributes to the relatively high incidence of rail dumping of pots in that fishery.

Table 13-4 Estimated rail dumped pots in the crab fisheries, 2005-2006 through 2009-2010

Fishery	Season	Rail dumped pots*	Rail dumped pots as a percent of total pot lifts	Average CPUE**	Average weight (pounds)***	Estimate of legal males rail dumped (pounds)
Bristol Bay red king crab	2005 - 2006	NA	NA	25	6.6	NA
	2006 - 2007	1,745	2.6	34	6.3	376,739
	2007-2008	813	1.2	28	6.4	146,435
	2008-2009	424	0.3	22	6.6	61,565
	2009-2010	591	0.6	21	6.3	78,189
Bering Sea *C. opilio*	2005 - 2006	600	0.9	204	1.5	184,165
	2006 - 2007	1,581	2.4	332	1.2	645,329
	2007-2008	1,057	1.6	352	1.3	467,112
	2008-2009	1,381	0.9	279	1.3	500,889
	2009-2010	1,269	1.0	255	1.4	453,033
Aleutian Islands golden king crab	2005 - 2006	243	0.4	23	4.4	24,357
	2006 - 2007	1,193	1.8	23	4.5	123,476
	2007-2008	527	0.8	24	4.5	56,822
	2008-2009	741	1.7	25	4.5	83,363
	2009-2010	1,066	2.3	26	4.5	124,722
Bering Sea *C. bairdi*	2005 - 2006	NA	NA	12	2.2	NA
	2006 - 2007	216	0.3	17	2.3	8,347
	2007-2008	142	0.2	17	2.3	5,552
	2008-2009	176	5.3	17	2.3	6,882
	2009-2010	308	3.6	28	2.8	24,147
St. Matthew Island blue king crab	2009-2010	22	0.7	10	4.5	990

Source: ADFG.

13.3.3 Handling mortality

In addition to the direct loss from retained catch, harvesting also reduces stock abundance due to bycatch mortality. Large numbers of crabs are handled and discarded during crab fisheries due to restrictions on size, sex, season, and target species. Handling mortality reduces future recruitment to the fishery by reducing both survival of pre-recruits and effective spawning biomass due to deaths of mature females and sublegal males (NMFS 2004). The time of year when crab are harvested affects the crab survival rate. Fishing seasons are designed to close during seasons of molting or mating of crab to avoid additional mortality during these biologically-sensitive periods. Additionally, evidence indicates that crabs captured in extremely cold and windy weather suffer higher rates of handling mortality (NMFS 2004). Estimates of total catch for TAC determination include a calculation for mortality of crab that is brought on deck, sorted, and then discarded. The mortality calculation is based on experimental studies of crab survival, and for Bristol Bay red king crab, the mortality rate is assumed to be 20 percent; for *C. opilio*, 50 percent.

Under rationalization, the season length has extended considerably, thereby slowing the pace of fishing and allowing fishermen to improve fishing methods, including sorting of catch by the gear and sorting on deck. Some vessels are reported to be installing conveyors and chutes that discard bycatch without handling. Although yet to be documented, these changes may affect handling mortality to some extent. Under rationalization, fishermen have more flexibility about when to fish, and for safety reasons are more likely to choose not to fish in the extreme weather conditions that may have been necessary before rationalization. It is possible that some of these considerations may have affected handling mortality. The crab plan team annually reevaluates handling mortality and could modify estimates in the future, as several studies are currently underway.

13.3.4 Soak times and catch per unit effort

Experimental studies have shown that longer soak times, in conjunction with the required pot escape mechanisms, are likely to increase the proportion of legal versus non-legal crabs caught in the fishery (Barnard and Pengilly 2006). Catch per unit effort is also dependent on other factors as well: the size-sex distribution of the crab population, where fishing is conducted relative to the spatial distribution of non-legal and legal crabs, and the sorting of legal crabs for retention or non-retention.

Soak times in the Bristol Bay red king crab fishery have lengthened in the years leading up to implementation of the program from an average of 18 hours in 1999 to an average of approximately 30 hours in 2003 and 2004 (see Table 13-5). Soak times have increase further since the program was implemented, averaging in excess of 50 hours in each of the first five seasons of the program. Over this same period, catch per unit effort has increased from an average of 18 legal male crab per pot lift (2000-2005) to an average of 25, 34, and 28 legal crab per pot lift, respectively, in the first three seasons of the program, before declining to slightly more than 20 crab per pot in the two most recent seasons. For the *C. opilio* fishery, the average soak time in the 2004 and 2005 season was 21 hours, and increased to in excess of 60 in each of the first five seasons of the program. Catch per unit effort averaged 144 legal male crab per pot lift in the five season preceding implementation of the program, increasing to approximately 285 crab per lift in the first five seasons of the program. Anecdotal reports note that the catch per unit effort has likely been affected by the extent of sea ice (particularly in 2005-2006) which, at times, has kept fishermen off the most productive grounds.

While data suggest a correlation between extended soak times and legal male catch, Table 13-3 appears to indicate that the levels of sublegal and female catch under the rationalization program remain within the range of bycatch levels from previous years.

Table 13-5 Soak times in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (2001 through 2008-2009).

soak times - hours		
Season	Bristol bay red king crab	Bering Sea *C. opilio*
2001	24	44.2
2002	18	39.7
2003	31	27.4
2004	28	21.1
2005	NA	20.9
2005-6	65	65
2006-7	51	63
2007-8	56.9	76.8
2008-9	56.8	61.1

Source: ADFG Summary of the Mandatory shellfish observer program database. (2001 through 2008-9)

13.3.5 Lost pots and ghost fishing

Mortality is also caused by ghost fishing of lost crab pots. Mortality of crab caused by ghost fishing is difficult to estimate with precision given existing information, but studies have shown that unbaited crab

pots continue to catch crabs, and pots are subject to rebaiting due to capture of other fish and crab. The impact of ghost fishing on crab stocks remains unknown. Pre-rationalization, it has been estimated that 10 percent to 20 percent of crab pots were lost each year (NPFMC 2007), although lack of observer coverage precluded accurate recording. All pots currently fished in Bering Sea crab fisheries contain degradable escape mechanisms allow catch to escape after an extended period of time to reduce ghost fishing.

Although pot limits have been removed under the rationalization program, in practice, the average number of pots fished per vessel remains less than that allowed pre-rationalization (see Table 4-26) Combined with the decrease in the number of vessels participating in the crab fisheries, this means that overall there is less gear on the fishing grounds post-rationalization. Although the pots are used more frequently during a fishing season, the higher catch per unit effort under rationalization still results in an overall reduction in gear.

In the first five years of the program, estimates of lost pots indicate that they have represented between approximately 1 percent and 1.4 percent of total registered pots in the Bristol Bay red king crab fishery, between 1 and 4 percent of total registered pots in the Bering Sea *C. opilio* fishery, and between approximately 6 percent and 14 percent of registered pots in the *C. bairdi* fishery (Table 13-6). In addition, approximately 1.5 percent of the registered pots were estimated to be lost in the St. Matthew Island blue king crab fishery, the one year that the fishery was open since the program was implemented. One factor that may affect the rate of lost gear in these latter fisheries is the longer fishing season. Longer soak times mean that the time between setting and retrieving the gear is extended, and combined with the three to four month season, increase the risk of a change in the weather and unforeseen encroachment of sea ice preventing the vessel from successfully retrieving its gear. The unusually high number of lost pots is the 2009-2010 *C. bairdi* fishery likely arose from the prevalence of ice on the grounds.

In the Aleutian Islands golden king crab fishery, the depths and steep bottom topography of the inter-island passes necessitate the use of longline pot gear, which is the only legal gear type. There are fewer participants in these fisheries as a result of rationalization, and fewer pots overall are registered in the fishery, although the number of pots per vessel has increased substantially. ADFG records of lost pots represent 1 percent or less of the total registered pots annually in the fishery, since the program was implemented.

Table 13-6 Lost pots by fishery (2006-2007 through 2009-2010)

Fishery	Season	Lost pots
Bristol Bay red king crab	2006 - 2007	154
	2007 - 2008	167
	2008-2009	198
	2009-2010	147
Bering Sea *C. opilio*	2006 - 2007	228
	2007 - 2008	599
	2008-2009	391
	2009-2010	229
Aleutian Islands golden king crab	2006 - 2007	135
	2007 - 2008	37
	2008-2009	62
	2009-2010	68
Bering Sea *C. bairdi*	2006 - 2007	88
	2007 - 2008	175
	2008-2009	394
	2009-2010	229
St. Matthew Island blue king crab	2009-2010	15
Sources: ADFG		

13.3.6 Season length and temporal and spatial dispersion

Under the program, the seasons for the fisheries have lengthened considerably (see Table 4-22 and Table 4-23). In the years leading up to the implementation of the program, the Bristol Bay red king crab fishery lasted at most 3 to 4 days, opening on October 15. Under the program, the fishery opens on the same date, but closes on January 15th. Despite the extended season, most of the harvest in the fishery is completed within a month (i.e., by mid-November), as the best market opportunities are available prior to the New Year. The Bering Sea *C. opilio* fishery, which prior to rationalization frequently lasted less than one month, is now open for seven months beginning in October. Yet, much of the harvest is still made during the traditional period of the fishery in late January and early February. Catches are delayed until after the New Year to wait until meatfill improves and to avoid conflicts with the Bristol Bay harvest. Once fishing begins, the fleet concentrates its harvests in a short period, in an attempt to avoid ice that most often occurs in the early spring months. The Eastern Aleutian Islands golden king crab fishery is primarily prosecuted between August and December, while the western Aleutian Islands fishery extends through the May 15 closure. Longer seasons can benefit the crab stocks by reducing the pressure associated with derby-style fishing, and allowing time for improving handling methods and sorting of crab at sea which should improve the survivability of crab bycatch. Overall, the temporal distribution of catches has increased under the program, this expansion has been somewhat limited.

Under the program, the spatial distribution of catch in the Bristol Bay red king crab fishery has diversified somewhat. In 2003, while landings were reported in 15 statistical areas (plus some miscellaneous landings), but the vast majority of catch came from only four areas (ADFG 2004). In 2006-2007, catch was reported in 12 statistical areas (plus some miscellaneous landings), with 90 percent of total pot lifts

and total harvest occurring in seven statistical areas (extending out from the popular fishing grounds of 2003). This trend has continued into the 2008-2009 season (Bowers et al. 2010; Bowers et al., 2008).

In past years, most of the Bering Sea *C. opilio* fishery catch occurred in the southern portion of that crab's range possibly due to ice cover and proximity to port and practical constraints of meeting delivery schedules. In 2003 and 2004, two-thirds or more of the catch was made south of 58.5° N. Yet, in both of those years, the ice edge was farther north than in past years, allowing some fishing to occur as far north as 60-61°N. Since implementation of the program, catch distribution is similar to years prior to the program with catch made south of 58°N. and west of the Pribilof Islands between about 171° W and 173°W; however, in the 2008-2009 season in excess of 6 million pound of catch was made east and south of the Pribilof Islands between 168° and 167° longitude and 55.5° and 56.6° latitude. The distribution of catch has drawn the concern of the SSC and the Plan Team, which have noted that the concentration of catches in the southern portion of the range of the fishery could add pressure to the northward migration of the stock (NPFMC, 2010).

Fishing effort in the eastern Aleutian Islands golden king crab fishery focuses primarily around Yunaska Island, and the Islands of Four Mountains, and in Seguam and Amukta Passes. In the western Aleutian Islands, the golden king crab fishery was prosecuted around the Delarof Islands, Amchitka Pass, and the Petrel Bank. Because of the small number of vessels participating in these fisheries, most of the landings information is confidential, both pre- and post-rationalization.

14 SIDEBOARD LIMITS IN OTHER FISHERIES

Recognizing that a change to a share-based management program may provide opportunities for participants to alter their behavior to increase participation in other fisheries, the Council typically considers sideboards to limit participants in the share-based fishery to their historic participation levels in other fisheries. In adopting the rationalization program, the Council imposed sideboards on harvesters receiving QS allocations. The Council is currently considering revisions to these sideboards, as well as new sideboards on the processing of Pacific cod by processors that received PQS allocations.

14.1 Harvester sideboards

Knowing that the harvesters in the crab fisheries may alter fishing patterns to increase catch in other fisheries, the Council included sideboard limits on catches of Gulf of Alaska groundfish and Gulf of Alaska Pacific cod for vessels and licenses with Bering Sea *C. opilio* history that contributed to an initial QS allocation. Sideboards under the program also prohibit participation in the Pacific cod fisheries by vessels with Bering Sea *C. opilio* history that contributed to a quota allocation and that landed less than 50 metric tons of groundfish harvested in the Gulf during the Bering Sea *C. opilio* qualifying period (January 1, 1996 and December 31, 2000). In addition, vessels with limited Bering Sea *C. opilio* catch (i.e., less than 100,000 qualifying pounds) and sufficient Gulf Pacific cod dependence (i.e., more than 500 metric tons of Gulf Pacific cod during *C. opilio* qualifying period) are exempt from the Gulf Pacific cod sideboard limits. Sideboard limits are based on Gulf groundfish and Gulf Pacific cod retained catch of crab vessels subject to the limits during the *C. opilio* qualifying period. The sideboard restrictions apply in the State of Alaska parallel groundfish fisheries to vessels with a Federal Fisheries Permit or LLP license. Since LLPs can move among vessels, it is possible that the sideboard limits on a vessel could differ from those associated with the license assigned to that vessel. In these cases, the more restrictive sideboard is applied.

Figure 14-1 provides a diagram of the structure of the Gulf groundfish sideboard limits. Since vessels participating in the American Fisheries Act are already subject to sideboards in Gulf groundfish fisheries, those vessels are exempt from these crab program sideboards.

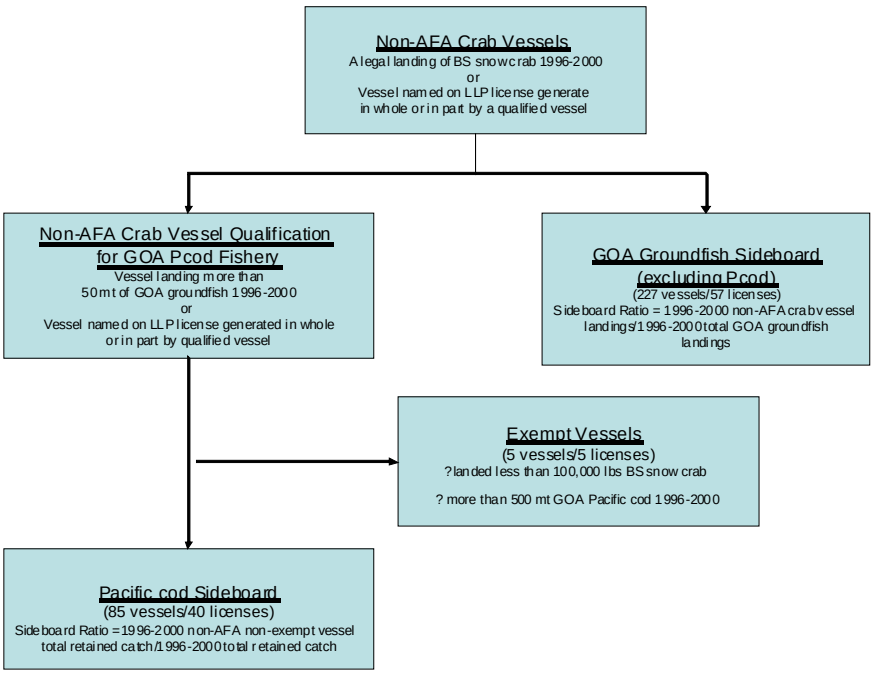

Figure 14-1 Diagram of non-AFA crab vessel sideboard program for the GOA

Under the program, 227 non-AFA crab vessels contributed to an initial allocation of Bering Sea *C. opilio* QS and are subject to the Gulf groundfish sideboard limits; 137 of these vessels are prohibited from fishing for Gulf Pacific cod; 85 vessels are subject to the Gulf Pacific cod sideboard limits; and 5 vessels are exempt from the Gulf Pacific cod sideboard limits. Also, 57 groundfish LLP licenses originated on non-AFA crab vessels and are subject to the Gulf groundfish sideboard limits; 12 of these licenses are prohibited from use for directed fishing in the Gulf Pacific cod fisheries; 40 licenses are subject to the Gulf Pacific cod sideboard limits; and 5 licenses are exempt from the Gulf Pacific cod sideboard limits.

In October 2008, the Council took action, which when implemented, would extend the Gulf Pacific cod sideboard exemption to three additional vessels. The action exempted vessels with Bering Sea *C. opilio* catch history of less than 750,000 pounds during the period from 1996 through 2000 provided the vessel landed more than 680 metric tons of Gulf Pacific cod during the period from 1996 through 2000. At that same time, the Council also extended the exemption of non-AFA crab vessels from Gulf pollock sideboards. Specifically, the exemption was extended to vessels with Bering Sea *C. opilio* catch history of less than 0.22 percent of the total catch from 1996 through 2000 and with 20 or more pollock deliveries from 1996 through 2000. It is estimated that, when implemented, a single vessel will be determined to meet these qualifying criteria.

NOAA Fisheries manages the sideboard limits by setting a single sideboard cap for each Gulf groundfish species (including Pacific cod). That amount is then available to all qualified vessels subject to the cap, on a seasonal basis (see Table 14-1) All targeted or incidental catch of sideboard species made by a vessel subject to the limits is deducted from the sideboard limit. NOAA Fisheries closes directed fisheries to vessels subject to the limit when it deems that sideboard amounts are inadequate to support directed fishing and projected incidental catch in other directed fisheries. NOAA Fisheries has prohibited directed fishing by vessels subject to the sideboard in all fisheries except the Western Gulf pollock fishery and the

Central Gulf and Western Gulf Pacific cod fisheries because the sideboard limits are deemed inadequate to support directed fishing.

Table 14-1 Gulf of Alaska non-AFA crab vessel groundfish harvest sideboard limits for Pacific cod

Species	Apportions and allocations by area/processor/gear	Ratio of 1996-2000 non-AFA crab vessel catch to 1996-2000 total harvest	2009 TAC (mt)	2009 non-AFA crab vessel sideboard limit (mt)
Pacific cod	**A Season**			
	January 1 - June 10			
	W inshore	0.0902	8,735	788
	W offshore	0.2046	970	198
	C inshore	0.0383	12,767	489
	C offshore	0.2074	1,418	294
	B Season			
	September 1 - December 31			
	W inshore	0.0902	5,823	525
	W offshore	0.2046	647	132
	C inshore	0.0383	8,510	326
	C offshore	0.2074	946	196
	Annual			
	E inshore	0.011	1,792	20
	E offshore	0	199	0

Table 14-2 provides annual total catch of GOA Pacific cod and other groundfish from 1995 to 2009 for non-AFA crab vessels excluding those vessels that are currently exempt from GOA Pacific cod sideboard limits. Prior to implementation of the crab sideboard limits, total catch of GOA Pacific cod by the non-AFA crab vessels ranged from 2,434 mt to 11,153 mt. During the 2006 fishing year, the GOA Pacific cod sideboard catch was 5,037 mt, while the limit was 3,615 mt. In 2006, the sideboard catch exceeded the sideboard limit due to a sideboard regulation being implemented in August 2006, which was after the A season was completed.

Table 14-2 Total catch (mt) of non-AFA crab vessels from 1995–2009 minus the 5 vessels exempt from Pacific cod sideboards

Year	Pacific cod	Other Groundfish
1995	3,651	127
1996	2,618	763
1997	2,434	590
1998	3,430	1,597
1999	7,651	1,375
2000	11,153	1,424
2001	3,464	2,660
2002	4,215	2,035
2003	4,953	1,477
2004	5,876	1,033
2005	6,760	2,629
2006	6,471	2,462
2007	6,760	2,629
2008	3,276	719
2009	2,520	853

Source: Table is from RIR Tables.xls, while raw data is from non_afa_snow_crab_cvs.xls and non_afa_snow_crab_cp5.xls which originated from ADF&G fish tickets for catcher vessels and blend data/catch accounting for catcher processors. Data does not include State water Pacific cod catch and sablefish and halibut IFQ bycatch of Pacific cod IFQ fisheries.

Table 14-3 provides a brief summary of the western and central GOA Pacific cod sideboard fishery closures during 2006 to 2009. The important point of this table is that it shows that, with the exception of 2009 in the western GOA, Pacific cod in both areas during the A season closed prematurely, as a result of the sideboard limit being reached during the early February period. The B season inshore sideboard fishery also closed prior to the end of the fishing season as a result of the sideboard limit being reached, again with the exception of 2009.

Table 14-3 Sideboard fishery closure dates for Western and Central GOA Pacific cod during 2006 - 2009

		Inshore				Offshore			
Area	Season	2006	2007	2008	2009	2006	2007	2008	2009
Western GOA	A	2 Mar (TAC)	16 Feb (TAC)	4 Feb (TAC)	22 Feb (TAC)	19 Feb (TAC)	14 Feb (TAC)	27 Feb (TAC)	10-Jun
	B	21 Aug (TAC)	14 Oct (TAC)	3 Oct (TAC)	31-Dec	12 Oct (TAC)	31-Dec	31-Dec	31-Dec
Central GOA	A	28 Feb (TAC)	24 Jan (TAC)	9 Feb (TAC)	13 Jan (TAC)	19 Feb (TAC)	14 Feb (TAC)	26 Feb (TAC)	19 Feb (TAC)
	B	21 Aug (TAC)	11 Oct (TAC)	26 Sep (TAC)	31-Dec	31-Dec	31-Dec	31-Dec	31-Dec

Source: NMFS Status of Fisheries/Closure Summary.

Table 14-4 provides an annual vessel count of the non-AFA crab vessels, by sideboard category in the GOA Pacific cod fishery from 1995 to 2009 that caught GOA Pacific cod. The number of Pacific cod exempt non-AFA crab vessels ranged between 4 and 5 during this period. For Pacific cod prohibited non-AFA crab vessels, the numbers ranged from 15 vessels in 1995, to 2 vessels in 1997. For Pacific cod sideboard non-AFA crab vessels, the vessel numbers ranged from 15 in 1997 to 60 in 2000. Since implementation of the sideboards on the non-AFA crab vessels, only 22 vessels recorded GOA Pacific cod catch. Finally, the number of other vessels that caught GOA Pacific cod has ranged from 476 in 1995, to 258 in 2006.

Table 14-4 Number of vessels fishing in the GOA Pacific cod fishery by sideboard category

Year	Pacific cod exempt vessels	Pacific cod prohibited vessels	Pacific cod sideboard vessels	Other Pacific cod vessels

1995	4	15	42	476
1996	5	8	28	414
1997	4	2	15	419
1998	4	6	26	412
1999	5	8	35	383
2000	5	11	60	399
2001	5	3	25	348
2002	4	7	20	287
2003	4	3	20	265
2004	4	6	21	281
2005	4	8	18	260
2006	4	6	22	258
2007	4	2	22	276
2008	4	2	27	306
2009	5	2	15	294

Source: non_afa_snow_crab_cvs.xls and non_afa_snow_crab_cp5.xls from ADF&G fish tickets for catcher vessels and blend data/catch accounting for catcher processors.

Table 14-5 provides GOA Pacific cod catch for non-AFA crab vessels by sideboard category, while Table 14-6 provides annual percent of GOA Pacific cod caught by each vessel group. Overall, the total catch of GOA Pacific cod has declined during the 1995 to 2009 period. In 1995, the combined catch of GOA Pacific cod by all vessels was 68,182 mt, while the combined catch in 2005 was 34,353 mt. For the Pacific cod exempt non-AFA crab vessels, on average their percent of the total GOA Pacific cod catch is 3.4 percent, with a catch range of 2,762 mt in 1996 to 1,016 mt in 2001. For non-AFA crab vessels prohibited from targeting GOA Pacific cod, on average their percent of the total GOA Pacific cod catch is 1.1 percent. Note that the sideboard regulations were not implemented until March 2006, which may explain the 2006 sideboard catch of 1,434 mt for this group of vessels. For the non-AFA crab vessels that are restricted by Pacific cod sideboards, on average their percent of the total GOA Pacific cod catch is 8.7 percent. Finally, GOA Pacific cod for other Pacific cod vessels on average account for 86.8 percent of all GOA Pacific cod catch.

Table 14-5 GOA Pacific cod catch (mt) of non-AFA crab vessels by sideboard category from 1995 - 2009

Year	Pacific Cod Exempt Vessel Catch	Pacific Cod Prohibited Vessel Catch	Pacific Cod Sideboard Vessel Catch	Other Pacific Cod Vessel Catch	Total Catch
1995	2,141	358	3,293	62,389	68,182
1996	2,762	62	2,556	63,447	68,827
1997	1,710	*	*	65,214	69,357
1998	2,508	53	3,377	57,470	63,409
1999	2,488	689	6,962	57,624	67,764
2000	1,388	429	10,724	41,456	53,997
2001	1,016	1,163	2,301	37,255	41,735
2002	1,077	1,142	3,073	35,429	40,721
2003	1,317	570	4,384	33,884	40,154
2004	1,080	563	5,313	34,768	41,724
2005	2,210	1,632	5,128	25,383	34,353
2006	1,807	1,434	5,037	28,186	36,464
2007	1,567	*	*	33,107	38,144
2008	949	*	*	31,339	35,564
2009	812	*	*	28,770	32,103

Source: non_afa_snow_crab_cvs.xls and non_afa_snow_crab_cp5.xls from ADF&G fish tickets for catcher vessels and blend data/catch accounting for catcher processors. Data does not include State water Pacific cod catch and sablefish and halibut IFQ bycatch of Pacific cod.

*Concealed for confidentiality

Table 14-6 Percent of GOA Pacific cod catch by sideboard category from 1995 - 2009

Year	Pacific Cod Exempt Vessel Percent of Total Catch	Pacific Cod Prohibited Vessel Percent of Total Catch	Pacific Cod Sideboard Vessel Percent of Total Catch	Other Pacific Cod Vessels Percent of Total Catch
1995	3.1%	0.5%	4.8%	91.5%
1996	4.0%	0.1%	3.7%	92.2%
1997	2.5%	*	*	94.0%
1998	4.0%	0.1%	5.3%	90.6%
1999	3.7%	1.0%	10.3%	85.0%
2000	2.6%	0.8%	19.9%	76.8%
2001	2.4%	2.8%	5.5%	89.3%
2002	2.6%	2.8%	7.5%	87.0%
2003	3.3%	1.4%	10.9%	84.4%
2004	2.6%	1.3%	12.7%	83.3%
2005	6.4%	4.8%	14.9%	73.9%
2006	5.0%	3.9%	13.8%	77.3%
2007	4.1%	*	*	86.8%
2008	2.7%	*	*	88.1%
2009	2.5%	*	*	89.6%
Average	**3.4%**	**1.1%**	**8.7%**	**86.8%**

Source: non_afa_snow_crab_cvs.xls and non_afa_snow_crab_cp5.xls from ADF&G fish tickets for catcher vessels and blend data/catch accounting for catcher processors. Data does not include State water Pacific cod catch and sablefish and halibut IFQ bycatch of Pacific cod.

*Concealed for confidentiality

14.2 Processor sideboard limitations

At the time of adopting the program, the Council elected not to adopt any processor sideboard limitations. Since that time, the Council has received public testimony suggesting that floating processors freed up as a result of the crab program could encroach on processor participants in the Aleutian Island Pacific cod fisheries. The Council is currently considering alternatives that would limit processors that contributed to allocations of PQS in the Bering Sea *C. opilio* fishery to their historic processing participation levels with the intent of protecting processors in the Aleutian Island Pacific cod fisheries. The Council is scheduled to revisit this issue in a separate agenda item at this meeting.

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