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

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1 INTRODUCTION

As a part of the crab rationalization program, the Council requested a preliminary review of the program three years after its implementation. At the December 2007 Council meeting, staff presented the Council with a workplan for the review. This paper is the three-year review of the program.

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 briefly examines the effects of the program on crews in both sectors. Changes in ex vessel pricing brought on by the shares 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 safety and biological condition of crab stocks.

The analysis is preliminary, as it examines only three years of fishing under the program. The change to any share-based management system requires participants to modify their behavior. For example, in the derby fisheries landings were made during and after the compact seasons. One of benefits expected to arise from the crab rationalization program is an extension of fishing over a longer period, to achieve harvesting efficiencies. Participants in the fishery can be expected to modify their behaviors to realize gains from this flexibility. The extended fishing period can be expected to complicate scheduling of deliveries. Participants in the program continue to adapt to the change in management.

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 three seasons is difficult, since participants have had little time to learn how 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	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
	Sex Restrictions	Bycatch Limits (in crab fisheries)
	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 only to harvesters that are unaffiliated with holders of processing shares. 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. 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 allocation in a program fishery was equal 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 would exempt custom processing in certain fisheries and regions from the plant owners share cap was adopted recently. That exemption is intended to allow 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

[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 would apply 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 was adopted that would limit the processing in any facility to 60 percent of the IPQ in the Western Aleutian Islands golden king crab and Eastern Aleutian Islands golden king crab fisheries.

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.

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 rule 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 is 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. 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).

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[3] The initial exemption from these requirements applied only for the first three years of the program. The Council extended this exemption indefinitely under a recent amendment to the program that 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]

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 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

[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.

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 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. Currently, NOAA Fisheries Financial Services Division is in the process of developing regulations defining eligibility for the loan program. Although the outcome of that process is uncertain, 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.

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.

Based on public testimony and a recommendation from the Advisory Panel at the December 2006 meeting, the Council passed a motion directing staff to develop protocols concerning confidentiality and quality of data collected under the economic data collection requirement. That process is ongoing.

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. 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.

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

Licenses endorsed for / also endorsed for	Bristol Bay red king crab	Bering Sea *C. opilio*	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		**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 by Amendments 23 and 28 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 shares to purchase interests in vessels. Alternatively, persons entered the fisheries as an investment. These persons 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.[7] 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 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 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

[7] 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.

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. Transfers are usually processed by RAM within two or three days of receipt of a complete application, but can take up to 10 days. RAM is in the process of developing a system of electronic transfers. Once in place, users of this system will be able to engage in real time transfers through the internet. This system is unlikely to be fully implemented for at least one more season.

Table 3-5 shows the number of QS transferred by operation type, share type, and fishery. In the first three years of the program, substantial portions of the harvesting QS pools have been transferred. Approximately 10 percent of the C share pool in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries traded hands in each of the first two years of the program. The transfer market for C shares seems to have slowed in the third year, which may be a reflection of persons who are no longer employed in the fisheries having divested of their shares in the firsts two years. 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 (2005-2006 through January 2008).

Year	Fishery	Sector	QS transferred	
			units	as a percent of total QS pool
2005 - 2006	Bristol Bay red king crab	Catcher processor owner	1,569,702	0.4
		Catcher vessel owner	15,337,188	3.8
		Catcher vessel crew	1,434,287	0.4
	Bering Sea *C. opilio*	Catcher processor owner	11,997,148	1.2
		Catcher vessel owner	40,969,076	4.1
		Catcher vessel crew	3,082,755	0.3
	Bering Sea *C. bairdi**	Catcher processor owner	1,570,469	0.8
		Catcher processor crew	19,854	0.0
		Catcher vessel owner	11,870,491	5.9
		Catcher vessel crew	563,706	0.3
	Eastern Aleutian Islands golden king crab	Catcher vessel owner	1,021,237	10.2
		Catcher vessel crew	43,372	0.4
	Pribilof red and blue king crab	Cather vessel owner	387,936	1.3
	St. Matthew Island blue king crab	Catcher vessel owner	766,644	2.5
		Catcher vessel crew	57,443	0.2
	Western Aleutian Islands golden king crab	Catcher vessel owner	878,114	1.5
		Catcher vessel crew	75,643	0.1
2006 - 2007	Bristol Bay red king crab	Catcher processor owner	777,429	0.2
		Catcher vessel owner	28,744,461	7.2
		Catcher vessel crew	1,237,670	0.3
	Bering Sea *C. opilio*	Catcher processor owner	3,494,652	0.3
		Catcher processor crew	222,842	0.0
		Catcher vessel owner	60,901,248	6.1
		Catcher vessel crew	3,049,661	0.3
	Bering Sea *C. bairdi**	Catcher vessel crew	181,990	0.1
	Eastern Bering Sea *C. bairdi*	Catcher processor owner	460,039	0.2
		Catcher vessel owner	17,195,877	8.6
		Catcher vessel crew	491,486	0.2
	Pribilof red and blue king crab	Catcher vessel owner	960,391	3.2
		Catcher vessel crew	48,351	0.2
	St. Matthew Island blue king crab	Catcher vessel owner	1,620,414	5.4
		Catcher vessel crew	79,301	0.3
	Western Aleutian Islands red king crab	Catcher vessel owner	1,232,580	2.1
	Western Bering Sea *C. bairdi*	Catcher processor owner	460,039	0.2
		Catcher vessel owner	17,195,877	8.6
		Catcher vessel crew	491,486	0.2
2007 - 2008	Bristol Bay red king crab	Catcher vessel owner	4,734,563	1.2
		Catcher vessel crew	493,960	0.1
	Bering Sea *C. opilio*	Catcher vessel owner	18,434,596	1.8
		Catcher vessel crew	983,437	0.1
	Eastern Aleutian Islands golden king crab	Catcher processor owner	396,848	4.0
		Catcher vessel crew	35,191	0.4
	Eastern Bering Sea *C. bairdi*	Catcher vessel owner	2,886,182	1.4
		Catcher vessel crew	217,301	0.1
	Pribilof red and blue king crab	Catcher vessel owner	654,792	2.2
	St. Matthew Island blue king crab	Catcher vessel owner	1,374,990	4.5
		Catcher vessel crew	48,781	0.2
	Western Aleutian Island golden king crab	Catcher processor owner	190,857	0.5
	Western Aleutian Island red king crab	Catcher vessel owner	265,488	0.4
	Western Bering Sea *C. bairdi*	Catcher vessel owner	3,208,167	1.6
		Catcher vessel crew	217,301	0.1

Source: NMFS Restricted Access Management transfer data.

Note: Percentages are based on quota share pool as of 2008. Annual transfers fishery and sector transfers of less than 5,000 units are excluded.

Data for 2007-2008 are partial year data, as of January 2008.

* Uses Eastern Bering Sea *C. bairdi* for the QS pool denominator.

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 beyond a level in excess of the individual cap at the initial allocation. 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, very few persons have left the fisheries—fewer than 15 persons (or less than 6 percent of the initial share holders). In all of the other fisheries, the number of owner quota share holders increased over the number in the initial allocations. In those fisheries, the mean, median, and maximum share holding was largely unchanged.

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

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	32	2.4	0.1	0.0	0.2	245	0.41	0.34	3.44
	South	234	93.0	0.4	0.3	3.4				
	Catcher processor	12	4.5	0.4	0.3	1.0				
Bering Sea *C. opilio*	North	202	42.7	0.2	0.2	1.2	231	0.43	0.41	2.59
	South	205	48.2	0.2	0.2	2.6				
	Catcher processor	13	9.1	0.7	0.7	2.2				
Eastern Bering Sea *C. bairdi*	Undesignated	234	93.3	0.4	0.3	2.6	244	0.41	0.31	2.91
	Catcher processor	13	6.7	0.5	0.5	1.1				
Western Bering Sea *C. bairdi*	Undesignated	234	93.3	0.4	0.3	2.7	244	0.41	0.31	2.91
	Catcher processor	13	6.7	0.5	0.5	1.1				
Eastern Aleutian Island golden king crab	South	13	95.2	7.3	6.6	20.4	15	6.67	5.97	20.35
	Catcher processor	2	4.8	2.4	2.4	4.1				
Western Aleutian Island golden king crab	Undesignated	13	26.9	2.1	1.0	11.0	16	6.25	1.74	45.73
	West	9	26.9	3.0	1.3	13.5				
	Catcher processor	3	46.2	15.4	0.5	45.7				
Western Aleutian Island red king crab	South	32	61.0	1.9	0.5	13.5	33	3.03	0.62	45.16
	Catcher processor	2	39.0	19.5	19.5	37.8				
St. Matthew Island blue king crab	North	121	76.7	0.6	0.6	3.4	136	0.74	0.62	4.45
	South	84	21.3	0.3	0.1	2.2				
	Catcher processor	5	2.0	0.4	0.3	0.9				
Pribilof red and blue king crab	North	85	67.1	0.8	0.5	3.1	113	0.88	0.52	3.42
	South	76	32.4	0.4	0.3	2.8				
	Catcher processor	1	0.5	0.5	0.5	0.5				

Source: NMFS Restricted Access Management IFQ database, crab fishing year 2007-2008.
Note: These share holdings data are publicly available and non-confidential.

As might be expected, 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). In general, C share holdings show some consolidation, as persons have acquired 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 fewer persons hold shares in each of these fisheries. In most instances, these are likely persons who no longer participate in the fisheries as active crew. Although active participation requirements did not apply for the first three years of the program, 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.

Fishery	Share holdings by operation type						Share holdings across operation types			
	Operation type	QS holders	Percent of pool	Mean holding	Median holding	Maximum holding	QS holders	Mean holding	Median holding	Maximum holding
Bristol Bay red king crab	Catcher vessel	153	96.5	0.6	0.5	2.0	156	0.64	0.54	2.00
	Catcher processor	8	3.5	0.4	0.4	1.2				
Bering Sea *C. opilio*	Catcher vessel	134	94.1	0.7	0.6	2.0	136	0.74	0.66	1.99
	Catcher processor	7	5.9	0.8	0.7	2.0				
Eastern Bering Sea *C. bairdi*	Catcher vessel	150	91.8	0.6	0.6	1.9	156	0.64	0.57	2.00
	Catcher processor	15	8.2	0.5	0.4	1.5				
Western Bering Sea *C. bairdi*	Catcher vessel	150	91.8	0.6	0.6	1.9	156	0.64	0.57	2.00
	Catcher processor	15	8.2	0.5	0.4	1.5				
Eastern Aleutian Island golden king crab	Catcher vessel	11	100.0	9.1	9.2	20.1	11	9.09	9.18	20.14
	Catcher processor	0	0.0	0.0	0.0	0.0				
Western Aleutian Island golden king crab	Catcher vessel	8	57.5	7.2	5.6	21.7	9	11.11	6.17	41.74
	Catcher processor	2	42.5	21.3	21.3	41.7				
Western Aleutian Island red king crab	Catcher vessel	4	86.4	21.6	14.3	49.5	4	25.00	20.84	49.46
	Catcher processor	1	13.6	13.6	13.6	13.6				
St. Matthew Island blue king crab	Catcher vessel	69	100.0	1.4	1.4	3.3	69	1.45	1.41	3.32
	Catcher processor	0	0.0	0.0	0.0	0.0				
Pribilof red and blue king crab	Catcher vessel	39	100.0	2.6	2.6	4.8	39	2.56	2.55	4.84
	Catcher processor	0	0.0	0.0	0.0	0.0				

Source: NMFS Restricted Access Management IFQ database, crab fishing year 2007-2008.
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 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 for any remaining catcher vessel owner QS. 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 2007-2008 season, QS holders with no processor affiliation received approximately 11.7 percent of their annual IFQ allocation as Class B IFQ, suggesting that approximately 20 percent of the QS pool is subject to affiliated PQS. 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 PQS affiliations. Although the amount of shares available for delivery to persons not holding unused IPQ is unchanged by this distribution of Class B IFQ, this distribution increases the portion of each independent harvester's allocation that may be marketed competitively without the constraint of processor share and regional landing requirements.

Table 3-8 Allocations of Class A IFQ and Class B IFQ by processor affiliation (2007-2008)

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	39	21.3	6.5	199	78.7	93.5	11.7
Bering Sea *C. opilio*	31	18.2	6.5	191	81.8	93.5	11.3
Eastern Aleutian Islands golden king crab	1	0.6	0.0	12	99.4	100.0	10.1
Eastern Bering Sea *C. bairdi*	24	16.0	0.0	211	84.0	100.0	11.7
Western Aleutian Islands golden king crab	1	0.0	0.0	12	100.0	100.0	10.0
Western Bering Sea *C. bairdi*	24	16.0	0.0	211	84.0	100.0	11.7

Source: RAM IFQ database (2007-2008).
* Processor affiliates may receive Class B IFQ for IFQ allocations in excess of IPQ holdings.

4 HARVEST SECTOR

This section reviews harvest sector IFQ use and participation in the fisheries in the first three 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 (2007-2008).

	Catcher vessel			Catcher processor		Total
	Owner		Captain/	Owner	Captain/	
Fishery	Class A	Class B	crew		crew	
Bristol Bay red king crab	15,281,406	1,697,931	528,407	807,708	19,247	18,334,699
Bering Sea *C. opilio*	45,030,918	5,003,431	1,601,490	4,994,834	99,922	56,730,595
Eastern Aleutian Islands golden king crab	2,243,082	249,229	80,995	126,663	0	2,699,969
Eastern Bering Sea *C. bairdi*	2,525,080	280,564	85,165	202,073	7,623	3,100,505
Western Aleutian Islands golden king crab	1,140,787	126,752	41,914	1,089,563	30,989	2,430,005
Western Bering Sea *C. bairdi*	1,594,952	177,211	53,792	127,637	4,812	1,958,404

Source: NMFS Restricted Access Management IFQ database, crab fishing year 2007-2008.

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. Examining data from the first three years of the program show a substantial reduction in the fleets in all fisheries. The figures reveal initial precipitous declines that, as expected, gradually slowed over time. Prior to the implementation of the rationalization program, between 167 and 251 vessels participated annually in each of the two largest fisheries, the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries. 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 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, 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.

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

Fishery	Season	Catch	Catch (as percent of total**) by		Number of vessels participating		
			catcher vessels	catcher processors	catcher vessels	catcher processors	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
Bristol Bay red king crab	2000	7,468,240	97.2	2.8	238	6	244
	2001	7,681,106	95.9	4.1	224	8	230
	2002	8,770,348	96.6	3.4	234	9	241
	2003	14,237,375	95.2	4.8	242	8	250
	2004	13,889,047	95.7	4.3	243	8	251
	2005 - 2006	16,472,400	96.7	3.3	88	4	89
	2006 - 2007	13,887,531	*	*	79	3	81
	2007 - 2008	18,324,046	*	*	72	3	74
Eastern Bering Sea *C. bairdi*	2006 - 2007	1,267,106	*	*	33	3	36
	2007 - 2008	1,439,435	*	*	19	1	20
Western Bering Sea *C. bairdi*	2005 - 2006	791,025	*	*	42	2	43
	2006 - 2007	633,910	*	*	34	2	36
	2007 - 2008	467,136	*	*	26	1	27
Eastern Aleutian Islands golden king crab	2000 - 2001	3,086,890	*	*	15	0	15
	2001 - 2002	3,128,409	100.0	0.0	19	0	19
	2002 - 2003	2,765,436	100.0	0.0	19	0	19
	2003 - 2004	2,900,247	100.0	0.0	18	0	18
	2004 - 2005	2,846,273	100.0	0.0	20	0	20
	2005 - 2006	2,569,209	*	*	6	1	7
	2006 - 2007	2,692,009	*	*	5	1	6
	2007 - 2008	2,690,377	*	*	3	1	4
Western Aleutian Islands golden king crab	2000 - 2001	2,902,518	*	*	11	1	12
	2001 - 2002	2,693,221	*	*	8	1	9
	2002 - 2003	2,605,237	*	*	5	1	6
	2003 - 2004	2,637,161	*	*	5	1	6
	2004 - 2005	2,639,862	*	*	5	1	6
	2005 - 2006	2,382,468	*	*	2	1	3
	2006 - 2007	2,002,186	*	*	2	1	3
	2007 - 2008	2,246,040	*	*	2	1	3
All fisheries	2000 - 2001				246	10	253
	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

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

* Withheld for confidentiality.

** Catch as a percent of IFQ allocations for 2005-2006, 2006-2007, and 2007-2008 seasons.

Note: "All fishery" participation in a season includes all fisheries prosecuted between August 1 and July 31.

For 2005-2006, 2006-2007, and 2007-2008 catcher processor vessel count 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 the first three 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*, Eastern Bering Sea *C. bairdi* and Western Aleutian Islands golden king crab fisheries. The *C. bairdi* fisheries are reported by participants to be particularly difficult to prosecute because of low catch rates. Harvest of the Western Aleutian Islands golden king crab fishery is reported to be economically challenging because of low market prices for golden king crab. Although the amount of unharvested IFQ in the Western Aleutian Islands golden king crab fishery cannot be reported on a regional basis due to policies regarding the protection of confidential data, participants report that most of the unharvested IFQ are from the West region, where processing costs are reported to be relatively high.

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 likely 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.

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	*		
	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	48.6	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	19.8	1	*		

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

* withheld for confidentiality.

Note: blanks are inapplicable.

While most participants have managed to harvest close to their full allocations, few overages have occurred in the first three years of the program (Table 4-4). A slight increase in the number of overages occurred in the second year of the program, with an overall increase from 15 to 22 IFQ overages. A slight increase in the number of overages per vessel and per landing also occurred, as harvests were slightly more concentrated across vessels and landings in the second year. However, the number of overages

dropped to 14 in the third year of the program. Over all three years, overages have been small relative to the size of the TAC in the fisheries. In the Bering Sea *C. opilio* and Bristol Bay red king crab fisheries (the only fisheries for which data can be released), overages were approximately one-one thousandth of the TAC or less. 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).[8]

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 future years, it is possible that overages can be reduced further from these already low levels. The Council has adopted an amendment that will allow the post-delivery transfer of IFQ and IPQ to cover overages. That amendment will take effect on Secretarial approval and completion of the rule making process.

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	7	3	5,984	2.94
	Bering Sea *C. opilio*	78	270	6	*	8,294	2.22
	Western Bering Sea *C. bairdi*	43	68	1	0	*	1.47
	Eastern Aleutian Islands golden king crab	7	30	0	0	0	0.00
	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	53	2	0	*	3.77
	Western Bering Sea *C. bairdi*	36	56	0	0	0	0.00
	Eastern Aleutian Islands golden king crab	6	29	1	0	*	3.45
	Western Aleutian Islands golden king crab	3	11	1	0	*	9.09
2007-2008	Bristol Bay red king crab	74	237	5	*	3,854	2.11
	Bering Sea *C. opilio*	78	427	8	*	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

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

* withheld for confidentiality.

Note: One overage during the 2005-2006 season was a catcher processor overage; three overages during the 2006-2007 season were catcher processor overages.

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.

[8] 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.

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. In the first season, Bristol Bay red king crab lease rates have been as high as 70 percent of the ex vessel price, while Bering Sea *C. opilio* lease rates have reached 50 percent of the ex vessel price in some cases. In the Bering Sea *C. bairdi* fishery lease rates were approximately 35 percent of the ex vessel price. The lower rate in this fishery is likely a reflection of the fact that the fisheries are, in part, an incidental catch fisheries with relatively lower catch rates and a low TAC. Lease rates in the Eastern Aleutian Islands golden king crab fishery were approximately 50 percent of the ex vessel prices, while lease rates in the Western Aleutian Islands golden king crab fishery were approximately 25 percent of the ex vessel price. The low price in the Western Aleutian Islands fishery likely has resulted from the high operating costs and low ex vessel price in that remote fishery. Lease rates dropped by as much as 10 percentage points in the various fisheries in the second year. Demand for shares in the Western Aleutian Islands golden king crab fishery reportedly did not supported a lease market in the second year.[9]

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.[10] 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.[11]

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 be held confidential. Liberal rules exempt vessels fishing cooperative allocations from vessel IFQ use caps. Because of these attributes, most QS holders have elected to join cooperatives (Table 4-5). By the third year of the program, nearly all IFQ were held by cooperatives. 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

[9] 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. In considering QS values, it is important to note that some risk premium should be incorporated into the value to account for variations in stocks and market conditions. In addition, it is possible that lease rates in the first few years of the program may be inflated as some vessel owners attempt to secure their position in the fleet in the face of substantial excess capital. 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.

[10] 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.

[11] 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.

coordinating harvest activity among non-cooperative IFQ holders) decreases. 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. In the 2007-2008 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.

Table 4-5 Percent of IFQ held by cooperatives.

Fishery	Number of IFQ holders (including cooperatives)	Number of cooperatives	Number of cooperative members	Percent of IFQ allocated to cooperatives	Maximum cooperative allocation	Maximum number of cooperative members
	2005 - 2006					
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
	2006 - 2007					
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
	2007 - 2008					
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

Source: NMFS RAM catch data.

High operating costs 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 purchased 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. This trend has continued, as operational costs 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 4-6 through Table 4-11 show the number of vessels fishing inside and outside of cooperatives, as well as the total catch and average and median amount of IFQ fished by these vessels for each fishery. In the first three years of the program in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries, approximately 15 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 has risen each year in both of these fisheries; however, some of this

increase in the third year is a result of TAC increases in these two fisheries, as opposed to greater consolidation of IFQ. 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 4-6 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	Catch (in pounds)	Average vessel's catch of cooperative held IFQ	Median vessel's catch of cooperative held IFQ	Cooperartive vessels fishing over the non-cooperative cap	Number of vessels	Catch (in pounds)	Average vessel's catch of individually held IFQ	Median vessel's catch of individually held IFQ
2005-2006	71	13,750,613	193,671	141,529	10	37	2,721,787	73,562	46,332
2006-2007	77	13,637,335	177,108	161,928	15	16	240,535	15,033	3,036
2007-2008	72	18,088,305	251,226	226,322	13	7	235,741	33,677	4,136

Source: RAM IFQ landings data

Table 4-7 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	Catch (in pounds)	Average vessel's catch of cooperative held IFQ	Median vessel's catch of cooperative held IFQ	Cooperartive vessels fishing over the non-cooperative cap	Number of vessels	Catch (in pounds)	Average vessel's catch of individually held IFQ	Median vessel's catch of individually held IFQ
2005-2006	63	27,938,875	443,474	348,802	13	34	5,309,134	156,151	78,670
2006-2007	69	32,182,046	466,406	411,855	13	12	477,102	39,759	7,789
2007-2008	78	56,387,093	722,911	611,455	12	7	335,307	47,901	14,306

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, likely caught incidentally in one of the two larger fisheries. These catch amounts suggest that few vessels (inside or outside of cooperatives) have targeted *C. bairdi* which is likely the case because of the relatively low TACs and reported low catch rates in the fisheries.

Table 4-8 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	Catch (in pounds)	Average vessel's catch of cooperative held IFQ	Median vessel's catch of cooperative held IFQ	Cooperartive vessels fishing over the non-cooperative cap	Number of vessels	Catch (in pounds)	Average vessel's catch of individually held IFQ	Median vessel's catch of individually held IFQ
2006-2007	34	1,232,366	36,246	3,833	12	4	31,678	7,920	*
2007-2008	20	1,439,435	71,972	33,807	5				

Source: RAM IFQ landings data

Table 4-9 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	Catch (in pounds)	Average vessel's catch of cooperative held IFQ	Median vessel's catch of cooperative held IFQ	Cooperartive vessels fishing over the non-cooperative cap	Number of vessels	Catch (in pounds)	Average vessel's catch of individually held IFQ	Median vessel's catch of individually held IFQ
2005-2006	31	665,998	21,484	2,672	7	14	125,027	8,931	6,768
2006-2007	36	633,910	17,609	396	12				
2007-2008	27	467,136	17,301	9,943	4				

The two Aleutian Islands golden king crab fisheries have experienced substantial consolidation through cooperatives, as well. In only one season in the first three years have any vessels fishing cooperative IFQ remained under the 10 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 the Eastern Aleutian Islands golden king crab fishery; at no time have vessels harvested individually held IFQ in the Western Aleutian Islands golden king crab fishery.

Table 4-10 Number of vessels fishing and catch inside and outside of cooperatives in the Eastern Aleutian Islands golden crab fishery.

EAG	Fishing inside cooperatives					Fishing outside cooperatives			
Season	Number of vessels	Catch (in pounds)	Average vessel's catch of cooperative held IFQ	Median vessel's catch of cooperative held IFQ	Cooperartive vessels fishing over the non-cooperative cap	Number of vessels	Catch (in pounds)	Average vessel's catch of individually held IFQ	Median vessel's catch of individually held IFQ
2005-2006	6	2,336,448	389,408	348,029	6	3	232,761	77,587	*
2006-2007	6	2,690,662	448,444	336,415	*				
2007-2008	4	2,690,377	672,594	*	4				

Source: RAM IFQ landings data
* Withheld for confidentiality.

Table 4-11 Number of vessels fishing and catch inside and outside of cooperatives in the Western Aleutian Islands golden crab fishery.

WAG	Fishing inside cooperatives					Fishing outside cooperatives			
Season	Number of vessels	Catch (in pounds)	Average vessel's catch of cooperative held IFQ	Median vessel's catch of cooperative held IFQ	Cooperartive vessels fishing over the non-cooperative cap	Number of vessels	Catch (in pounds)	Average vessel's catch of individually held IFQ	Median vessel's catch of individually held IFQ
2005-2006	3	2,382,468	794,156	*	3				
2006-2007	3	2,000,276	666,759	*	3				
2007-2008	3	2,246,040	748,680	*	3				

Source: RAM IFQ landings data
* Withheld for confidentiality.

The degree to which IFQ held by a cooperative are managed as a pool varies across cooperatives. Cooperatives managing their IFQ as a pool typically distribute underages (or unused IFQ) among cooperative 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 the processor to coordinate the fleet, and this has increased information flow between catchers 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 4-13 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 three years of the program. Figure 4-1 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 harvests have been more than double their prerationalization levels in pounds and as a percent of the total catch. The mean and median vessel harvest in the fishery has grown consistently in the first three years of the program, but the largest harvests have fluctuated, both in pounds and as a percent of the total harvests. The histogram of harvests also shows a consistent pattern of consolidation since implementation.

Table 4-12 Simple statistics of the fleet participating in the Bristol Bay red king crab fishery.

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	13,887,531	1.23	170,268	1.05	146,374	3.27	453,476
2007-2008	74	18,324,046	1.35	247,343	1.22	222,838	3.57	654,402

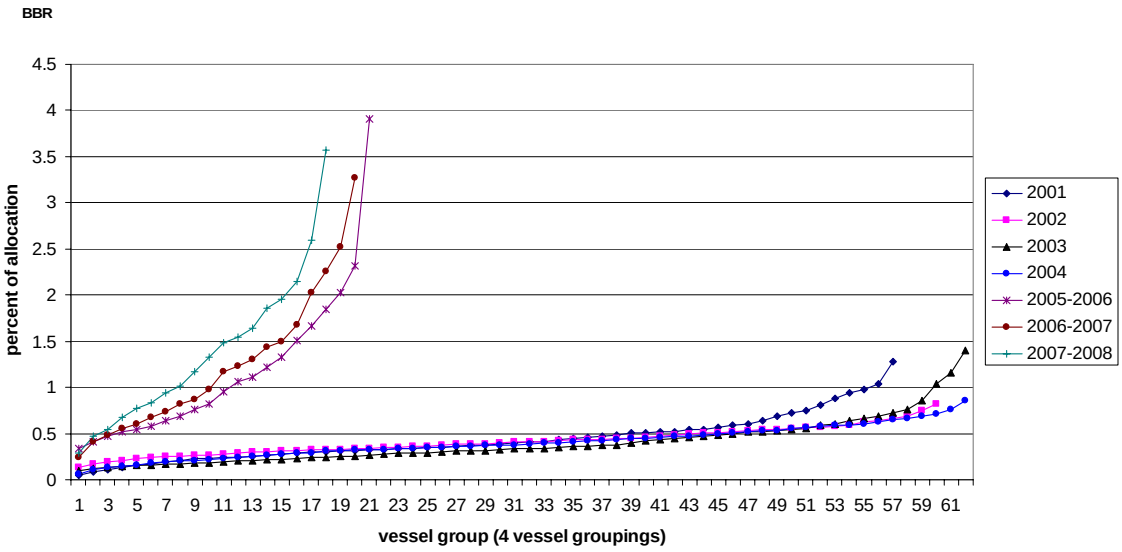

Figure 4-1 Catch by vessel as a percent of the total allocation in the Bristol Bay red king crab fishery

Table 4-13 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 three years of the program. Figure 4-2 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 yeaers immediately preceding rationalization.[12]

Unlike the Bristol Bay red king crab fishery, the fleet size fluctuated across the first three years, reaching a low in the 2006-2007 season, then rising in the 2007-2008 season. This increase likely occurred to support harvest of the increased TAC in the third year of the program, as the mean, median, and largest harvests increased substantially despite the increase in participating vessels.

Table 4-13 Simple statistics of the fleet participating in the Bering Sea *C. opilio* fishery.

Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four	
			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

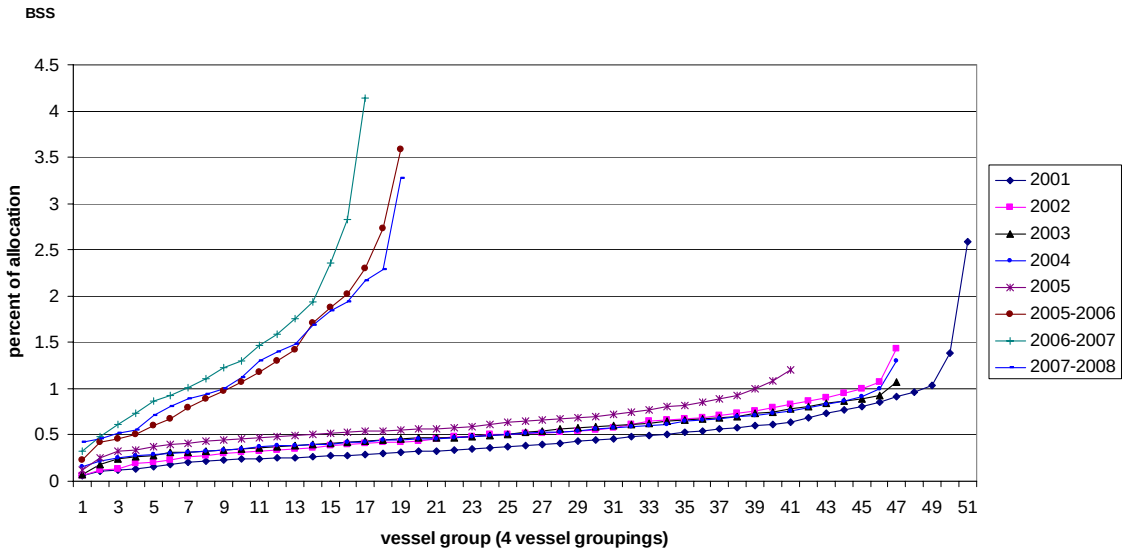

Figure 4-2 Catch by vessel as a percent of the total allocation in the Bering Sea *C. opilio* fishery.

Table 4-14 and Table 4-15 show simple catch statistics of the fleets participating in the Western and Eastern Bering Sea *C. bairdi* fisheries during the first three years of the program. These fisheries were reopened under the program after being closed for nearly a decade. Figure 4-3 and Figure 4-4 are histograms showing the distribution of catch across the fleets during the first three years of the program, with vessels grouped in fours to protect confidentiality. The fisheries are generally prosecuted incidentally

[12] 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.

to the Bering Sea *C. opilio* and Bristol Bay red king crab fisheries, although participants 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 4-14 Simple statistics of the fleet participating in the Western Bering Sea *C. bairdi* fishery.

Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four	
			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

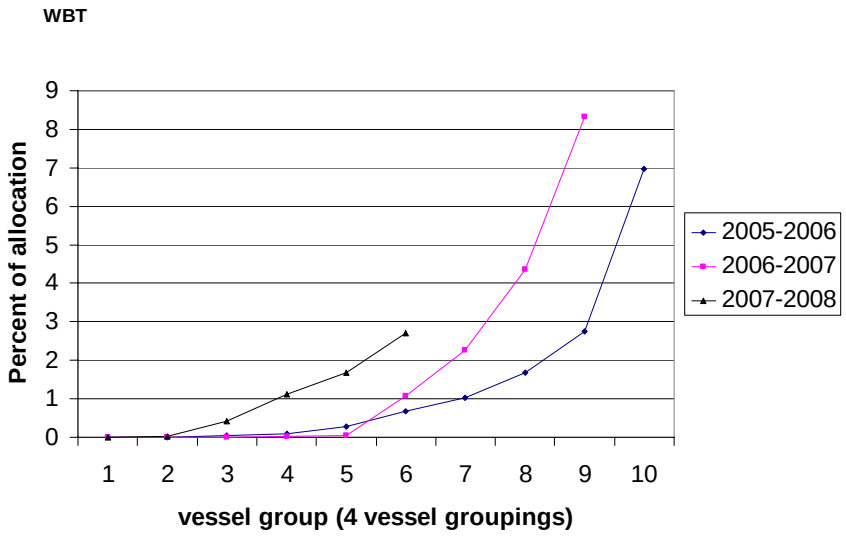

Figure 4-3 Catch by vessel as a percent of the total allocation in the Western Bering Sea *C. bairdi* fishery.

Table 4-15 Simple statistics of the fleet participating in the Eastern Bering Sea *C. bairdi* fishery.

Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four	
			as percent of total allocation	in pounds	as percent of total allocation	in pounds	as percent of total allocation	in pounds
2006-2007	36	1,264,044	2.08	26,301	0.23	2,871	9.58	121,130
2007-2008	20	1,439,435	2.32	33,414	1.09	15,695	7.81	112,409

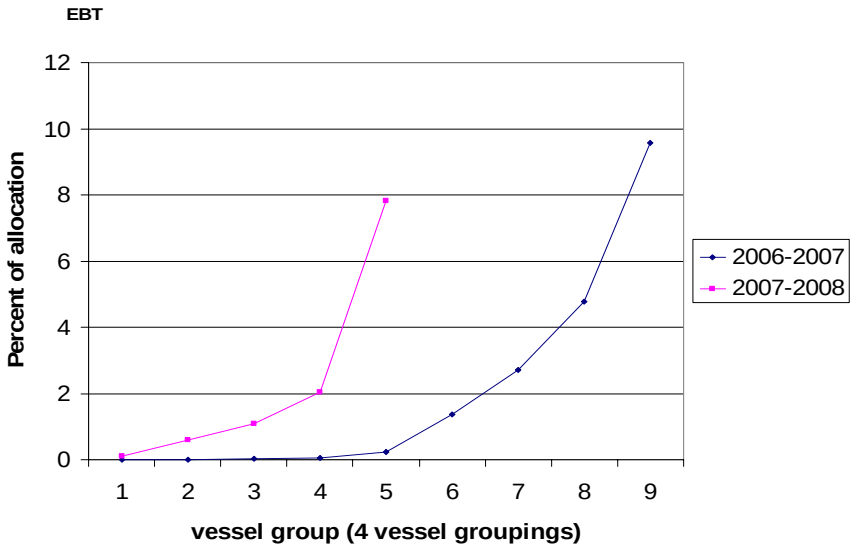

Figure 4-4 Catch by vessel as a percent of the total allocation in the Eastern Bering Sea *C. bairdi* fishery.

Table 4-16 and Table 4-17 show simple catch statistics of the fleets participating in the Eastern and Western Aleutian Islands golden king fisheries during the first three 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 4-16 Simple statistics of the fleet participating in the Eastern Aleutian Islands golden crab fishery.

Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four	
			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				

Table 4-17 Simple statistics of the fleet participating in the Western Aleutian Islands golden crab fishery.

Season	Number of vessels in the fishery	Total Catch	Average vessel harvest		Median vessel harvest		Average of highest four	
			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				

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 4-18 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 4-19).[13] For example, the 2005-2006 Bristol Bay red king crab season was prosecuted towards the 18.3 million pound TAC 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

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

period of several months; however, deliveries remain most concentrated in the Bristol Bay red king crab fishery. That season is only four months, substantially shorter than the season in other fisheries, and markets tend to be strongest near the year's end leading up to the holidays.

Table 4-19 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	
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	
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	
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	
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	
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	

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 4-5).[14] In all three years of the program, in excess of 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 4-6). Participation in the first week of the fishery and after the sixth week dropped to approximately 10 vessels or fewer.

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

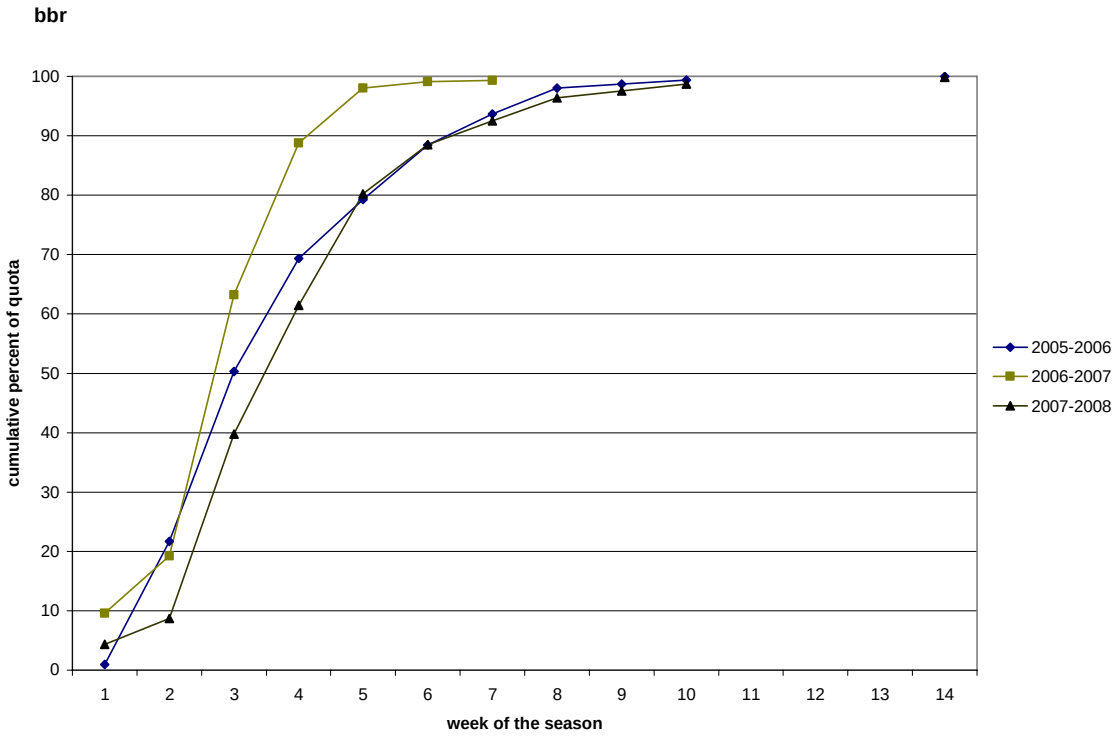

Figure 4-5 Post-rationalization cumulative deliveries in the Bristol Bay red king crab fishery.

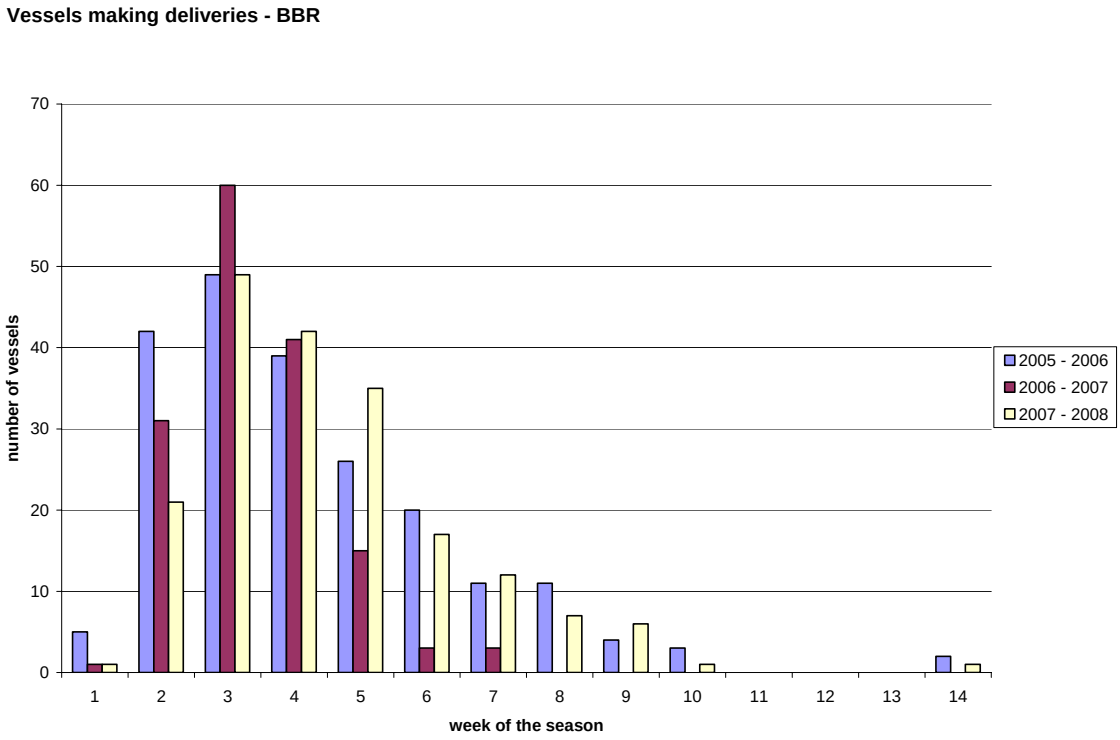

Figure 4-6 Vessels making deliveries by week in the Bristol Bay red king crab fishery (2005-2006 through 2007-2008).

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 4-7). 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 4-8). 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.

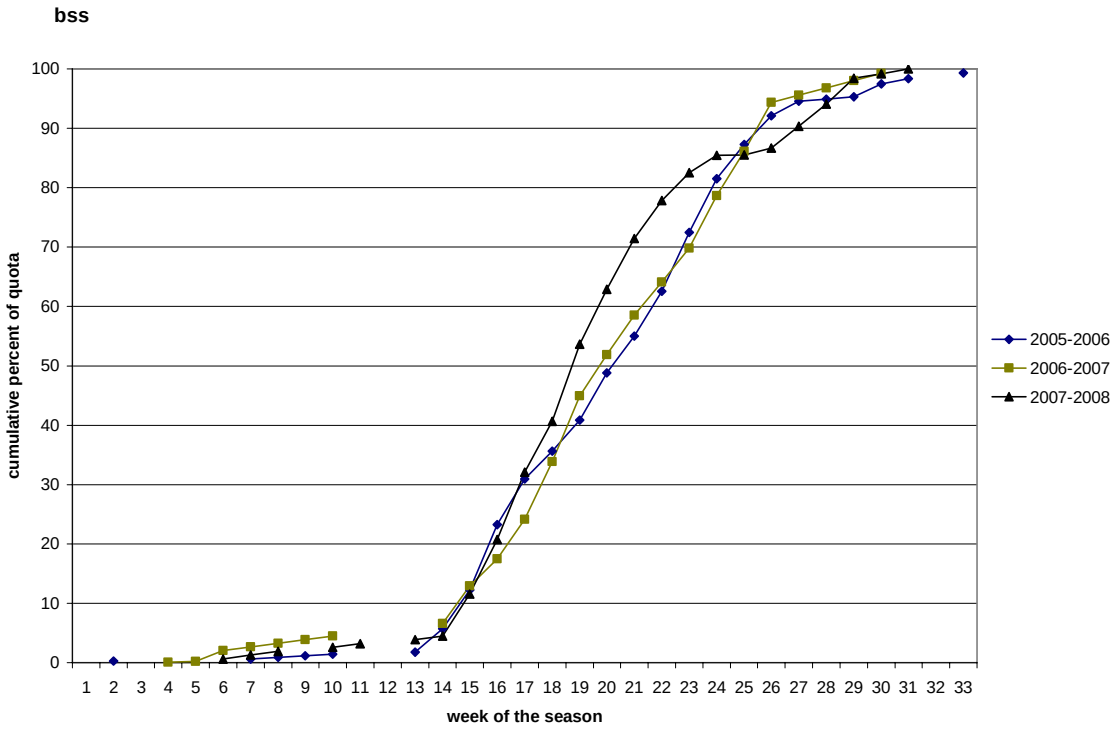

Figure 4-7 Post-rationalization cumulative deliveries in the Bering Sea *C. opilio* fishery.

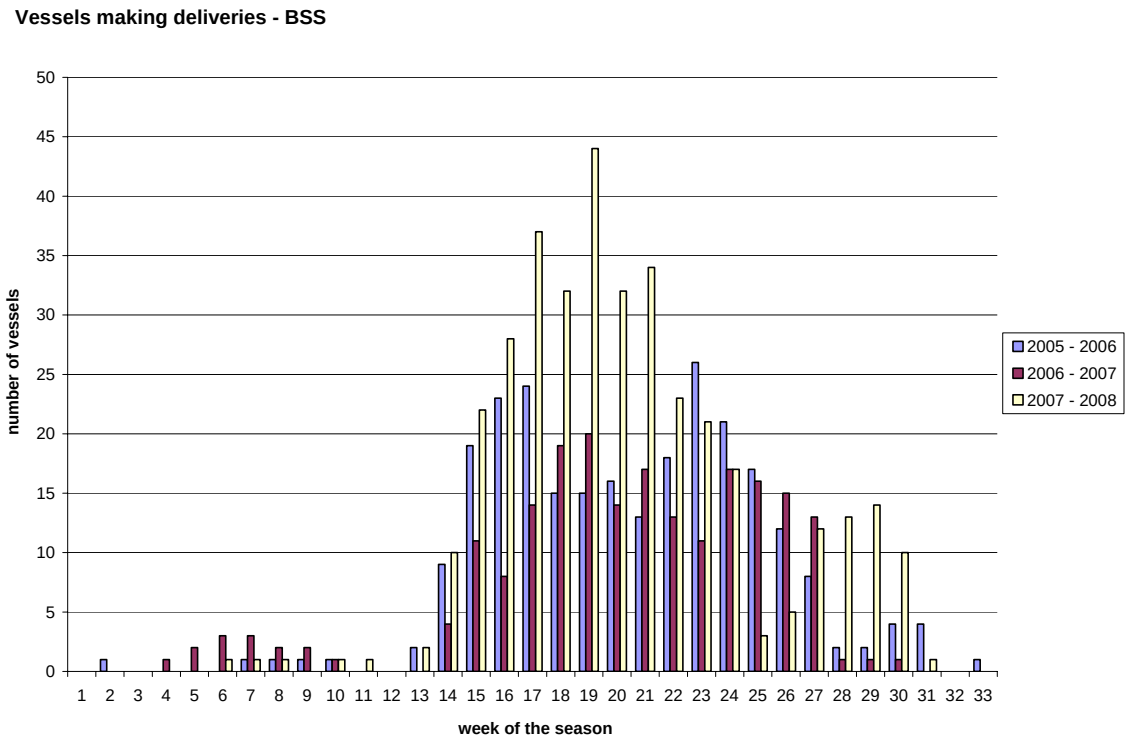

Figure 4-8 Vessels making deliveries by week in the Bering Sea *C. opilio* fishery (2005-2006 through 2007-2008).

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 4-20) with post-rationalization deliveries (Table 4-21) shows that the average number of deliveries per vessel has doubled in most program fisheries.[15] 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.

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

Table 4-20 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 4-21 Post-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	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
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
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	
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
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			
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

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 two processors.

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 throughout the first three 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 to save on operating costs in the fisheries (see Table 4-22). In the first three 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. With fewer vessels in the fisheries, fewer pots may be used in total, with some vessels using more pots or pulling 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 three years of the program.

Although fishing efficiency may be improved by increasing the number of pots used by each vessel and allowing pots to fish during deliveries, the risk of pot loss may increase through this change in fishing operations. In the Bering Sea *C. opilio* fishery, in particularly, pot losses can occur as ice descends from the north.

Table 4-22 Pots usage and catches by fishery

Fishery	Season	Number of pots registered*	Registered pots per vessel	Number of pot lifts *	Lifts per registered pot*	Average catch per unit effort (crabs per pot lift)*	Pounds per pot
Bering Sea *C. opilio*	2001	40,379	195	176,930	4.4	97	129.7
	2002	37,807	199	308,132	8.2	76	96.1
	2003	20,452	108	139,279	6.8	154	182.4
	2004	14,444	76	110,087	7.6	157	199.3
	2005	12,840	77	69,863	5.4	239	324.3
	2005 - 2006	13,734	176	108,320	7.9	204	306.9
	2006 - 2007	10,851	155	80,112	7.4	332	408.2
	2007 - 2008	13,647	175	129,457	9.5	349	438.2
Bristol Bay red king crab	2000	26,352	108	98,694	3.7	12	75.7
	2001	24,571	107	63,242	2.6	19	121.5
	2002	25,833	107	68,328	2.6	20	128.4
	2003	46,964	188	128,430	2.7	18	110.9
	2004	49,506	197	90,976	1.8	23	152.7
	2005 - 2006	15,713	177	99,573	6.3	25	165.4
	2006 - 2007	14,685	181	64,325	4.4	34	215.9
	2007 - 2008	11,885	161	101,734	8.6	28	180.1
Eastern Aleutian Islands golden king crab	2000 - 2001	10,598	707	71,551	6.8	10	43.1
	2001 - 2002	12,927	680	62,639	4.8	12	49.9
	2002 - 2003	11,834	623	52,042	4.4	12	53.1
	2003 - 2004	12,518	695	58,883	4.7	11	49.3
	2004 - 2005	13,165	658	34,848	2.6	18	81.7
	2005 - 2006	8,833	1,262	21,898	2.5	25	117.3
	2006 - 2007	8,150	1,358	23,839	2.9	24	112.9
	2007 - 2008	4,200	1,050	20,496	4.9	28	131.3
Western Aleutian Islands golden king crab	2000 - 2001	8,910	743	101,239	11.4	7	28.7
	2001 - 2002	8,491	943	105,512	12.4	7	25.5
	2002 - 2003	6,225	1,038	78,979	12.7	8	33.0
	2003 - 2004	7,140	1,190	66,236	9.3	10	39.8
	2004 - 2005	7,240	1,207	56,846	7.9	12	46.4
	2005 - 2006	4,800	1,600	27,503	5.7	21	86.6
	2006 - 2007	6,000	2,000	22,694	3.8	20	88.2
	2007 - 2008	4,800	1,600	25,287	5.3	21	88.8

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

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 now time fishing to avoid weather conflicts and conflicts with other activities. Avoiding poor weather not only improves safety on the deck and in the plant, but also allows for better product quality.

4.4 Captains and crew

The changes in vessel participation in program fisheries arising after rationalization have had noticeable impacts on the number of captains and crew employed in the fisheries. The reduction in vessel participation decreased the number of crew employed substantially. 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 approximately 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 first three 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 the first three years of the program, when compared to the 2001 to 2005 season average. In the Eastern Aleutian Islands golden king crab and the Western Aleutian Islands golden king crab fisheries, these declines in the average number of crew positions were approximately 75 positions and 25 positions, respectively.

Although these job losses are substantial, one must also consider the terms of employment in the prerationalized fisheries in assessing the magnitude of the loss. Few crab deck jobs, particularly in the two large fisheries, fully supported a crewmember. Because of the small size of 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. The relatively short tenure of crab crew jobs was attractive to many crew, since they 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.

Most crew (including captains) who retained their positions under the new management faced a change in terms of employment and payment. Though crew payment practices differ somewhat across the fleets, the most common practice is that crew are paid a share of the gross revenues net of the crew's share of operating expenses. Based on anecdotal evidence, many crew received full crew share on IFQ owned by the vessel owner. In most cases, shares paid on leased IFQ fished by a vessel were 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. The effects of this change vary to the extent that the amount of leased quota varied across the fleet. In some instances, vessels reportedly leased a substantial portion of the quota fished, with little held quota. In these instances, crew received virtually all share payments from the discounted revenue base. In some other instances, vessels reportedly fished almost all owned quota, in which case crew received a share similar to their historic share. Some vessels held substantial amounts of quota, but also leased substantial quota. In most of these instances, crew are reported to have received historic share payments for vessel owned quota, supplemented with shares from the discounted base revenues on leased quota. In some cases, however, vessel owners are reported to have charged royalties on owned quota, lowering the base on which shares are calculated for all quota fished on the vessel. Depending on the level of royalty charged, crew could receive substantially reduced payments from the historic shares. 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.

Notwithstanding these changes in compensation, in most cases, crew employed by vessels fishing in the program are reported to have more stable and better paying positions than prior to the program's implementation. Many crew are reported to rely exclusively on crab fishing for their income. 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 that the vessel participates in (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 other crew. In addition, overall improvements in safety in the fishery may also have helped improved conditions for crew.

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 4-23).

Table 4-23 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 87.3 percent of the catcher vessel IFQ allocation). 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 three 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 the first three years of the program. 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.[16] In the other case, certain shares did change named holder, which explains a large part of the transfer of processing share interests (including share leasing) 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.

In addition to the transfers of processor quota shares, substantial leases of annual quota (IPQ transfers) occurred in the first two years of the program. As with PQS transfers, in some cases, these leases

[16] 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 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.

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).

Table 5-2 Processor share transfers (2005-2006 through 2006-2007).

Fishery	Season	PQS transfers			IPQ transfers (leases)		
		Number of transfers	PQS units	Percent of pool	Number of transfers	Pounds of IPQ	Percent of pool
Bristol Bay red king crab	2005-2006	1	37,557,492	9.4	2	2,638,857	19.2
	2006-2007	1	14,199,170	3.6	8	3,000,012	25.8
Bering Sea C. opilio	2005-2006	1	83,536,499	8.3	9	5,870,736	22.0
	2006-2007	2	1,470,884	0.1	10	8,168,240	31.3
Bering Sea *C. bairdi* *	2005-2006	1	17,743,023	8.9	6	230,903	19.5
	2006-2007	1	20,876	0.0	NA	NA	NA
Eastern Aleutian Island golden king crab	2005-2006	1	1,149,483	11.5	5	152,718	6.8
	2006-2007	0	0	0.0	4	129,703	5.8
Eastern Bering Sea *C. bairdi*	2005-2006	NA	NA	NA	NA	NA	NA
	2006-2007	1	3,676,006	1.8	7	327,962	23.9
Pribilof red and blue king crab	2005-2006	1	4,050,738	13.5	NA	NA	NA
	2006-2007	0	0	0.0	NA	NA	NA
St. Matthew Island blue king crab	2005-2006	1	2,342,552	7.8	NA	NA	NA
	2006-2007	1	12,955	0.0	NA	NA	NA
Western Aleutian Island golden king crab	2005-2006	0	0	0.0	10	50,290	4.4
	2006-2007	0	0	0.0	9	198,240	17.4
Western Aleutian Island red king crab	2005-2006	0	0	0.0	NA	NA	NA
	2006-2007	0	0	0.0	NA	NA	NA
Western Bering Sea *C. bairdi*	2005-2006	NA	NA	NA	NA	NA	NA
	2006-2007	1	3,676,006	1.8	6	186,784	23.3

Source: RAM PQS and IPQ database.

* Bering Sea *C. bairdi* was separated into an Eastern and Western fishery after the first year of the program.

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 5-3). 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 5-3 Current processing quota share holdings by region

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	2	1.28	1.28	2.33	16	6.25	2.60	23.16
	South	16	6.09	2.60	20.83				
Bering Sea *C. opilio*	North	8	5.87	5.51	15.46	20	5.00	2.08	25.18
	South	18	2.95	0.25	9.72				
Eastern Bering Sea *C. bairdi*	Undesignated	23	4.35	0.83	24.26	23	4.35	0.83	24.26
Western Bering Sea *C. bairdi*	Undesignated	23	4.35	0.83	24.26	23	4.35	0.83	24.26
Eastern Aleutian Island golden king crab	South	8	12.50	6.04	45.91	8	12.50	6.04	45.91
Western Aleutian Island golden king crab	Undesignated	8	6.25	0.41	33.29	9	11.11	1.03	62.98
	West	9	5.56	0.49	29.69				
Western Aleutian Island red king crab	South	9	11.11	1.03	62.98	9	11.11	1.03	62.98
St. Matthew Island blue king crab	North	6	13.06	8.92	29.94	12	8.33	5.06	32.67
	South	9	2.41	1.76	7.81				
Pribilof red and blue king crab	North	6	11.26	12.01	23.28	14	7.14	3.17	24.49
	South	11	2.95	0.98	13.50				

Source: NMFS Restricted Access Management IFQ database, crab fishing year 2007-2008.
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 three 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).[17] 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.

[17] 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	
			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.

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 12, and has remained constant at that level. The average processing by the top 3 plants in fishery increased to approximately 20 percent, with the concentration of the different share types slightly higher (suggesting that the largest processors of the different share types differ). In two of three 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 in two of the three first years.

Table 6-4 Processing by plants in the Bristol Bay red king crab fishery (2005-2006 through 2007-2008)

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
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
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
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

Source: RAM IFQ database.

In the first three years of the program, between 10 and 12 processors have participated in the Bering Sea *C. opilio* fishery, a decline of almost 5 processors from prior to the program (see Table 6-5). The overall concentration of processing increased for both Class B IFQ and C share IFQ in each successive year of the program. Concentration of processing declined slightly in the most recent season. This decline likely resulted from the increase in the TAC, which resulted in substantial increases in the mean and median pounds processed, as well as the average pounds processed by the largest three plants.

Table 6-5 Processing by plants in the Bering Sea *C. opilio* fishery (2005-2006 through 2007-2008)

IFQ type	Season	Plants processing	Mean		Median		Average processing	
			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
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
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
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

Source: RAM IFQ database.

Ten or fewer plants participated in processing in the Bering Sea *C. bairdi* fisheries in the first three years 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 2007-2008)

IFQ type	Season	Plants processing	Mean		Median		Average processing	
			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
Class B	2005 - 2006	7	7,815	14.3	8,122	14.8	11,633	21.3
	2006 - 2007	4	12,366	25.0	*	*	*	*
	2007 - 2008	3	8,674	33.3	*	*	NA	NA
C share	2005 - 2006	6	1,859	16.7	2,133	19.1	3,086	27.7
	2006 - 2007	4	3,283	25.0	*	*	*	*
	2007 - 2008	3	3,544	33.3	*	*	NA	NA
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

Source: RAM IFQ database.
* withheld for confidentiality

Table 6-7 Processing by plants in the Eastern Bering Sea *C. bairdi* fishery (2005-2006 through 2007-2008)

IFQ type	Season	Plants processing	Mean		Median		Average processing	
			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
Class B	2006 - 2007	6	17,263	16.7	14,769	14.3	20,543	19.8
	2007 - 2008	3	48,861	33.3	*	*	NA	NA
C share	2006 - 2007	7	3,673	14.3	3,983	15.5	6,265	24.4
	2007 - 2008	4	8,246	25.0	*	*	*	*
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

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 three 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.

Table 6-8 Number of plants active in the Eastern Aleutian Islands golden king crab and Western Aleutian Islands golden king crab fisheries (2005-2006 through 2007-2008)

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

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 6-10). 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.

To date, rights of first refusal on PQS are believed to have lapsed in only a few instances. Most notably, the right is believed to have lapsed with respect to 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 have testified that they have reached agreements with holders of these PQS to protect the interests of St. George.

Monitoring of the lapse of community rights of first refusal could be challenging. 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. This 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).[18] 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.

Table 6-9 Distribution of rights of first refusal by community (2007-2008).

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

Fishery	Region	Right of first refusal boundary	Number of PQS holders	Percentage of PQS pool
Bristol Bay red king crab	North	None	1	0.0
		St. Paul	2	2.7
	South	Akutan	1	20.8
		False Pass	1	3.9
		King Cove	1	9.8
		Kodiak	3	4.0
		None	4	3.6
		Port Moller	3	3.7
		Unalaska	11	51.5
Bering Sea *C. opilio*	North	None	3	1.0
		St. George	2	9.7
		St. Paul	6	36.3
	South	Akutan	1	9.7
		King Cove	1	6.3
		Kodiak	4	0.1
		None	4	1.8
		Unalaska	13	35.0
Eastern Aleutian Islands golden king crab	South	None	1	1.7
		Unalaska	7	98.3
Pribilof red and blue king crab	North	None	1	0.3
		St. Paul	5	67.3
	South	Akutan	1	1.2
		King Cove	1	3.8
		Kodiak	4	2.9
		Unalaska	5	24.6
St Matthew Island blue king crab	North	None	5	64.6
		St. Paul	4	13.8
	South	Akutan	1	2.7
		King Cove	1	1.3
		Kodiak	1	0.0
		Unalaska	6	17.6

Source: RAM PQS data 2007-2008.

Despite the end of the cooling off period and the ease with which the right of first refusal may be avoided, in the third year of the program, most 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 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.

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 6-10).

Table 6-10 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. 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 6-11 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. 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 6-12 Processing by share type and community (2007-2008)

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	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	244,843	100.0	2	*	100.0
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.

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 the first two 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. Custom processing arrangements in that fishery expanded in the second year of the program and appear to have declined in the third year. 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 6-13 Number of active IPQ holder (buyer) accounts and IPQ processing plants by fishery (2005-2006 though 2007-2008)

Fishery	Region	Community of Plant	2005 - 2006		2006 - 2007		2007 - 2008	
			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
	South	Akutan	1	1	1	1	2	1
		Dutch Harbor	3	3	3	3	7	4
		King Cove	1	1	3	1	1	1
		Kodiak	2	2	2	2	2	2
		Floater	2	2	2	2	2	1
Bering Sea *C. opilio*	North	St. Paul	1	1	1	1	5	1
		Floater	6	3	14	2	3	1
	South	Akutan	1	1	1	1	1	1
		Dutch Harbor	5	4	7	3	4	3
		King Cove	1	1	1	1	1	1
		Kodiak	1	1	1	1	1	1
		Floater	1	1			3	1
E. Aleutian Islands golden king crab	South	Akutan			1	1		
		Dutch Harbor	3	3	4	4	4	4
		Floater	1	1				
W. Aleutian Islands golden king crab	Undesignated	Adak	1	1				
		Dutch Harbor	2	2	2	2	2	2
	West	Adak	2	1	2	1	1	1
		Floater	3	2				
Eastern Bering Sea *C. bairdi*	Undesignated	Akutan	Fishery closed		1	1	1	1
		Dutch Harbor			5	3	4	3
		King Cove			1	1	1	1
		Floater			1	1	2	2
Western Bering Sea *C. bairdi*	Undesignated	Akutan	1	1	1	1		
		Dutch Harbor	4	4	5	3	2	1
		King Cove	1	1	1	1	1	1
		Kodiak	1	1				
		St. Paul	1	1			3	1
		Floater	4	2	1	1	3	2

Source: RAM IFQ data and RCR permit file.

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 6-14). 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 6-14 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 time 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 6-15). 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 the second and third 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 slightly longer period, with the average processor receiving all deliveries within a three week period or less. This concentration of landings helps 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 follows no apparent pattern across years. A few factors likely contribute to this lack of orderliness. In first year of the program, participants in both sectors were likely learning how to operate under the program. Processors operating in the North expressed a clear 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 second year of the program harvesters had greater coordination in harvesting practices. In addition, 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. These changes resulted 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 year 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 TAC 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 South region in the Bering Sea *C. opilio* fishery for the average processor, landings were distributed across a noticeably longer period in the first two years, when compared to prerationalization years. This distribution of landings over time is less costly to most processors in the South, which process landings from competing groundfish fisheries (i.e., pollock and cod) during the early part of the year when the *C. opilio* fishery is primarily prosecuted. In the third year of the program, the distribution of landings for the average processor remained similar to the distribution in the second year, but was shorter than in the North, where deliveries were delayed by ice conditions.

In the Eastern Aleutian Islands golden king crab fishery in the first three years of the program, processors 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 some extent, these differences arise from a failure of harvesters and processors to coordinate activities through matching shares and committing to harvest and receive catch. In the 2006-2007 season, the limited average processing period likely arose from a delay in the harvest of any crab from the fishery by catcher vessels until late in the season.

Table 6-15 Days between first and last delivery by processor (2005-2006 through 2007-2008)

Season	Fishery	Region	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
2005-2006	Bristol Bay red king crab	North	0	1	32.0	32	32
		South	1	9	52.6	43	88
	Bering Sea *C. opilio*	North	0	3	72.3	77	88
		South	2	7	103.1	90	202
	Eastern Aleutian Islands golden king crab	South	0	4	80.5	65	182
	Western Aleutian Island golden king crab	None	0	2	162.0	162	174
		West	1	2	77.5	77.5	116
	Western Bering Sea *C. bairdi*	None	1	9	84.1	71	167
2006-2007	Bristol Bay red king crab	North	0	1	13.0	13	13
		South	1	10	17.0	15	32
	Bering Sea *C. opilio*	North	0	3	28.7	24	60
		South	1	7	86.6	84	144
	Eastern Aleutian Islands golden king crab	South	1	4	59.0	72	82
	Eastern Bering Sea *C. bairdi*	None	2	5	96.0	152	155
	Western Aleutian Island golden king crab	None	0	2	76.5	76.5	78
		West	0	1	18.0	18	18
	Western Bering Sea *C. bairdi*	None	1	5	61.8	45	141
2007-2008	Bristol Bay red king crab	North	0	1	10.0	10	10
		South	0	10	36.3	29	84
	Bering Sea *C. opilio*	North	0	2	107.0	107	108
		South	1	9	81.9	82	119
	Eastern Aleutian Islands golden king crab	South	0	4	56.5	60	94
	Eastern Bering Sea *C. bairdi*	None	0	8	91.5	122.5	150
	Western Aleutian Island golden king crab	None	0	2	146.5	146.5	232
		West	0	1	172.0	172	172
	Western Bering Sea *C. bairdi*	None	0	6	67.7	59.5	115

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 6-16). 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. In the first and third years of the program, processors in the South region in the Bristol Bay red king crab fishery took slightly more deliveries on average than prior to implementation of the program. The single processor operating in the North region in this fishery received at most 10 deliveries each season.

Table 6-16 Deliveries per processor in the Bristol Bay red king crab fishery (2001 through 2007-2008)

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

Sources: ADFG Fish tickets and 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.

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 6-17). 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. 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 6-17 Deliveries per processor in the Bering Sea *C. opilio* fishery (2001 through 2007-2008)

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

Sources: ADFG Fish tickets and 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.

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 6-18). This lower number of average deliveries likely arises from the relatively low TACs in these two fisheries.

Table 6-18 Deliveries per processor in the Eastern and Western Bering Sea *C. bairdi* fishery (2005-2006 through 2007-2008)

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
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

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 6-19 and Table 6-20). 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.

Table 6-19 Deliveries per processor in the Eastern Aleutian Islands golden king crab fishery (2001-2002 through 2007-2008)

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

Sources: ADFG Fish tickets and RAM IFQ database.

Note: A delivery is all offloads from a vessel on a single day.

Table 6-20 Deliveries per processor in the Western Aleutian Islands golden king crab fishery (2001-2002 through 2007-2008)

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

Sources: ADFG Fish tickets and 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.

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 in the last two years, most delivery scheduling issues have been resolved amicably. 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. Processors in the South have more latitude to move effort 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.[19] 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 have made substantial investments in the program fisheries. In the 2007-2008 season, neither CDQ groups nor the Adak community group held any PQS directly. CDQ groups and the Adak community group have acquired PQS interests recently and may also have indirect holdings of PQS.

Four of the six CDQ groups had direct holdings of QS during the 2007-2008 season. In addition, it is believed that some CDQ groups also have 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 exceed 30 percent of the QS. CDQ groups also directly hold in

[19] 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.

excess of 6 percent of the QS in both of the major fisheries (the Bristol Bay red king crab and the Bering Sea *C. opilio* fishery).

Table 7-1 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	1,250,587	7.1	0.3	23,444,451	6.3	6.0	4	24,695,038	6.3
Bering Sea C. opilio	8,061,549	9.1	0.8	59,169,661	6.7	6.1	4	67,231,210	6.9
Eastern Aleutian Islands golden king crab				2,961,237	32.1	30.5	2	2,961,237	30.5
Eastern Bering Sea C. bairdi	915,592	7.0	0.5	10,788,865	5.9	5.5	4	11,704,457	6.0
Pribilof red and blue king crab				1,307,970	4.5	4.5	3	1,307,970	4.5
St. Matthew Island blue king crab				1,491,571	5.2	5.1	3	1,491,571	5.1
Western Aleutian Islands golden king crab				4,664,466	22.4	12.0	2	4,664,466	12.0
Western Aleutian Islands red king crab				1,017,010	2.9	1.7	3	1,017,010	1.7
Western Bering Sea C. bairdi	915,592	7.0	0.5	10,821,156	6.0	5.6	4	11,736,748	6.0

Source: RAM QS database (2007-2008).

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. In all CDQ fisheries, at least one or two catcher processors actively harvest CDQ allocations. In the Western Aleutian Islands golden king crab fishery, the Adak allocation is harvested exclusively by catcher vessels.

Table 7-2 Participation in program and CDQ fisheries by operation type (2005-2006 through 2007-2008)

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
Bering Sea *C. opilio*	2005-2006	76	4	13	2
	2006-2007	66	4	10	2
	2007-2008	74	4	10	2
Eastern Aleutian Islands golden king crab	2005-2006	6	1	3	0
	2006-2007	5	1	3	0
	2007-2008	3	1	3	0
Eastern Bering Sea *C. bairdi*	2006-2007	33	3	3	1
	2007-2008	19	1	2	1
Western Aleutian Islands golden king crab*	2005-2006	2	1	1	0
	2006-2007	2	1	2	0
	2007-2008	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

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

* 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, between approximately one-half and two-thirds of annual CDQ harvests have been landed with harvests from the program fishery allocations. 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, amounts of CDQ landings 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. 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 7-3 Landings of CDQ group and Adak community group allocations (2005-2006 through 2007-2008)

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	826,638	66.1	6	8	423,681	33.9
	2007-2008	7	13	799,806	51.8	6	11	743,129	48.2
Bering Sea *C. opilio*	2005-2006	8	10	1,119,106	40.7	8	14	1,631,838	59.3
	2006-2007	7	9	723,567	31.5	7	14	1,571,906	68.5
	2007-2008	6	11	970,809	24.8	9	21	2,950,805	75.2
Eastern Aleutian Islands golden king crab	2005-2006	2	2	*	*	3	4	*	*
	2006-2007	3	5	*	*	1	1	*	*
	2007-2008	2	2	*	*	1	1	*	*
Eastern Bering Sea *C. bairdi*	2006-2007	2	2	*	*	1	1	*	*
	2007-2008	1	2	*	*	1	2	*	*
Western Aleutian Islands golden king crab**	2005-2006	1	1	*	*	1	3	*	*
	2006-2007	1	1	*	*	2	4	*	*
	2007-2008	1	2	*	*	1	2	*	*
Western Bering Sea *C. bairdi*	2005-2006	5	6	113,057	71.9	3	4	44,186	28.1
	2006-2007	2	2	*	*	5	7	*	*
	2007-2008					5	7	*	*

Source: RAM IFQ database, 2005-2006, 2006-2007, and 2007-2008.
* withheld for confidentiality.
** Adak allocation.

8 CRAB MARKETS AND PRICES

This section briefly summarizes market conditions in the first three 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).

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.

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.

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).

8.5 New market development/changes in existing markets

For many years, the majority of king and snow crab products from Alaska have 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.

Product improvement can also occur 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 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

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.

Data limitations complicate efforts to discern differences in ex vessel prices across share types. The only data collected by NOAA Fisheries that show price by share type are elandings data.[20] These data are collected at the time of landing and do not include any post-landing payments, which are reportedly an important part of pricing under current practices. Consequently, elandings price data may be misleading and are not presented here. Instead, the discussions of ex vessel prices for different share types rely primarily on information reported by fishery participants.

During the first three 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. Since the program's implementation, marine fuel prices have 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 the 2006, 2007, and 2008 seasons disrupted fishing and deliveries of landings to the

[20] Economic data reports included ex vessel price by share type beginning in the 2006 calendar year.

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 three 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.[21] 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.

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, an 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

[21] The Council recently 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.

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 allowed 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 to disburse program costs. All share holders from both sectors are required to join an arbitration organization by May 1st of each year.[22] 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.

[22] 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.

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):[23]

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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 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);

[23] 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.

(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 the binding process (which has been suggested by some participants), 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. The annual deadline for arbitration organization membership is May 1st. 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 three 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

During the first three years of the program, an annual market report and pricing formula were 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 three 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.[24] Participants and analysts have since been able to follow the regulatory schedule for developing these reports. To the extent 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). However, participants from both sectors have expressed various concerns, which will be discussed below.

The market report

During the first three years of the program, the Council recognized that crab price volatility 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

[24] The Council recently 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.

information, including information from subscription services, in order to prevent information in the report from being used for anticompetitive purposes.[25]

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 new authority to supplement the market report, the arbitration organizations could agree to make available current, publicly available market information to participants in both sectors, in addition to the market analysis contained in past reports. Given the contentious price negotiations in the crab fisheries in recent years, the presence of an unbiased source of up to date market information is expected to have a beneficial effect on 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.

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 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 all 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.

[25] 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.

The methodology for development of the formula has evolved over time. 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.

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.

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.

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 2005. 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 (1997-2005)

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 Red King Crab	1997	7.0	6.18	3.27	53.0%	53.1%
	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%	

[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 (1997-2005)

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%	

[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 (1997-2005)

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%	

[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[26]

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 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:

> *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).

[26] 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.

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 could 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 three years of the program, the price formula has evolved, and the confusion over interpretation of the arbitration standard has lessened. In the first year of the program, the formula arbitrators for the Aleutian Islands golden king crab fisheries interpreted the standard as requiring the establishment of a price formula that preserves the historic division of profits in the fishery.[27] The formula arbitrator for all fisheries since that first report interpreted the standard as requiring the establishment of a price formula that preserves the historic division of first wholesale revenues in the fishery (Sackton, 2006b; Sackton, 2006c). The arbitrator has exercised his discretion in using different data sources to describe ex vessel and first wholesale prices for the different program fisheries. In addition, in some instances, the arbitrator has adjusted the formula based on factors set forth in the standard.

Assuming that the standard is generally intended to establish a price that preserves the historic division of revenues in the fisheries, it is especially important to specify which years of history to consider in establishing that division.[28] The workgroup generally agreed that the years 1994-2002 were representative years that should be used for applying the standard for the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries; however, the Council took no action to identify historical years. There is some justification for expanding the years to be considered beyond those suggested by the workgroup. For example, the Bristol Bay fishery was closed in 1994 and 1995. On the other hand, if the standard is intended to preserve pricing relationships at levels observed prior to implementation of the program, prices after the program began should not be considered.[29]

The next step in putting into practice the historic division of revenues standard is describing the historic relationship of first wholesale prices and ex vessel prices. Debate about the best data for describing that relationship has contributed to discord among the sectors. During the first three years of the program, COAR data have generally been used by the arbitrator. Yet, some of these data may not accurately reflect annual first wholesale/ex vessel price relationships. COAR data are collected on an annual basis; however, ex vessel sales and first wholesale sales from a fishery season may not have occurred within that time frame. The Western (and, at times, the Eastern) Aleutian Island golden king crab fishery season historically extended over the New Year; consequently, ex vessel prices and first wholesale transactions from a single season may have been reported in more than one year. In the event that production in a given year is not sold during that year, COAR respondents are directed to provide an estimated price based on prevailing market conditions. These price estimates may differ from actual sales prices. A similar problem arises in the Bristol Bay red king crab fishery, where a large portion of a calendar year's harvests are sold in the following year. In addition, some fishery participants have questioned the

[27] The report of the formula arbitrators acknowledged that the formula must preserve the historical division of revenues in the fishery, but raised the concern that the requirement to consider the "efficiency and productivity of the harvesting and processing sectors" and "the interest of maintaining financially healthy and stable harvesting and processing sectors" implied that costs and profitability should be a consideration. The report concluded that the intent of the standard is to preserve "historic profit shares". Data shortfalls, however, led the arbitrators to rely on a historic division of revenues standard (Northern Economics, Inc., 2005, p. 35).

[28] Applying this standard also requires one or more sources of revenue data. Both the EIS and arbitration workgroup expressed concern over the adequacy of existing data sources and the need to consider all relevant, verifiable price data, including data obtained from public sources and fishery participants (Workgroup on Binding Arbitration, 2002b; NPFMC/NMFS. 2004b, p. 386).

[29] Prices after program implementation may be relevant to establishing a price formula, but not for the purpose of determining the historic division of revenues.

accuracy of certain portions of the COAR data, such as whether COAR data accurately describe prices for FOB Alaska sales (as distinguished from FOB Seattle sales), and have suggested that data entry errors may exist. In response, the arbitrator has substituted Alaska Business Tax data for COAR data in some instances.

The standard and the minutes of the committee suggest at least two factors that could be considered as affecting the historic relationship between first wholesale prices and ex vessel prices.[30] In the first clause of the standard, the arbitrator is directed to consider the size of the annual harvest in determining the historic division of revenues. This provides clear direction to the analyst to consider whether the ex vessel price/first wholesale price relationship should be a function of the TAC. A second factor that could influence the historic relationship is suggested by the committee minutes. Those minutes suggest (without reaching conclusion) that ex vessel prices may have varied by port (Workgroup on Binding Arbitration (2002b)). The analysis of the standard also suggests that these factors could influence the historic division of revenues:

> *Market changes are also likely to have influence[d] the share of revenues. For example, harvesters may have received a different share of the revenues in years of high prices than in years of low prices. In addition, the revenue share received by harvesters is also likely to [be] sensitive to changes in total harvest. Location[s] of landings are also likely to influence the division of revenues. Prices for landings in different communities have historically varied. The arbitrator will need to accommodate these variations in applying the arbitration standard.* (NPFMC/NMFS, (2004b) at 385).

The EIS analysis of the standard also suggests that this port of landing could influence the historic division of revenues:

> *Location[s] of landings are also likely to influence the division of revenues. Prices for landings in different communities have historically varied. The arbitrator will need to accommodate these variations in applying the arbitration standard* (NPFMC/NMFS, 2004b, p. 385).

These discussions suggest identified factors that could be considered in assessing historical prices under the standard. For example, the arbitrator could consider whether the division of revenues varied with TACs in a fishery and incorporate any observed variation into the formula. If such variation occurred, its incorporation into the formula would be necessary to preserve the relative positions of the two sectors as intended by the formula. Similarly, variations across landing locations could be assessed by the arbitrator and incorporated in the formula, if deemed necessary to preserve the historic division of revenues. To date, development of an accepted historic division of revenues relationship has been hindered by debate over the existence of an ex vessel price differential across regions in the program fisheries.

Each of the formula reports for the Bering Sea *C. opilio* fishery has considered this potential regional price differential and has included three different price formulas (one for each region, as well as a formula derived from prices from both regions combined). These data interpretation issues have contributed to the failure of the system to arrive at a settled, accepted historic division of first wholesale revenues relationship. Once the historic price relationship is established, other relevant factors (including those listed in the standard) may be more fully considered. As discussed above, most of these factors are

[30] In addition, the 18 month review of the program suggests that the historic division of revenues may have varied with production. Given the historic dominance of shellfish section production, it is unlikely that sufficient data exist to distinguish the historic division of revenues for other product forms or that the historic division of revenues in the fisheries was ever based on any other product form.

generally considered to accommodate changes in the fisheries that might justify deviating from the historic price relationship (rather than modifying that relationship itself).

Several factors involved in application of the standard could receive additional attention and specification in the formula report. For example, once the formula is established, the price to which the formula applies should be considered. One approach is to simply apply the formula to the first wholesale price received by the processor to the transaction. This approach is appealing for its simplicity, yet may not be appropriate in all cases. If a processor secures an extremely favorable first wholesale price (i.e., well above the average in the fishery) it may be appropriate to allow that processor to retain a portion of that additional price. By doing so, the processor will have a greater incentive to work to find the best markets in the future. On the other hand, if a processor has an extremely unsuccessful marketing year—securing a price well below the average in the fishery—it might also be appropriate to apply some price other than that processor's first wholesale price to create an incentive for that processor to make greater marketing efforts and to avoid penalizing holders of Class A IFQ who might have been required to deliver to that processor. While these extremes may not arise in many cases, the need to develop a fair scheme for addressing cases of a processor deviating from the average success in the market will instill greater confidence in the arbitration system.[31]

A related area of concern is that the standard be applied to fairly must balance the incentives for processors to hold inventory against the processors' inventory holding costs. As the formula arbitrator has observed, the standard should not be interpreted to create an incentive for a processor to limit inventory holdings to relatively short periods simply to avoid holding costs. If a processor bears all holding costs, it is possible that the processor would try to move inventories as quickly as possible to avoid holding costs. The arbitrator has suggested that average historic inventory holding periods should be the baseline for assessing whether some adjustment from the historic formula should be made. While this is a reasonable starting point for the consideration of adjustments, it should be clear to most participants in the fisheries that deviation from the average alone should not lead to an adjustment. While it may not be possible to determine a specific adjustment for each circumstance, it is possible that the formula could begin to develop a methodology for identifying circumstances in which an adjustment might be appropriate and for determining the extent of the adjustment. Although the adjustment in an individual case would be at the discretion of the contract arbitrator, an identified methodology for determining whether adjustments are appropriate and the scale of the adjustment would add certainty to the arbitration process. This added certainty might benefit participants in the fishery by providing some basis for assessing the consequences of their choices.[32]

As the development of the formula and the fisheries evolve additional attention can be given to other factors. Product developments, as well as the development of new markets, could require attention in the future. Not only is the distribution of the benefits from these developments important, but as the potential for the arbitration system to create incentives and disincentives for innovation must be considered. The importance of factors is likely to change over time requiring both sectors and the arbitrator to follow trends to ensure that the arbitration system effectively addresses issues affecting the fisheries and the markets can or may serve.

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[31] The formula arbitrator has correctly noted that first wholesale prices historically varied across processors and years to suggest that some level of variability should be expected and tolerated (Sackton, 2007a,b,c). This observation may be a starting point for developing a methodology for identifying and addressing excessive variability.

[32] Since contract arbitrations are conducted on a last best offer basis and the outcome of contract arbitration proceedings cannot become public, only the formula arbitration can provide guidance on the application of the standard to participants in the fisheries.

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. This limitation is evident in the evolution of this provision. As first proposed, the provision would have applied the highest arbitrated price to all arbitrated deliveries in a fishery. Although never agreed upon, the arbitration workgroup considered a modification that would have applied the highest price to all arbitrated deliveries with an adjustment, if needed, to accommodate specific terms of delivery. The analysis of the provision noted this shortcoming and its potential to complicate (or frustrate) realization of the intended benefit of applying the highest price to all deliveries. To arrive at fair price for each arbitrated delivery could require revisiting each decision, considering the conditions of the delivery and determining an appropriate adjustment to the arbitration outcome (see NPFMC/NMFS (2004b) at 395-6). In addition, application of an arbitrated price to deliveries of others would be patently unfair, since the persons involved in the delivery would not have been a party to the arbitration proceeding. In finalizing the arbitration program, the Council chose not to adopt a system that would apply the highest arbitrated price to other deliveries, instead electing to modify the provision to require consideration of the highest arbitrated price the following year in development of the price formula by the formula arbitrator. This lower emphasis recognizes the potential for a highest arbitrated price to reveal changing trends in the market or fishery, while also recognizing its potential to be inappropriate (or unfair) to simply apply the price to all deliveries.

As with most indicators, consideration of the highest arbitrated price by the formula arbitrator requires discretion and should be in the context of the delivery and the arbitration program, including the arbitration standard. As noted earlier, the binding arbitration proceedings are conducted on a "last, best offer" basis, under which the arbitrator is limited to choosing one of the offers of the competing parties. Under this structure, it is likely that the decision of the contract arbitrator is not the "best" price, but is only the better of the two offered prices. Taking the decision out of the context of its competing offer (and the circumstances surrounding the dispute) would seem to give inappropriate weight to the decision. Given these limitations, it seems appropriate for the formula arbitrator to be given adequate information concerning the issues in a proceeding and the opportunity to consider whether the outcome of the dispute should affect the application of the standard to landings in the fishery, as a whole.[33]

So, if the highest arbitrated price is an indicator of a trend that should be considered under the standard, then the formula arbitrator may be right to grant extra weight to that price in development of the formula. For example, if the highest arbitrated price is based on a product or market development that is known and available to all participants in a fishery, it may be appropriate to adjust the formula price upwards. On the other hand, if the highest arbitrated price arises from an effort by a processor to time deliveries to serve a specific limited market, which increases harvest costs for the harvester, it may be inappropriate to make any adjustment to the price formula based on the highest arbitrated price.

Confidentiality requirements for arbitration results also complicate consideration of the highest arbitrated price. Under the terms of the program, parties to an arbitration proceeding and arbitrators are generally prohibited from revealing the information and terms of any arbitration to others (80 CFR 680.20(g)). As a

[33] Having the formula arbitrator consider the 'highest arbitrated price' in context of the standard should also relieve possible pressures on contract arbitrators to consider the situation of persons that are not party to the specific binding proceeding when making their decisions. A contract arbitrator that knows his decision will affect all prices in a fishery in the following year may feel some duty to come to a decision that is appropriate for all landings, as opposed to a decision that is appropriate for the parties to the dispute.

result, the incorporation of the highest arbitrated price into the price formula cannot be explained by the context of that arbitration. Instead, the justification for an adjustment must be explained in general terms with reference to the standard. Providing this general explanation for adjustment likely provides stability and predictability, as unexplained adjustments to the formula may lead to greater uncertainty and more contentious negotiations.

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). Achieving this balance requires the consideration of factors that historically affected the division of revenues. Once this balance is established, changes in fisheries and production that evolve after implementation of the program can be accommodated through equitable division of the benefits arising from those changes. This two-staged process is intended to arrive at a stable pricing relationship that may be adapted to changes in the program fisheries. Given the complexity of the standard, the evolution of the price formula that has occurred over the first three years of the program is not surprising. Over time, the formula should be expected to stabilize, as both the method and result of the arbitrator's application of the standard become acceptable to the parties.

Procedure for development of the price formula

A second aspect of the price formula that may be problematic is 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).[34] In the second and third year of the program, the formula arbitrator has developed a "formal" process for submission of comments and interactions with the arbitrator. The arbitrator also responds in writing to each written comment to convey the rationale behind the formula. While these actions have reduced the concerns of participants that one sector has greater access to the arbitrator and more influence on the formula, both sectors remain somewhat dissatisfied with some aspects of the process by which the formula is developed. For example, while communications concerning appropriate data sources for establishing the historic first wholesale/ex vessel price relationship have been provided under the process suggested by the arbitrator, each sector remains concerned that the other may derive a competitive advantage through the timing of communications. In addition, the moderate changes in the formula from year-to-year have contributed to some instability in harvester/processor relationships in the fishery.

Considering the stability that would be generated by the development of an accepted historic first wholesale/ex vessel price relationship in the formula report, it could benefit participants to use a more structured process for the consideration of data and specification of that relationship (particularly until the price relationship is well accepted). For example, the two arbitration organizations, representatives of participants from the different sectors, and the proposed formula arbitrator could develop by agreement a process for the submission and consideration of data and the specification of the formula (e.g., simple average v. linear regressions). A process for the review and rebuttal of data submissions and the structure of the formula could be proposed to ensure that both sectors have adequate opportunity to confront data submitted by the opposing sector.[35] Although this process will likely be more time consuming and involved than the current system for the development of the formula report, it could result in greater acceptance of the historic price relationship and provide greater stability in future negotiations. A better

[34] 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).

[35] It should be noted that any such review process will need to stipulate aggregation of data to protect the confidentiality interests of the participants.

accepted formula will also allow participants to focus on some of the more challenging pricing issues that are likely to arise under the arbitration standard.

Greater structure to the arbitration process could also aid in the resolution of other pricing issues by the arbitration system. Addressing variability of prices across processors, inventory holding times, and product and market development in a manner that is accepted by participants in the fisheries will require a process that effectively considers the interests of both sectors, as well as variation across participants in the sectors. Although these issues may not be ripe for consideration in the formula until the broader issue of arriving at an acceptable historic first wholesale/ex vessel price relationship, the development of a process for addressing these issues through the non-binding formula (or notes accompanying the formula) could improve the acceptance of the arbitration program by participants.

In addition to general information submitted by industry participants, the formula arbitrator must also have access to the previous year's binding arbitration outcomes to consider the "highest arbitrated price" in developing the formula. In the first year of the program, the formula arbitrator received only the two bids and the contract arbitrator's decision on the winning offer. This information is insufficient for the formula arbitrator to discern the justification for the decision and accord the decision reasonable and appropriate weight. To address this shortcoming, NOAA Fisheries has agreed to provide the formula arbitrator with all arbitration submittals of the parties. These submittals contain supporting arguments advanced by the participants and should enable the formula arbitrator to understand the terms at issue and the circumstances surrounding the dispute, as well as compare the two offers.[36] Providing the formula arbitrator with this information also has the advantage of ensuring that the contract arbitration's decision is given appropriate weight (in light of the broader standard) in the following year's formula.

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 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. Coordinated with share matching is the process for initiating a binding arbitration proceeding. 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.[37] Alternatively, the parties may agree to take a 'lengthy season approach' to arbitration, under which any

[36] NOAA Fisheries has suggested that administrative complexity could be reduced if the formula arbitrator is provided these submittals by the arbitration organizations. If the Council elects to develop an amendment package for this program, NOAA Fisheries would likely suggest that the package include an amendment to address this administrative issue.

[37] 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 compel an IFQ holder to commit to deliveries,.

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.[38] 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. Within this time frame, harvesters and processors must match shares and either settle 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).[39] 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. It should also be considered that the St. Matthews blue king crab and Pribilof red and blue king crab fisheries have not been open since the program was implemented. If these fisheries were to open, their TAC announcements and IFQ/IPQ issuance would coincide with the TAC announcement and share issuances in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries, adding further time pressures to share holders wishing to rely on the arbitration system.

[38] 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.

[39] 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).

Table 8-6 Approximate schedule for share matching and arbitration, 2006-2007

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. While this system has benefited participants by creating a single forum for commitment of shares, achieving its objective requires timely information concerning share holdings, commitments, and transfers. The current system of transfers requires submission of original notarized signatures of both parties to the transfer to Restricted Access Management (RAM) offices in Juneau. RAM has expedited transfers by accepting facsimile transmittals for inter-cooperative transfers.[40] However, given the tight timeline for matching shares to facilitate participation in the arbitration system, time lags in the agency administration of transfers may prevent access to the arbitration system for some share holders. RAM staff is working with industry to develop a more efficient system to administer transfers on the web. Once active, this system will greatly benefit participants' share matching by expediting transfers.

Recognizing the necessity of share matching and the importance of market timing, the workgroup that developed the arbitration system sought to have a system that would have delivery terms (including prices) decided prior to or early in the season. To meet that objective, share matching, negotiation, and the initiation of arbitration had to occur in the preseason. The starting point for share matching and negotiations is, by necessity, the issuance of IFQ and IPQ.[41] Since the IFQ and IPQ issuance cannot be made without the TAC, the TAC announcement constrains the time for share matching and negotiations. An earlier TAC announcement would allow the periods for negotiation, share commitment, and arbitration initiation to be extended back from the seasoning opening; however, TAC announcements likely cannot be made noticeably earlier than their current dates given the timing of stock surveys and the need to complete stock assessment models based on the most recent survey data. Annual stock surveys are conducted in the late summer of each year. Under the current schedule, analysts who produce stock assessments and TACs have little time to complete modeling needed for the fall fisheries. In addition, many participants in the fisheries believe that preseason negotiations cannot fully resolve price issues because markets for the season's production are not known.

[40] Intra-cooperative transfers of shares and custom processing arrangements, which do not require agency administration, have mitigated this problem. Other transfers can leave share holders uncertain concerning appropriate parties for share matching during the administration of the transfer.

[41] Class B IFQ are issued only to QS holders that have no affiliation with an IPQ holder to ensure that the negotiating leverage realized through those shares is realized by independent share holders. Affiliation is determined on an annual basis, to ensure that up to date ownership information is used for assessing affiliations. Since the total Class B IFQ issuance is 10 percent of the IFQ pool on an annual basis, the specific portion of each QS holder's allocation that will be Class B IFQ is not known with certainty until IFQ are issued. Consequently, participants that wish to pre-plan their share matches cannot do so with certainty until IFQ are issued.

In the first three 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 specific time during the 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. Given that participants from both sectors see the lengthy season approach as the only meaningful access to arbitration, the Council could consider providing an alternative to the existing structure by extending the deadline for initiation of arbitration (and removing the lengthy season approach).[42] Determining the appropriate deadline for initiation of arbitration is likely best decided after receiving input of both sectors and will require consideration of several different factors. First, the deadline should allow ample time for participants to resolve share matching, schedule fishing, and to make reasonable efforts to complete negotiations. Second, the deadline should not extend indefinitely, but should balance the interests of processors (who may wish to finalize contracts) with the interests of harvesters (who may wish to extend the end date to ensure all first wholesale market information are available for use in the arbitration). Balancing these interests requires that the deadline be set late enough in the season so that the general condition of first wholesale markets are known, but not so late that processors are unable to complete their financial books for the season.[43] Given a reasonable opportunity, it is likely that industry could agree on an arbitration timeline that balances these interests.

Extending the time for initiating arbitration could also affect the interests of the parties. Under the current arbitration system, each processor is limited to a single arbitration proceeding in each season. Allowing multiple proceedings with each processor as a part of an extended timeline could be costly to all participants. It should also be kept in mind that many of the harvest share holders are in a single Fishermen's Collective Marketing Act cooperative, the Inter-Cooperative Exchange, under which all members share information and negotiate collectively.[44] Although technically not a share holder or party to the proceedings, allowing members of this organization to participate in multiple arbitration proceedings with a processor may be inconsistent with the intent of allowing each person a single arbitration opportunity, as it would effectively allow this single representative body multiple attempts at arbitration.

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 year, no proceedings were brought.

All proceedings to date arose under the lengthy season approach to arbitration, occurring in the spring, more than 6 months after the original deadline for initiation of arbitration proceedings in these fisheries.

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[42] This extension would only move the deadline for initiating arbitration. Most participants believe that the share matching timeline is effective. The extension also would not limit the ability of harvesters to initiate arbitration any time after matching shares with a processor during the extension. Maintaining access to the arbitration system early in the season is important for harvesters because they may need to use arbitration for scheduling deliveries.

[43] Harvesters may feel little pressure to resolve ex vessel prices prior to all market information being available because they likely will have received a large majority of their payments at the time of landing. To date, the binding arbitration process has been used only to determine the amount of any payments beyond the minimum price paid at the time of landing.

[44] The Fishermen's Collective Marketing Act (FCMA) provides fishermen with an exemption to prohibitions on collective negotiation of prices. The Inter-Cooperative Exchange (ICE) includes members of several of the harvest cooperatives formed under the program. ICE represents holders of approximately 70 percent of the unaffiliated QS in the fisheries.

As noted earlier, delaying the proceedings provided participants with the opportunity to complete share matching and preparation for the season and allowed them to assess market conditions prevailing at the time of fishing and sale of products from the fisheries. The delay also allowed parties to reach reasonable settlements, thereby avoiding the cost burden of the proceedings. In all the proceedings, harvesters were represented by the Inter-Cooperative Exchange.[45] While confidentiality rules prevent disclosure of substantive price information from the proceedings, it can be reported that harvesters prevailed in all arbitration proceedings concerning ex vessel prices.[46]

Share holders in the program fisheries, as well as arbitration organizations, have raised some concerns with respect to the binding proceedings. The discussion that follows separates substantive issues (arising out of interpretation and application of the arbitration standard) from procedural issues (arising from under the process for arbitration).

Application of the arbitration standard in binding arbitration

As discussed above, the arbitration standard delineates the principle 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. Two possible means of assessing the influence of these factors are suggested by the arbitration workgroup that developed the standard and the EIS analysis of the arbitration standard. First, in determining the ex vessel price that preserves the historic division of first wholesale revenues, the arbitrator can consider whether any of the listed factors affected that division (Workgroup on Binding Arbitration, 2002a). For example, some participants contend that the division of revenues reflected in ex vessel prices is influenced by delivery location and total harvest levels. Consideration of listed factors in this manner is consistent with maintaining the preservation of the division of first wholesale prices as the primary role of the arbitrator.

Second, the workgroup and analysis suggested the listed factors may be considered to the extent that they concern events that occurred subsequent to implementation of the rationalization program (Workgroup on Binding Arbitration, 2002a; NPFMC/NMFS, 2004a, p. 4-162). Changes in market conditions, product forms, and production processes that occur subsequent to implementation would all seem to be within the scope of this consideration. In general, the standard suggests that these factors are to be considered while maintaining the overall objective of preserving the historic division of first wholesale revenues. For example, considering ex vessel prices for Class A IFQ, Class B IFQ, and C share IFQ landings should not compel an arbitrator to match any of those prices in an arbitration finding, but instead consider whether those prices provide some indication of trends in production or in the fishery that should weigh on an arbitration finding. For example, a comparatively low price offer for a Class A IFQ delivery by a processor could indicate that either the processor is not offering a reasonable price given market

[45] 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.

[46] Processors have prevailed in arbitration of procedural matters, such as eligibility to arbitrate and timing of arbitration.

conditions or that the processor disputes the historic division of revenues suggested by other processor offers.[47] In the first instance, an arbitrator could be asked to decide whether it is reasonable under the standard for the processor to be compelled to pay a division of revenues based on the first wholesale price received by other processors that achieved greater market success. Such a finding could be justified if the processor is perceived by the arbitrator to have not made appropriate production and marketing efforts.[48] In the second instance, the processor could be trying to pay a lower price based on its perception that harvesters have received a lower portion of first wholesale revenues in the fishery. The contract arbitrator's finding may hinge on an assessment of the historic division of first wholesale revenues and whether the lower price is warranted under that standard.[49]

While the above discussion of the standard addresses some of the pricing issues that may arise in the program fisheries, it does not adequately address the complexity (or multidimensionality) of delivery terms and negotiations. In the first three years of the program, some participants have struggled 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.[50] Some representatives of participants to arbitration proceedings assert that they were nonplussed by the outcomes. The level of predictability of the proceedings is expected to increase over time. However, given the complexity of issues that could be faced by the arbitrator, it is possible that some outcomes may not be fully predictable.

Some of the more complex negotiation issues to date relate to factors beyond the basic consideration of the historic division of revenues. One such issue is whether the historic division of revenues has differed between the North and South regions. This issue was central to the disputes in the first year arbitration proceedings. Given that the arbitration standard explicitly directs the arbitrator to consider delivery

[47] This is akin to suggesting that in implementing the standard, the contract arbitrator must decide whether the first wholesale price to which the division is applied is the first wholesale price of the specific processor to which a delivery is made or the average first wholesale price in the fishery (or some combination of the two). The standard, on its face, gives no indication of which of these two prices should be used to derive an ex vessel price for a delivery. The EIS analysis of the last best offer arbitration suggests that effective administration of the arbitration standard requires that consideration be given to the broader market:

> *The separation of IPQ holders in the process could limit the effectiveness of the system in protecting IFQ holders that deliver to low revenue IPQ holders. To create incentives for each IPQ holder to increase revenues, an arbitrator will need to consider the performance of the IPQ holder with respect to all processors in the fishery (including any that do not hold IPQs). A revenue dividing pricing formula that considers only the revenues of the participating IPQ holder might reduce the incentive for low revenue IPQ holders to improve revenues. On the other hand, a revenue dividing formula that has a component that weights the performance of all processors in a fishery could be used to create an incentive for an IPQ holder to be competitive with others in the industry. The potential of this system to incorporate a fleet wide component into the arbitrated price depends on the degree to which participants incorporate industry performance into final offers and whether arbitrators have access to information from the industry as a whole that is necessary to validate those offers* (NPFMC/NMFS, 2004b at 393).

[48] On the other hand, if a processor took reasonable risks in the market but experienced a drop in revenues, the arbitrator may find that the processor should not bear the entire burden of its attempt to pursue the most valuable market. This finding would likely depend on the specific relationship between harvesters and processors and whether harvesters would have shared in the benefits, had the processor achieved better results in the market. In short, the arbitrator should take into account the overall market and the harvester/processor relationship.

[49] Some harvesters have been frustrated that processors are unwilling to simply match higher prices offered by other processors, as happened in the pre-rationalization fisheries. Given the extended season and isolation of each processor in the arbitration system, it is not surprising that processors are reluctant to quickly match offers of competitors.

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

location in applying the 'historic division of revenues,' the consideration of the appropriateness of differentiating North and South pricing is within the scope of the arbitrator's authority; however, a more structured and expansive process for consideration of this issue in the development of the formula report could reduce the level of dispute. Several arguments have been advanced by processors to support their contention that a price differential should be acknowledged. Some processors have argued that operating costs are substantially higher in the North region, and, therefore, lower ex vessel prices in the North are justified to maintain production efficiencies and the financial health of processors in the region. In addition, some processors contend that the consolidation of harvester shares on fewer vessels has caused inefficiencies in processing by extending processing activities over a longer period. This consolidation is argued to have had the same effect as a larger TAC, under which harvesters have historically benefited from delivering in the North, and, consequently, were willing to accept a lower price than in the South. Under the standard, the arbitrator is directed to consider production efficiency (given the limitations of the management structure) and the financial health of the both the harvesting and processing sectors, as well as TAC size effects, when applying the historic division of revenues standard. Again, the breadth of considerations under the standard appears to permit the arbitrator to consider these arguments. Whether such arguments are compelling (or determinative of the arbitration outcome) is likely to depend on the circumstances.[51]

Process for binding arbitration

This section describes and evaluates 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. Some participants believe that authorizing the IFQ holder to select the arbitrator creates a harvester advantage in the proceeding.[52] In addition, IFQ holders in all binding arbitration proceedings to date have been represented by the Inter-Cooperative Exchange. At times, the Inter-Cooperative Exchange has selected the same arbitrator to preside over consecutive proceedings. This common selection could have potential strategic effects by allowing the harvest representatives to gauge the arbitrator's response to their arguments in the first proceeding.

In considering whether any potential advantage arising out of this arbitrator selection process merits correction, one should carefully consider the rationale for the current process, the overall needs of the system, and the fairness of the current rule. The extent of any potential advantage is limited by the joint selection of the pool of arbitrators by PQS holders. Since the pool is selected jointly, the risk of a biased arbitrator is limited. While an arbitrator that is perceived to be overly receptive to the arguments of one side could provide an advantage in one year, the other sector could eliminate that arbitrator from the pool in the next year. Under the current rule, the pool of contract arbitrators is selected at least 50 days prior to the season. The selection of a single arbitrator from the pool by one side is an efficient mechanism for expediting the schedule for arbitration proceedings. Under the standard arbitration schedule, proceedings are intended to be resolved prior to the season, to limit the potential for disruption of operations during the season. On the other hand, the need for an expedited process could be questioned though, since proceedings have typically used the lengthy season approach.

[51] An interesting aspect of the program is the interaction of the formula arbitrator's annual report and the binding arbitration proceedings presided over by 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 the binding process (which has been suggested by some participants), this informal feedback creates a flexible system providing some level of reliability concerning the application of the standard.

[52] Both the arbitration workgroup and Council proposed that all arbitrators be selected jointly (NPFMC, 2004; Work Group on Binding Arbitration, 2003). Whether the joint selection of the pool of arbitrators alone satisfies that directive is debatable.

A possible alternative to selection of the arbitrator by the harvesters initiating the proceeding is a joint selection process. Typically, such a system would require either agreement of the parties to the proceeding or a tiered selection process. Joint selection by the parties could delay the start of proceedings, if the parties were unable to quickly reach agreement or if a delay was used strategically to gain an advantage in the proceeding. Alternatively, a tiered process could be used under which each party selects an arbitrator who together must agree on a third arbitrator. This third arbitrator would preside over the proceeding. Such a system would likely result in a brief delay in the start of proceedings, the importance of which would depend on the fishery and nature of the dispute. In addition, this process would be slightly more cumbersome and costly by involving two additional parties in the selection process.

Beyond the selection of the arbitrator, much of the regulations governing the binding arbitration process are general. Some of the dissention between harvester and processors has centered on this lack of specificity. Much of the remainder of this section describes areas of the arbitration process that some participants believe could benefit from additional definition. In considering whether adding that definition is appropriate, the Council should consider the degree to which that definition could provide or be used to advantage specific participants in the arbitration process and the extent to which that definition could constrain the process. Defining a specific rule to address a current concern could constrain the ability of participants to modify that rule should it become obsolete in the future. 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. As such, any regulatory change in the arbitration process initiated by the Council should consider the potential to constrain the potential for participants to adapt the system as needed in the future.

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 FCMA cooperative (50 CFR 680.20(h)(3)(viii) and (xi)).[53] 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. With the exception of quality and performance disputes, participants in the fishery (and in arbitration proceedings) can seek remedies only through civil law. Furthermore, the regulations do not provide a process for appealing an arbitration decision.

The Council's recent amendment is intended to resolve some of these concerns. While arbitrators generally have the authority to make determinations of whether procedural requirements for arbitration have been met (i.e., procedural arbitrability), the amendment is intended to clarify that an arbitrator has the authority to determine whether harvesters properly initiated or joined a proceeding to arbitrate.

[53] 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.

Likewise, the amendment is intended to address concerns of whether the arbitrator may decide if parties properly agreed to the lengthy season approach (i.e., did the parties have an agreement to arbitrate using the lengthy season approach).[54]

Some participants have also raised concerns that the relatively short time period during which proceedings occurred provided little opportunity to explore the validity of data presented by the opposing party. In addition, the process used is asserted to have provided no opportunity to cross examine concerning evidence presented by the opposing party. It has been suggested that the arbitrator should disallow use of data (or other evidence) that are not presented at a time that allows reasonable review by the opposing party and should draw a negative presumption concerning data that should be available to a party that the party chooses not to present. The Council's recent amendment should clarify that the arbitrator has the ability to adopt a process to allow parties time to assess the validity of data (and other evidence) presented by the opposing party and to ask questions concerning those data (and evidence). In most instances, the arbitrator is likely in the best position to determine consequences for failing to present data or presenting data in an untimely manner.

In addition, some participants have argued that the contract arbitrators should be required to provide opinions supporting all arbitration decisions. These opinions could serve as precedents for future actions or could provide a basis for the decision to be scrutinized in any judicial review initiated by dissatisfied parties. The development of opinions and judicial review could provide additional information to parties concerning the operation of the system and may increase predictability of the system. On the other hand, these opinions and reviews could contribute to the adversarial nature of the process. As with other changes in the program, the potential of these changes to alter the negotiating positions of participants should be considered.

Persons favoring arbitration as a means of resolving disputes often do so, in part, for its finality. As such, arbitration decisions are typically subject to limited judicial review. In most instances, the grounds for appeals of arbitration outcomes are defined to be limited to cases of fraud, impartiality, or misconduct (see Section 23, RUAA and Section 10, FAA). Courts, however, have allowed for arbitration systems to expand judicial review (see Gateway Tech. Inc. v. MCI Telecommunications Corp., 64 F.3d 993 (5th Cir. 1995) and Lapine Tech. Corp. v. Kyocera Corp., 130 F.3d 884 (9th Cir. 1997)). The scope of judicial review is often greater for "compulsory arbitration" under which parties are required to participate in an arbitration system for public policy reasons (such as to avoid teacher or firefighter strikes). These systems typically mandate evidentiary records from the arbitration proceeding and written decisions (see Nolan-Haley, 2001).

As with other aspects of this system, the Council should consider the overall effects of the arbitrator providing supporting opinions for decisions and creating for expanded judicial review of outcomes. Leaving aside antitrust considerations[55] (which are certain to be raised by a system of arbitration opinions and an appeals process) the implications of such a system should be assessed. A potential benefit of the arbitrator providing a basis for the outcome is that participants could develop a better understanding of the application of the standard, at least by that arbitrator. If the decision is not subject to expanded judicial

[54] It is possible that the arbitrator's authority to make this decision would be upheld absent the recent amendment. While the existence of an agreement to arbitrate is typically decided by courts (see Section 6, Revised Uniform Arbitration Act (RUAA) of 2000 and Section 4, Federal Arbitration Act (FAA)), in at least one instance where the parties submitted the issue to the arbitrator, the arbitrator's finding was found to govern (see First Options of Chicago, Inc v. Kaplan, 514 U.S. 938, (1995)).

[55] The current position of NOAA General Counsel and the Justice Department is that any information from these individual proceedings must remain confidential to limit the potential for anticompetitive activities. Some participants in both sectors have expressed their opinion that the release of this information at the end of a season would add certainty to the arbitration process without creating increasing any risk of anticompetitive behavior.

review (and is not precedential), the need for and benefit from the opinion is likely minimal, as it may not even provide guidance to parties to the arbitration.[56]

If judicial review of the arbitrator's findings are expanded, standards for review would need to be developed (i.e., under what conditions would a decision be reversed). While a system of arbitrator opinions and expanded judicial review could provide a venue to contest outcomes perceived to be unfair, the system would also decrease finality of outcomes. The need for early and final resolution of disputes was deemed important in the development of the arbitration program. Also, persons dissatisfied with the outcome of an arbitration proceeding could use the threat of judicial review to leverage different terms than those specified by the arbitrator. Using judicial review (or the threat of seeking judicial review) strategically is clearly beyond the intended scope of the arbitration system as developed by the Council. In addition, a system of opinions and expanded judicial review could also add substantially to the costs of the system.

Under a system of precedential outcomes (in which arbitrators provide reasoned opinions for all decisions), opinions could be used to further clarify application of the standard for all participants. Although this might provide clarity of the standard, the establishment of a precedent could hurt fishery participants that are not a party to the arbitration, who might be bound by the precedent in the future. Considering the importance of the standard to arbitration outcomes, it is possible that any review of an arbitration outcome would draw most participants in each sector to submit briefs, since they would be concerned that the interpretation of the standard that determined the outcome of the review would be applied to them in the future. Such a system of judicial review and precedents would likely add substantial complexity to the system, which is already perceived by participants as overly complex.

The potential benefits of such a system of arbitration opinions and expanded judicial review, with respect to both arbitration outcomes and development of the interpretation of the standard, should be weighed against the current system. In the current system, arbitration outcomes are perceived as final.[57] It is possible that an arbitrator could misinterpret the standard, in which case, the parties to the arbitration would be left to meet the terms of the outcome for that year.[58] The finality of the decision, however, would effectively move participants past negotiation of terms to performance of terms. If necessary, the participants could make efforts to remove the arbitrator from the pool of contract arbitrators in the following year. In the current system, the evolution of the interpretation of the arbitration standard is realized through the annual reports of the formula arbitrator and the exchange of information between the formula arbitrator and contract arbitrators. The formula arbitrator is required to consider the highest arbitrated outcome from the previous year; the contract arbitrator is required to consider the price formula generated by the formula arbitrator. In the long run, this annual process could provide some of the desired certainty and predictability with respect to interpretation of the arbitration standard. Unfortunately, this

[56] It is possible that the arbitration organizations (or the arbitrators) under the existing rule (including the amendment allowing procedural changes not inconsistent with regulation) could develop a process to provide some feedback to participants from a proceeding. Some participants in the system might favor such a process, as it could aid their understanding of arbitration outcomes. For consistency, it might be best to develop such a process through the arbitration organizations, after discussion of that process with both sectors and contract arbitrators.

[57] It is important to note that since no judicial challenges of arbitration outcomes have occurred, it is possible that a future challenge could bring into question the finality of arbitration outcomes depending on the outcome of that challenge.

[58] Whether the last best offer format of the arbitration is likely to exacerbate errors is not known.

feedback takes place only once annually, extending the time over which interpretation of the standard is likely to evolve and be clarified.[59]

Some participants have suggested that current regulations that prohibit release of arbitration outcomes indefinitely (intended to prevent anticompetitive behavior) is overly restrictive. They argue that making the outcomes public at the end of the season would increase predictability of the arbitration system. Moreover, these participants believe that the information creates no potential for anticompetitive behavior because the information is no longer current at that point. The information, however, could provide participants with information concerning the application of the standard that would increase understanding of arbitration outcomes in the future. Whether such a release could be used for anticompetitive purposes should be fully examined prior to changing the current limitation.

As an alternative to a system of written opinions and full scale review, some participants have suggested that each arbitrator could hold an informal conference with the parties to the proceeding at the end of the season to review the arbitration outcome and its basis. The meeting would be intended to lead to greater acceptance of the outcomes by participants. While the meetings could have the intended effect, the use of such a procedure should be approached with caution. There is some risk that meetings of this type could lead to less acceptance of findings, in the event that the arbitrator's findings are not consistent with the parties expectations or opinions. At the extreme, the meetings could lead dissatisfied parties to attempt appeals of findings. Because of the risks posed by these meetings, the development of these debriefing meetings should be carefully considered.

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 few years of the program, participants have resolved delivery schedule issues without resorting to the arbitration system. This 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. To control production efficiency losses some processors have adopted negotiation positions that penalize deliveries outside of identified windows (or, from another perspective, reward harvesters for deliveries within those identified windows). 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.[60] Coordination of deliveries is therefore critical to realizing benefits under the program. The organization of fishing in cooperatives has aided the sectors in addressing this issue by providing improved coordination among harvesters.

[59] It is possible that a more structured process for submission of information to the formula arbitrator could increase certainty by improving feedback to the arbitrator from participants during the development of the annual report.

[60] Some harvesters delivering in the North region have expressed concern with delivery scheduling and waiting to offload. It is unclear the extent to which these issues are caused by the unanticipated circumstances in that region (i.e., the processor fire or ice conditions). As processing consolidates in the North region (as might be expected with the new exemption of custom processing from the processor share use caps), it is possible that scheduling complications in the North could be exacerbated.

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. Recent high cod prices, together with the flexibility offered by the share allocations in the rationalization program, have induced increased participation of harvesters in the fall and winter Pacific cod fisheries. In some instances, processors have been frustrated by harvesters' reluctance to accommodate their delivery timing preferences due to conflicts with Pacific cod fishing.[61] These conflicts with other fisheries are likely to continue in the future as differences in delivery preferences persist.

Given the individual scheduling preferences of harvesters and processors, delivery timing issues are by necessity complex. Yet, if participants believe these issues require resolution by an arbitrator, it is likely that an arbitrator could reasonably consider the different interests and provide an arbitrated outcome. Likely, each of the last best offers would balance price against delivery preferences. Across the first few years of the program, participants have resolved delivery schedule issues without need to resort to the arbitration system.

In the first few years of the program, the challenge of achieving coordination has been exacerbated because of uncontrollable events. In all three 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 which can be attributed to the disabled platform. 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 requires the share holders (the Class A IFQ holder and the IPQ holder) to find both available Class A IFQ and available IPQ with consistent 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. Alternatively, 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 has directed staff to analyze 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. The process could require the holder of the IFQ for which the exemption is sought to submit an affidavit attesting to certain conditions under which the exemption is granted.

[61] Some harvesters also 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.

Harvester standdowns

One of the primary expectations of the Council in advancing the arbitration program was that early season harvester standdowns would be averted. Prior to implementation of the program, harvesters periodically organized fleetwide standdowns, delaying the start of fishing at the season opening, to induce processors to offer a higher price (NPFMC/NMFS, 2004b). By providing an arbitration option to harvesters it was thought that standdowns, which may result in costly delays in deliveries of products to markets, could be avoided. However, under the program, harvesters that are members of the Inter-Cooperative Exchange have organized standdowns in a few instances. These standdowns have targeted select processors that the group believed had offered an inadequate minimum price to be paid at the time of landing for Class A IFQ deliveries. In these instances, harvesters maintained the right to arbitrate under the lengthy season approach; therefore, the delays in fishing complemented any negotiating leverage derived from the arbitration system. The harvesters focused the standdowns on the price paid at the time of landing (prior to any adjustments based on the first wholesale price received for the crab). This price is important to both sectors because it serves as a minimum price, which, under most pricing arrangements, is subject to an upward adjustment, depending on the price received by the processor when the crab is sold.

From the harvesters' perspective, the use of delays in fishing to induce processors to offer a higher minimum price serves a few purposes. By achieving a satisfactory minimum price, harvesters reach a level of confidence to begin fishing, even if all pricing issues are not resolved. This enables production from the fishery to begin for markets that are time sensitive, most importantly the winter red king crab market in Japan.[62] The higher minimum prices under this structure are also argued by harvesters to provide a signal to the market in general. Some participants believe that the first wholesale price often reflects the ex vessel price. They argue that improving ex vessel prices (even recognizing that those are minimum prices) sends a signal of the strength of the market to sellers. Whether the use of delays in fishing in this manner is detrimental depends on one's position in the fishery and whether these market effects actually occur. If first wholesale markets are boosted by the higher price at landing, it is possible that both sectors could benefit.

Pricing structure and its effects on incentives and risk

Under the pricing structure used by most participants in the fishery, harvesters receive a payment at landing that is the minimum ex vessel price that may be later supplemented based on the market price received for the crab production. This pricing arrangement is largely a function of the arbitration standard, which specifies that ex vessel prices should preserve the historic division of first wholesale revenues.[63] To maintain that division of revenues, harvesters receive a specific portion of the revenues from crab products sold into the market. This arrangement has a few affects on both the incentives and risk exposure of participants in the fisheries.

Prior to implementation of the program, participants negotiated in the preseason, usually arriving at a single dollar price that often applied to all landings in the fishery (NPFMC/NMFS, 2004b). Under this pricing structure, all risk shifted to the processor on receipt of the landing; the processor bore all post delivery costs, including handling, shipping, and storage costs, and received all benefits arising from its production and market decisions. So, a processor's incentive to achieve success in the market was not distorted by any sharing of either the costs borne or benefits reaped from its decisions.

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[62] Most harvesters realize that substantial delays in fishing could jeopardize the potential for their harvests to serve that market, which may limit their ability to leverage their position with fishing standdowns. Since these negotiations settle only the minimum price, it is unlikely that harvesters will standdown for a period that constrains a processors ability to serve high valued markets.

[63] The initial price formula developed for the golden king crab fisheries suggested this approach to pricing based on the arbitrators' interpretation of the arbitration standard (NEI, 2005).

Under the structure adopted for most landings currently, harvesters typically receive a minimum payment at delivery, which is supplemented by a share of first wholesale revenues in excess of a threshold amount based on that minimum price. The processor continues to bear all post delivery costs and any risk of loss for sales that generate revenues that would result in an ex vessel price below the minimum price based on the sharing agreement. Under the new pricing arrangements, the processors' risk may be less than under the former pricing structure. Under the former structure the processor bore all market risk after delivery. Under the new structure, the processors risk is reduced to the extent that the minimum price is discounted in comparison to the single dollar price that would have been accepted without the sharing arrangement; however, harvesters share the benefits in the event that the first wholesale revenues for sales results in a higher final price than the single dollar price that would have been accepted on delivery. This pricing structure may reduce the processor's market risk by shifting part of that risk to harvesters. The degree to which risk is shifted depends on two factors: the minimum price (and the difference between that minimum price and the single dollar price that would have been accepted with no revenue sharing) and the sharing of the revenues in excess of the threshold amount.

A concern among participants is that the current pricing arrangement may affect market decisions and benefits derived from the program fisheries. If prices are final on delivery, a processor's activities in the market are determined by its perception of the net benefit arising from those activities. Under the current arrangement, the processor will only weigh its share of the benefits against any post delivery costs. This can create an incentive for the processor to sell sooner, as it attempts to reduce its risk and maximize its expected gain. 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 could be problematic in some circumstances.

Given that current market decisions arise out of a pricing structure in which benefits after delivery are shared among processors and harvesters, contract negotiations may be the best way to address the perceived problem. Parties could agree to a price that represents a lower portion of the realized first wholesale revenues in exchange for a higher minimum price on landing, shifting risk to the processor and firming up the processor's incentive to more aggressively pursue the best market opportunities. Alternatively, it is possible that parties with an established relationship could agree to greater market risk (or even cost) sharing with a lower minimum price. A relationship able to support this type of arrangement takes time to develop and may not develop in some instances. In addition, harvesters must feel confident that the processor will make appropriate efforts in pursuing market opportunities.[64]

As with other more subtle contractual issues, this issue could be overshadowed in arbitration proceedings, especially if the historical price formula is still disputed. Even if the issue is central to an arbitration proceeding, the arbitrator will need to weigh the different interests appropriately in making a decision (i.e., balance the costs of holding inventory against the potential higher price that could be obtained by waiting to sell the product). The degree of uncertainty concerning market conditions and expectations make this a particularly challenging issue for an arbitrator. In any case, the participants in the fishery and the Council should be attentive to this issue in assessing the success of the program in the long run. The issue, however, does not lend itself to a simple solution, given the division of revenues standard.

[64] It is important to recognize that the "historical division of revenues" standard is derived from average market success (or the average first wholesale price). While it is reasonable to insist that processors make legitimate efforts to pursue good markets, it is likely not reasonable to insist that processors pay a division based on the highest first wholesale price.

Complexity, Cooperatives, and the Inter-Cooperative Exchange

Among the greatest frustrations of participants (particularly harvesters) in the fisheries is the complexity of the program. The extent to which this complexity is attributable to certain 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 market pricing that accommodates the circumstances of delivery and participants. To address these complexities, many harvesters have organized their harvest activities in cooperatives, with much of the communications concerning fishing schedules and price negotiation being undertaken by the cooperative leadership.[65] In addition, most cooperative leaders participate in the Inter-Cooperative Exchange, which represents its members in the arbitration process. 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 complete 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.

The organization of activities in cooperatives and the Inter-Cooperative Exchange has engendered some controversy. Some harvesters are frustrated that these representative entities have distanced them from decision making in the fishery. These frustrations to some extent are self imposed, as harvesters have voluntarily elected to enter cooperatives and the Inter-Cooperative Exchange and agreed to the structure of those organizations. Direct relationships with processors would be the best way to overcome this distance. Processors share some of the harvest sector's frustration, as they find themselves negotiating with representatives of harvesters, as opposed to the harvesters themselves. As with harvesters, the most effective way for processors to overcome this distance is through better direct relationships with harvesters. Some fishermen were frustrated by strong positions taken by processors during first year negotiations. For example, some processors offered higher minimum prices in exchange for waivers of arbitration rights. Harvesters perceived these offers as unfair and processors have largely discontinued this practice. More direct harvester/processor relationships must be built on trust, which could take time to develop. The potential for these more direct relationships will also increase over time, as the effects of the arbitration process become more certain and predictable.

In the first three years of the program, it is not surprising that participants have adopted an adversarial approach in negotiations, as they attempt to influence the interpretation of the arbitration standard and the development of that process. Some harvesters and processors have suggested that the processor-by-processor negotiations have contributed to the confrontational nature of negotiations. Harvesters are frustrated that processors are reluctant to match high price offers, while processors are frustrated that harvesters contend that a single price (equal to the highest price paid by any processor) is appropriate. The extended time available for negotiations and arbitration (particularly under the lengthy season approach) has likely compounded this frustration.

Notwithstanding any future efforts on the part of individual harvesters and processors to engage in more direct negotiation, cooperatives are likely to continue to have a large role in fleet coordination. Given the complexity of coordinating landings in the rationalized fishery (particularly the compounding of that complexity with A share/IPQ landing requirements), cooperatives are likely to be important for

[65] 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.

coordinating timing of fishing and landings. The need for the Inter-Cooperative Exchange depends, in large part, on the extent to which participants develop relationships under which harvesters perceive little advantage from their membership. In the near future, the entity seems very likely to continue in its current role. In the long run, it is possible that its role may evolve to primarily information sharing, with a less prominent role in negotiations. This evolution depends on the extent to which the arbitration system develops predictability and harvesters perceive that they are able to achieve reasonable success in direct negotiations with processors.

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 reduce net revenues from the program fisheries.

Over the first three years of the program, the annual costs of the arbitration organizations and arbitration administration have declined as the administrative aspects of the arbitration system become more established and consolidated. The arbitration organization for harvesters that have no processor affiliation (i.e., independent harvesters) charges each member $500.[66] 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, harvesters paid no fee for arbitration administrative expenses in 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. Considering the first three 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.[67]

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.[68]

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

[66] 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.

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

[68] 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.

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.[69] 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.

Notwithstanding that the Inter-Cooperative Exchange may be a cost effective organization, concerns have been raised that some harvesters who are not members of the Inter-Cooperative Exchange "free ride"—approaching a processor independently after the Inter-Cooperative Exchange has completed negotiations, and obtaining its settled price, without paying for membership in the Inter-Cooperative Exchange. Processors may encourage this behavior, if they believe that inducing more harvesters to leave the Inter-Cooperative Exchange reduces its funding and effectiveness. Along the same lines, processors may wish to induce persons to leave the Inter-Cooperative Exchange if they believe that negotiations with the cooperative are contentious or harm their relationships with their fleets.

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.[70] 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.[71] Since that time, many harvesters have adapted to the program and used their cooperative associations to pool Class B IFQ to be

[69] 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.

[70] 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.

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

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 are not currently available.[72] Anecdotal evidence, however, suggests 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. These premiums are said to range from approximately 5 cents to approximately 20 cents, with variation across fisheries, processors, and time (including within seasons).[73] Premiums are thought to have been at a low during the first year of the program, when crab product markets were particularly weak. Processors, concerned about their weak position in the market, were generally less willing to buy crab to add to existing inventories. In addition, harvesters becoming familiar with the program were likely less well-prepared to coordinate activities to generate competition for Class B and C share IFQ catches. In the second and third years, markets have improved and harvesters are said to have become better organized, stimulating more competition for Class B and C share IFQ landings. The magnitude of premiums are said to vary across processors and through the seasons. In some cases, the premiums are thought to be raised when a processor has identified a specific market for its product. Although premiums are believed to increase with the value of the crab species—Bristol Bay red king crab receiving the greatest premium and Bering Sea *C. opilio* receiving the smallest—exceptions exist with processor market opportunities. The magnitude of the premium also depends on the price for Class A IFQ catches. If those prices change in the future (with changes in the price formula or its application), the magnitude of the premium on Class B and C share IFQ will also change.

In addition to anecdotal price information, several 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 8-7). The data suggest that harvesters have increasingly coordinated the harvest of allocations to allow deliveries of Class B and C share IFQ harvests independent of harvests of Class A IFQ. In the third year of the program, in excess of 60 percent of Class B and C share IFQ harvests were delivered independent of Class A IFQ harvests. In addition, the size of these deliveries has increased substantially since the first year of the program, suggesting that harvesters are achieving greater efficiency in the harvest of these shares. The growth in the percentage of the Class B and C share IFQ pools that are delivered separately from Class A IFQ landings suggest that harvesters have been able to negotiate separate delivery terms for these shares. Although these deliveries suggest that competition has been generated for these landings, other data may also suggest competition.

[72] The only currently available data showing price by share type are elandings data collected by NOAA Fisheries. These data are collected at the time of landing and do not include any post-landing adjustments or bonuses, which are reported to be an important part of pricing under current practices. Since the first year of the program, Economic Data Reports have included ex vessel price by IFQ Class, but those data are currently undergoing a review and are unavailable for use at this time.

[73] 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.

Table 8-7 Deliveries of crab harvested exclusively with Class B and C share IFQ (2005-2006 through 2007-2008).

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
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
Eastern Aleutian Islands golden king crab	2005-2006	28	2,442,550	308,474	2	7.1	*	*	*	
	2006-2007	24	2,565,435	320,223	2	8.3	*	*	*	*
	2007-2008	27	2,564,271	322,581	1	3.7	*	*	*	*
Eastern Bering Sea *C. bairdi*	2006-2007	51	1,214,997	129,288	8	15.7	3,010	2.3	376	102
	2007-2008	50	1,365,796	179,568	7	14.0	145,065	80.8	20,724	18,360
Western Aleutian Islands golden king crab	2005-2006	19	1,266,167	163,226	2	10.5	*	*	*	*
	2006-2007	9	880,286	162,106	0	0.0	0	0.0	0	0
	2007-2008	16	1,126,051	163,214	3	18.8	48,066	29.4	16,022	11,851
Western Bering Sea *C. bairdi*	2005-2006	68	759,073	65,861	17	25.0	12,148	18.4	715	311
	2006-2007	55	611,417	62,597	12	21.8	6,556	10.5	546	38
	2007-2008	43	457,193	36,653	5	11.6	24,276	66.2	4,855	7,278

Source: RAM IFQ landings database.
* withheld for confidentiality.
** includes Class B IFQ and C share IFQ landings.

Examining buyers of Class B and C share IFQ catches and the extent to which buyers of those catches purchase larger portions of the Class B and C share IFQ catches than Class A IFQ catches suggest that some processors are aggressively competing for landings of Class B and C share IFQ catch (see Table 8-8). 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. In all cases, the poundage of Class A IFQ catches purchased by these buyers has exceeded their purchases of Class B and C share IFQ catches. This 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 8-8 Purchases of IFQ landings by share type (2005-2006 through 2007-2008).

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	Percent of Class A IFQ pool purchased	Percent of B/C IFQ pool purchased	Pounds of Class A IFQ landings purchased	Pounds of B/C IFQ landings purchased
Bristol Bay red king crab	2005 - 2006	9	13,757,569	10	1,968,154	4	18.2	62.3	2,505,097	1,226,332
	2006 - 2007	10	11,584,465	12	1,661,730	5	27.6	54.3	3,200,529	902,304
	2007 - 2008	13	15,277,413	15	2,220,327	6	18.6	86.8	2,838,886	1,928,226
Bering Sea *C. opilio*	2005 - 2006	9	26,402,706	10	3,830,350	5	32.5	59.6	8,579,616	2,281,550
	2006 - 2007	12	25,934,701	14	3,772,320	5	13.3	73.8	3,454,996	2,782,536
	2007 - 2008	11	45,025,445	15	6,602,252	7	13.1	71.2	5,914,751	4,699,000

Source: RAM IFQ database.
* includes Class B IFQ and C share IFQ.
Data for other fisheries cannot be shown because of confidentiality protections.

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. In only the Eastern Bering Sea *C. bairdi* fishery have more persons purchased Class B or C share IFQ catches than Class A IFQ catches. In all other fisheries, the same number of persons have purchased catches from these two 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 fisheries. Given the relatively small TACs in these fisheries, they are less likely to support processor entry in any case. In all fisheries, only 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. The extent of competition cannot be discerned.

Table 8-9 Buyers of catches by share type and fishery (2005-2006 through 2007 2008)

Fishery	Season	Number of buyers of landings of		Number of buyers buying a lesser percent of the Class A IFQ landings than B/C IFQ landings
		Class A IFQ	B/C* IFQ	
Eastern Aleutian Islands golden king crab	2005 - 2006	4	4	2
	2006 - 2007	5	5	1
	2007 - 2008	3	3	1
Eastern Bering Sea *C. bairdi*	2006 - 2007	7	8	3
	2007 - 2008	6	7	2
Western Aleutian Islands golden king crab	2005 - 2006	4	4	2
	2006 - 2007	4	4	1
	2007 - 2008	3	3	1
Western Bering Sea *C. bairdi*	2005 - 2006	7	7	4
	2006 - 2007	8	8	4
	2007 - 2008	7	7	2

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 in the second and third years 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 has 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.

The potential for institutional disincentives to limit the motivation for PQS holders to aggressively pursue new markets suggests that continued attention should be given to the prospect of market developments in applying the arbitration standard. As such, it important that both formula arbitrators and contract arbitrators look beyond production in program fisheries to fisheries throughout the world when considering whether processors are making reasonable efforts to pursue available market opportunities. When undertaking this consideration, arbitrators should consider the potential for the development of markets, as well as gauging reasonable efforts, expenditures, and investments to pursue those markets given a processor's existing production and PQS holdings. Costly revamping of production might be an unreasonable expectation for potential markets that may not succeed. On the other hand, processors might

be expected to make minor and experimental production changes that could be used to explore the potential for new products and markets. In applying the arbitration standard, it should be expected that a processor recoups its additional costs for these production changes prior to being expected to share any added production revenues with harvesters. It should be noted that if a harvester bore additional harvest costs to enable the processor to diversify its production, the harvester should be expected to recoup these costs prior to the processor realizing added gains from the production.

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 in the first few years of the program is 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 and the relatively new market is continuing to develop. 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 tend to be large, requiring substantial access to capital (see Table 9-2). The average transaction for owner QS (based on available price information and the average transfer size) exceeded $300,000 in the Bering Sea *C. opilio* fishery in the first two years of the program. At the extreme, in the second year of the program, the average owner QS transaction in the Bristol Bay red king crab fishery was for slightly less than $1 million. 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. The separation of accessible harvest privileges from vessel ownership also allow persons to enter by purchasing a vessel without QS. Through the leasing market a person who is able to run an effective vessel operation may be able to enter the fishery without substantial QS holdings. 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 (2005-2006 to 2007-2008)

Crab Fishing Year	Fishery	Sector	Price per QS unit*	Total QS units transferred**	Number of transfers	Average QS units transferred	Average cost of transfer ($)
2005 - 2006	Bristol Bay red king crab	CVC	0.72	1,434,287	24	59,762	43,029
		CVO	0.56	15,337,188	24	639,050	357,868
	Bering Sea *C. opilio*	CVC	0.24	3,082,755	30	102,759	24,662
		CVO	0.39	40,969,076	44	931,115	363,135
	Bering Sea *C. bairdi*	CVC	0.19	563,706	18	31,317	5,950
		CVO	0.29	11,870,491	20	593,525	172,122
2006 - 2007	Bristol Bay red king crab	CVC	0.68	1,237,670	27	45,840	31,171
		CVO	1.2	28,744,461	35	821,270	985,524
	Bering Sea *C. opilio*	CVC	0.19	3,049,661	36	84,713	16,095
		CVO	0.26	60,901,248	50	1,218,025	316,686
	Bering Sea *C. bairdi*	CVC	0.11	181,990	4	45,498	5,005
	Eastern Bering Sea *C. bairdi*	CVC	0.05	491,486	20	24,574	1,229
		CVO	0.07	17,195,877	33	521,087	36,476
	St. Matthew Island blue king crab	CVC	0.17	79,301	11	7,209	1,226
	Western Bering Sea *C. bairdi*	CVC	0.03	491,486	20	24,574	737
		CVO	0.08	17,195,877	32	537,371	42,990
2007 - 2008	Bristol Bay red king crab	CVO	0.94	4,734,563	16	295,910	278,156
	Bering Sea *C. opilio*	CVO	0.27	18,434,596	23	801,504	216,406
	Eastern Bering Sea C. bairdi	CVO	0.06	2,886,182	9	320,687	19,241

Notes: Includes only transfers through November of 2007. All transfers of Bering Sea *C. bairdi* occurred prior to division of those allocations into two areas and therefore include ransfers of both Eastern and Western Bering Sea *C.bairdi* . The crab fishing year begins on July 1 and ends on June 30. A portion of these transfers included accompanying IFQ for the current season.
Source: Restricted Access Management, NOAA Fisheries.
* Based on transfers for which price information are available and may be released.
** Includes all transfers in this season of this fishery and sector.

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 three years of the program suggests that the average transfer in all fisheries is valued at less than $50,000. Notwithstanding these relatively small scale transactions, some crew report that access to capital remains problematic, as a 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 approximately 10 percent of the owner QS in most fisheries (see Table 9-3). As many as 17 new holders, who did not receive an initial allocation in any fishery, have acquired QS in the first three 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

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	27	47,822,236	12.3	17	37,472,319	9.6
Bering Sea *C. opilio*	27	101,712,035	10.4	17	84,322,232	8.7
Eastern Aleutian Islands golden king crab	1	1,021,237	10.5	1	1,021,237	10.5
Eastern Bering Sea *C. bairdi*	17	18,449,875	9.5	17	18,449,875	9.5
Pribililof red and blue king crab	10	2,806,769	9.6	4	2,215,703	7.6
St. Matthew Island blue king crab	17	3,048,882	10.4	8	1,988,321	6.8
Western Aleutian Islands golden king crab	2	879,760	2.3	2	879,760	2.3
Western Aleutian Islands red king crab	6	9,054,708	15.6	3	8,822,797	15.2
Western Bering Sea *C. bairdi*	17	18,482,166	9.5	17	18,482,166	9.5

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. The few persons that have entered the fisheries 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 Western Aleutian Islands golden king crab fishery, the one new entrant acquired in excess of 5 percent of the C share QS pool. Given that only a few vessels participate in that fishery, the large share acquisition is not surprising.

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

Fishery	New C share QS holder in the fishery			New C share 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	14	1,077,535	9.0	5	315,487	2.6
Bering Sea *C. opilio*	11	2,303,296	7.6	5	1,127,003	3.7
Eastern Aleutian Islands golden king crab	0	0	0.0	0	0	0.0
Eastern Bering Sea *C. bairdi*	6	153,660	2.6	6	153,660	2.6
Pribililof red and blue king crab	1	27,116	3.0	0	0	0.0
St. Matthew Island blue king crab	8	108,660	12.1	1	13,137	1.5
Western Aleutian Islands golden king crab	1	75,643	6.3	0	0	0.0
Western Aleutian Islands red king crab	0	0	0.0	0	0	0.0
Western Bering Sea *C. bairdi*	6	153,660	2.6	6	153,660	2.6

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 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

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	3	53,867,976	14.1	2	51,756,662	13.6
Bering Sea *C. opilio*	4	86,194,722	8.6	2	84,798,627	8.5
Eastern Aleutian Islands golden king crab	3	1,365,308	25.2	2	1,272,608	23.4
Eastern Bering Sea *C. bairdi*	1	3,676,006	1.8	1	3,676,006	1.8
Pribililof red and blue king crab	1	4,155,008	13.9	0	0	0.0
St. Matthew Island blue king crab	2	2,397,581	8.0	1	12,955	0.0
Western Aleutian Islands golden king crab	2	2,269,884	8.1	1	2,165,711	7.8
Western Aleutian Islands red king crab	2	19,415,902	32.3	1	3,248,567	5.4
Western Bering Sea *C. bairdi*	1	3,676,006	1.8	1	3,676,006	1.8

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 8-9). This entry has been relatively small scale, as Class B and C share IFQ represent a relatively small portion of the IFQ pool. These entering processors 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 MONITORING 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 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.

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 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 and the MSA, 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 season exceeded costs, NOAA Fisheries will have to subtract the remaining balance from the estimated costs, prior to calculating the fee percentage for the 2009-2010 season (effectively reducing the fee percentage for the 2009-2010 season).

For the first three years of the program the fee percentage was set at the maximum level, 3 percent of ex vessel value. NOAA Fisheries has lowered the fee percentage for the 2008-2009 season to 1.05 percent of ex vessel value, primarily because the 2007-2008 costs were about half of their levels in prior years. 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 three years of the program, most categories of management costs have declined (see Table 11-1). These declines, together with the large TAC increases and strengthening markets in the third year of the program led to the decline in the fee percentage in the fourth year of the program.

Table 11-1 Management costs and cost recovery fees (2005-2006 through 2007-2008.

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%
Fees for cost 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 - Fee Percentage set at 1.05 % of ex vessel value

12 FISHING VESSEL SAFETY

12.1 Fatalities in BSAI crab fisheries

Commercial fishing is one of the most dangerous jobs in the United States, and the BSAI crab fisheries are particularly hazardous because harvesting of crab species generally takes place during the winter when air and water temperatures are colder; high winds, snow, sleet, and ice are more prevalent; daylight hours shorter; and high seas are more common (National Institute for Occupational Safety and Health, 1997). In addition, crabbing fishing gear consists of steel pots weighing up to 800 pounds each, which require cranes and hydraulics for setting, retrieval, and stowage. Lines also pose a substantial risk to inattentive crew. Crab pots stacked on deck can severely compromise vessel stability, especially if accompanied by icing conditions. The derby-style BSAI crab fisheries contributed to these dangers by often encouraging participants to fish in unsafe weather conditions, work continuously for long periods without rest, and possibly overload their vessels with pots (National Institute for Occupational Safety and Health, 1997).

Between 1991 and 1996, a total of 61 fatalities occurred in Alaska's crab fisheries, accounting for 42% of all commercial fishing-related fatalities in the state (National Institute for Occupational Safety and Health, 1997). During this period, the average annual fatality rate in the shellfish (primarily crab) fisheries in Alaska was 356/100,000/year, 50 times the overall U.S. occupational fatality rate of 7.0/100,000/year. Since the early 1990s, however, the number of fatalities in the BSAI crab fisheries has shown an overall downward trend (see Table 12-1).

Table 12-1 Fatalities in the Bering Sea and Aleutian Islands crab fisheries, 1990–2008

	Years prior to implementation of the rationalization program										Seasons under the rationalization program		
Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2005-2006	2006-2007	2007-2008
Number of fatalities	10	1	3	7	0	1	0	1	0	6	0	0	0

Source: Lincoln (2007) and USCG Marine Safety Detachment Kodiak

Several factors have contributed to the decline in fatalities in the Being Sea and Aleutian Island crab fisheries. A progression of safety measures beginning in the early 1990s were implemented by the USCG. In particular, these safety requirements contributed to a substantial increase in the percentage of

the commercial fishermen surviving vessel sinking and capsizing. National Institute for Occupational Safety and Health (NIOSH) found that in Alaska, the number of vessels lost per year has stayed relatively constant, but the survival rate for those onboard increased from 73% in 1991 to 93% in 1998 (Lincoln, 2007).

These data suggest that the Commercial Fishing Industry Vessel Safety Act (CFIVSA) of 1988 improved survivability (Lincoln and Conway, 1999). Provisions of the CFIVSA implemented in the early 1990s required the USCG to issue new regulations for safety equipment and operating procedures for fishing, fish tender and fish processing vessels. As a result of this legislation vessels are better equipped with Emergency Position Indicating Radio Beacons (EPIRBs), life rafts, side-band radios, and survival suits. Moreover, emergency drill instructor training and mandatory monthly drills are required of all fishing vessels. In addition, the CFIVSA enabled the USCG to establish the Voluntary Dockside Examination (VDE) Program in 1992 (Medlicott, 2002). If vessels pass a safety inspection by the USCG or Coast Guard Auxiliary they are issued a dockside exam decal. In 1998, the NPFMC initiated a regulation that made the VDE or some other documentation of compliance with USCG regulations mandatory for all vessels carrying observers (Cullenberg, 2002). Furthermore, since 2005, each vessel participating in the crab fisheries has had to receive a dockside exam decal from the USCG before it is issued a fishing license by the Alaska Commercial Fisheries Entry Commission and allowed to fish in the crab fisheries in each season.

The success of the CFIVSA suggested that further improvements in safety could be made through efforts to prevent vessel loss. In Alaska, the USCG responded by implementing the vessel stability check program in 1999. The program identifies and corrects safety and stability hazards known to exist on vessels participating in Bering Sea and Aleutian Island crab fisheries. These fisheries were selected for the program because they had the highest fatality rate of any fisheries in the state. Each vessel participating in one of the two major crab fisheries (historically in October and January) is checked by the USCG prior to its participation to ensure the vessel meets basic stability and loading standards. A NIOSH evaluation of the stability check program showed a decline in fatalities in the Bering Sea and Aleutian Island crab fisheries from an annual average of 7.2 fatalities in the ten years preceding the program's implementation to 1.2 per year in the years since its implementation through 2007 (Lincoln, 2007).

To further improve safety, prior to rationalization the USCG stationed a helicopter-equipped cutter on the fishing grounds during the two major crab seasons and stationed an emergency response helicopter at Cold Bay during the Bristol Bay red king crab season (in October), and at St. Paul during the Bering Sea *C. opilio* season (in January). This practice has continued under the rationalization program, but the timing of deployments is undergoing changes with the extension of crab fishing seasons and evolving needs in other fisheries. The long seasons pose a financial challenge to the USCG, as it restructures its rescue equipment and crew deployments. Also prior to implementation of the program, the USCG and State of Alaska signed an agreement in 2001 allowing the Alaska Department of Fish and Game to delay opening a BSAI crab fishery for up to 48 hours to let bad weather pass if the USCG's ability to conduct search-and-rescue missions is significantly impaired.

12.2 Effects of the program on fishing vessel safety

The downturn in fatalities in BSAI crab fisheries began before the implementation of the rationalization program in 2005. In the first three years of the program, there have been no fatal events in the program fisheries. However, it is not possible to ascertain with certainty the extent to which the program contributed to the improved safety record in the fisheries.

Prior to implementation of the rationalization program, vessels could suffer reduced catches if they chose to delay fishing because of bad weather. Fishery participants report that the exclusive allocations under

the program have reduced the pressure to risk unsafe weather or sea conditions by removing the need to compete for a share of the available catch of crab. In the first year of the program, for example, some boats chose to remain in port or other secure areas for three days after the Bristol Bay red king crab season opened because of bad weather. The vessels left for the fishing grounds only after weather and sea conditions improved. The gain in vessel safety from this season opening standdown under the program may have been limited by the aforementioned policy of delaying opening a fishery for up to 48 hours to allow storms to pass.

In addition to affecting captains' decisions to fish or not on a given day, the program has affected decisions made on the grounds that enhance safety in the program fisheries. In particular, captains allow crews to get more rest during fishing trips. Prior to rationalization, compression of fishing activity during a season to just a few days in a race-for-fish scenario meant that crewmembers worked around the clock, which created extreme fatigue and increased the likelihood of accidents (Matulich, 2008). The exclusive allocations and extended season under the program have allowed captains to slow fishing, thereby allowing crews more (and more regular) rest than in the derby fishery. Vessels stop working during this rest period and "jog" in a safe, low fuel consumption mode or transit between strings of pots. By reducing fatigue among crewmembers, this daily sleep can be critical to crew safety.

Under the rationalization program, vessels are also more likely to suspend fishing on the grounds during periods of bad weather. Crews typically rest during these periods, while the vessel jogs or transits slowly between fishing areas. Some participants have reported that vessels may choose to time deliveries or not leave the dock after making a delivery to avoid severe weather. These practices have an added advantage, since crab in on-board tanks can be damaged or stressed by severe weather, resulting in higher deadloss.

On the other hand, some factors may limit the ability of harvesters to take full advantage of opportunities to fish at a slower pace to reduce crew fatigue and to avoid fishing in dangerous weather. These factors include a continued desire to minimize days at sea and persistence of the work ethic of individuals who have been historically employed largely because of their ability to work fast for long periods of time. The effects of these factors on fishing practices may subside over time, particularly if high fuel prices induce participants to slow their fishing to save on operating costs.

It is also important to note that delivery contracts between vessels and processing plants still exist and may pressure a captain to complete deliveries by a certain date to avoid ex vessel price reductions. Crab processing is labor intensive, and timing of deliveries is important for processors in order to reduce the costs to processors of keeping crews on hand, standing by to process crab. In some cases, market demands may impose time pressures on harvesters and processors. The Japanese market for king crab, which is the most important market for Bristol Bay red king crab, has a particularly strong seasonal component. The vast majority of sales of king crab take place around and before the year end holidays (Sackton, 2007a). In order to maintain this traditional Japanese end-of-year gift giving market, Alaska processors must have the crab delivered by harvesters by mid-November (Herrmann and Greenberg, 2006). While these time pressures may lead to more aggressive harvest schedules, harvesters have used these time pressures to their advantage in price negotiations. Specifically, some harvesters have organized standdowns to extract a higher price from processors. Although processors still vigorously negotiate delivery schedules in the preseason, they have become more accommodating of harvester delays inseason to the extent that those delays arose from safety concerns expressed by captains.

Fleet contraction may also have contributed to safety in the program fisheries through several ancillary effects. Prior to implementation of the program many marginally productive vessels participated in the fisheries. Vessel owners continued to fish their vessels to maintain their historic interests in the crab fisheries and to maintain some revenue stream to support loan payments and vessel and gear maintenance. The overall poor profitability of the highly capitalized fisheries with relatively low TACs may have

economically forced some owners to postpone needed vessel maintenance. Fleet contraction resulted in the removal of many of these marginal vessels from the fleet. In addition, the higher revenues per vessel in the fishery may have increased the availability of funds for vessel maintenance. Fleet contraction also resulted in a decrease in the number of and catch of smaller vessels, which can be more readily overwhelmed by heavy sea conditions (see Table 12-2 and Table 12-3).

Table 12-2 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		
		Number of vessels	Harvests		Number of vessels	Harvests		Number of vessels	Harvests		Number of vessels	Harvests	
			in pounds	as a percent of total harvests		in pounds	as a percent of total harvests		in pounds	as a percent of total harvests		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
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

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

Table 12-3 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	0	3	9	7
	2002-2003	0	3	9	7
	2003-2004	0	3	8	7
	2004-2005	0	3	9	8
	2005-2006	0	0	3	4
	2006-2007	0	0	2	4
	2007-2008	0	0	2	2
Eastern Bering Sea *C. bairdi*	2006-2007	0	5	17	14
	2007-2008	1	3	10	6
Western Aleutian Island golden king crab	2001-2002	0	0	3	6
	2002-2003	0	0	3	3
	2003-2004	0	0	3	3
	2004-2005	0	0	3	3
	2005-2006	0	0	1	2
	2006-2007	0	0	1	2
	2007-2008	0	0	1	2
Western Bering Sea *C. bairdi*	2005-2006	0	5	20	18
	2006-2007	0	5	15	16
	2007-2008	0	6	14	7

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

Some participants also believe that fleet consolidation has contributed to safety in the fisheries by improving crew skills and professionalism. In the years leading up to the rationalization program, crews

in the fisheries would actively fish crab for only a few weeks each year.[74] Under the program, most crews are active in the crab fisheries for a period of months. This extended employment provides crew with more (and more regular) experience deploying and hauling gear. Although some turnover occurs, most crews reportedly have more continuity under rationalization. This lower turnover (including reduced movement among vessels) allows crew to better learn to work together as teams and learn the crew practices of a particular boat as well as acquire a better understanding of safety equipment and practices. Other participants in the fisheries, however, have expressed concern that it may have become more difficult to hire and keep qualified crew because experienced crewmembers are unwilling to work under the extended seasons under the program.

Certain procedural aspects of the program have also been criticized for compromising vessel safety. Most prevalent are assertions that the regional landing requirement has created a situation where captains have less flexibility to take sea conditions into account when deciding where to deliver crab. Processors in the North region are especially sensitive to delivery schedules, since processing crews are positioned in the Pribilofs (the only North communities with crab processing) exclusively to process crab. Unexpected circumstances in the Bering Sea *C. opilio* fishery, together with the more rigidly scheduled deliveries are argued to have led some vessels to take greater risks in all of the first three years of the program. Each year, ice in and around St. Paul harbor delayed deliveries, sometimes for several days. In the spring of 2007, icing problems were compounded by a disabling fire on one of the two floating processors scheduled to operate in the North region. With limited processing capacity scheduled for the North region, deliveries were delayed, and, at one point, three crab vessels were trapped in the ice temporarily outside St. Paul harbor.

While travelling through ice no doubt poses threats to fishing vessels and crews. Vessels are not only at greater risk of loss, but also may suffer hull, propeller, and rudder damage. In some instances, this damage may not be easily detectable. The extent to which the North region landing requirement or processor scheduling under the rationalization program have contributed to these safety risks is uncertain. Prior to implementation of the rationalization program, vessels periodically became trapped in the ice during the Bering Sea *C. opilio* season, particularly when attempting deliveries to St. Paul. In addition, most harvesters prefer to deliver catch in the Bering Sea *C. opilio* fishery to the Pribilofs to avoid the travel costs associated with deliveries to the South. Lastly, ice conditions that cause problems for deliveries to the Pribilofs are frequently accompanied by icing problems on the grounds. To the extent that harvesters are unable to make deliveries to St. Paul for an extended period, they may be unable to continue fishing. Harvesters unable to fish, however, may need to offload any crab onboard to avoid deadloss. In addition, it is possible that this issue could be addressed if a satisfactory provision for emergency relief from regionalization can be developed to alleviate risks associated with regional landing requirements.

It is also important to note that where permissible program constraints that pose safety risks have been removed. For example, safety concerns led to exemptions to the 'cooling off' provision, which required IPQ to be used in the "community of origin" (or community of the processing history that led to the initial allocation of those processing quota shares) during the first two years of the program. In both of those years, PQS holders petitioned NOAA Fisheries for an exemption from the limitation of the 'cooling off' period, claiming unavoidable circumstances prevented their processing of shares in the City of St. George. In both years, NOAA Fisheries granted the exemption concluding that an unavoidable circumstance prevented processing in the St. George harbor. Specifically, NOAA Fisheries found that

[74] Prior to rationalization some vessels fished Pacific cod before and after the shorter seasons, extending their pot fishing seasons. Although the Pacific cod fisheries allow crews to practice deploying and hauling gear. Many vessels in the crab fisheries have continued to fish in the Pacific cod fisheries since implementation of the rationalization program.

storm damage to the breakwater at the harbor in St. George prevented safe entry of processing vessels to the St. George harbor. With no other location available to safely process in St. George, NOAA Fisheries granted the waiver of the 'cooling off' requirement.

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, and consequently the minimum TAC threshold has been eliminated, so that both Western and Eastern fisheries are open.

Table 13-1 Guideline harvest level, or total allowable catch, and harvest, for crab fisheries, 2000-2008, in millions of pounds

Season	Bristol Bay red king crab		Bering Sea *C. opilio*		Aleutian Islands golden king crab		Bering Sea *C. bairdi*	
	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	
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			19.4	23				
2005 - 2006	16.5	16.5	33.5	33.3	5.1	5.0	1.6	1.0
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

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 2007.

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.

Table 13-2 Deadloss in the crab fisheries, 2000-2008

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
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
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
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

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

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 of 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).

High grading and increased in discard rates have not been an issue in fisheries or seasons, other than the 2005-2006 Bristol Bay red king crab season (Table 13-3). 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 2007-2008 (Bristol Bay red king crab, Bering Sea *C. opilio*) and 2005-2006 though 2007-2008 (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
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
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
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
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

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

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 a 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 the crab fisheries. Observers attempt to estimate the number of rail dumped pots, although they cannot 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. As the fishery evolves cooperative fishing arrangements may reduce rail dumping, as vessel level overages are addressed by transfers.

Table 13-4 Estimated rail dumped pots in the crab fisheries, 2005-2006 through 2007-2008

Fishery	Season	Rail dumped pots*	Rail dumped pots as a percent of total pot lifts
Bristol Bay red king crab	2005 - 2006	NA	NA
	2006 - 2007	1,745	2.6
	2007 - 2008	813	1.2
Bering Sea *C. opilio*	2005 - 2006	600	0.9
	2006 - 2007	1,581	2.4
	2007 - 2008	1,057	1.6
Aleutian Islands golden king crab	2005 - 2006	243	0.4
	2006 - 2007	1,193	1.8
	2007 - 2008	527	0.8
Bering Sea *C. bairdi*	2005 - 2006	NA	NA
	2006 - 2007	216	0.3
	2007 - 2008	142	0.2

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. 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. To some extent, these changes may affect handling mortality. Additionally, evidence indicates that crabs captured in extremely cold and windy weather suffer higher rates of handling mortality (NMFS 2004). 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. While it is possible that some of these considerations may have affected handling

mortality under the program, ADF&G currently has no plans to reevaluate the handling mortality percentages.

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 31 hours in 2004. Soak times have increase further since the program was implemented, averaging 65 hours and 51 hours, respectively, in the first two seasons of the program (Bowers et al 2008). 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. For the *C. opilio* fishery, the average soak time in the 2004 and 2005 season was 21 hours, and increased to 65 hours and 63 hours, respectively, in the 2005-2006 and 2006-2007 seasons (Bowers et al 2008). Catch per unit effort averaged 189 legal male crab per pot lift in the 2004 and 2005 seasons, and 204, 332, and 349, respectively, in the first three seasons of the program. Anecdotal reports note that the catch per unit effort in the 2005-2006 season was likely affected by the extent of sea ice which kept fishermen off the most productive grounds during much of the season.

While a definite correlation between extended soak times and legal male catch exists, 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.

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 were increased from 200 or 250 pots allowed per vessel, depending on vessel length, to 450 pots per vessel in the Bristol Bay red king crab and Bering Sea *C. bairdi* and *C. opilio* fisheries, under the rationalization program, in practice, the average number of pots fished per vessel remains less than that allowed pre-rationalization (see Table 4-22) 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 last two years, records of lost pots indicate that they have represented approximately 1 to 1.4 percent of total registered pots in the Bristol Bay red king crab fishery, and between 2 and 6 percent of total registered pots in the Bering Sea *C. bairdi* and *C. opilio* fisheries were lost (Table 13-5). 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.

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 in the fishery in the last two years.

Table 13-5 Lost pots by fishery (2006-7 though 2007-2008)

Fishery	Season	Lost pots
Bristol Bay red king crab	2006 - 2007	154
	2007 - 2008	167
Bering Sea *C. opilio*	2006 - 2007	228
	2007 - 2008	599
Aleutian Islands golden king crab	2006 - 2007	135
	2007 - 2008	37
Bering Sea *C. bairdi*	2006 - 2007	88
	2007 - 2008	175

Sources: ADFG

13.3.6 Season length and temporal and spatial dispersion

Under the program, the season length for the fisheries has lengthened considerably (see Table 4-18 and Table 4-19). 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, with most of the harvest is completed by mid-November, although some landings continued through the season closing on January 15. The Bering Sea *C. opilio* fishery has spread out over the full seven months of its opening, although much of the harvest is still caught during the traditional period of the fishery in late January and early February. Although Bering Sea *C. bairdi* had a small directed fishery, most of the harvest was incidental to the *C. opilio* fishery in the western portion, or the Bristol Bay red king crab fishery in the eastern portion. 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 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.

Under the program, the spatial distribution of catch in the Bristol Bay red king crab fishery has diversified. 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) (Bowers et al. 2008). Dispersing the fishery both geographically and temporally will reduce any localized fishing pressure impacts on the crab stocks.

In the Bering Sea *C. opilio* fishery, the majority of fishery catch has occurred in the southern portion of the *C. opilio* range, even in years when ice cover has not restricted the fishery from moving farther north. In 2003 and 2004, 66 percent and 78 percent of the catch, respectively, was south of 58.5° N. (Turnock and Rugolo 2007); the same pattern is apparent in the last three years. Under rationalization, harvest location has shifted to the southeast, however. A high percentage of the catch is taken out of statistical areas to the west of the Pribilof Islands, one of which accounted for the statistical area with the greatest effort in 2005-2006 season (approximately 16 percent of that season's total harvest), and four of which accounted for 74 percent of the total harvest for 2006-2007 (Bowers et al 2008). These statistical areas represented a relatively small percentage of the overall *C. opilio* harvest in 2003 (14 percent of the total harvest, ADFG 2004).

Fishing effort in the eastern Aleutian Islands golden king crab fishery focused 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 that contributed to for Bering Sea *C. opilio* quota 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 show 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 these 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.

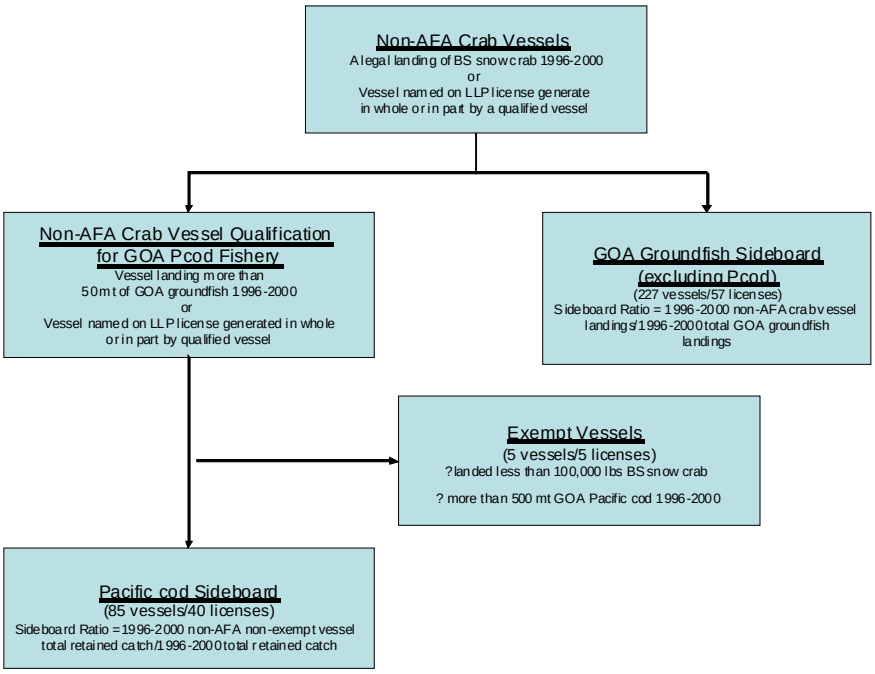

Figure 14-1 Diagram of non-AFA crab vessel sideboard program for the GOA

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 GOA Pacific cod sideboard limits.

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. 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 provides annual total catch of GOA Pacific cod, pollock, and other groundfish from 1995 to 2007 for non-AFA crab vessels that are subject to the GOA sideboard limits. Prior to implementation of the crab sideboard limits, total catch of GOA Pacific cod by the sideboarded non-AFA crab vessels ranged from 2,301 mt to 10,724 mt. During the 2006 fishing year, the GOA Pacific cod sideboard catch was 5,037 mt, while the limit was 3,615 mt. The reason the 2006 sideboard catch exceeded the sideboard limit was due to the sideboard regulations being implemented in March 2006, after the A season was completed.

Table 14-1 Total catch (mt) of Non-AFA crab vessels limited to sideboard limits

Year	Pacific Cod	Pollock	Other Groundfish
1995	3,293	62	66
1996	2,556	760	2
1997	2,422	580	5
1998	3,377	1,495	98
1999	6,962	1,328	45
2000	10,724	1,374	50
2001	2,301	2,547	109
2002	3,073	1,923	81
2003	4,384	1,296	173
2004	5,313	920	112
2005	5,128	2,539	80
2006	5,037	2,258	204
2007	*	1,711	61

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 IFQ fisheries.

Table 14-2 provides a brief summary of the Western and Central Gulf Pacific cod sideboard fishery closures during 2006 and 2007. In both areas during the A season the sideboard limit was reached in early February resulting in closure of the fishery. The B season sideboard fishery was also closed prior to the end of that fishing season, as a result of the sideboard catch reaching the limit.

Table 14-2 Sideboard fishery closure dates for Western and Central GOA Pacific cod during 2006 and 2007

Area	Season	Inshore		Offshore	
		2006	2007	2006	2007
Western GOA	A	2 Mar (TAC)	18 Feb (TAC)	19 Feb (TAC)	14 Feb (TAC)
	B	1 Sep (TAC)	14 Oct (TAC)	12 Oct (TAC)	
Central GOA	A	28 Feb (TAC)	24 Jan (TAC)	19 Feb (TAC)	14 Feb (TAC)
	B	1 Sep (TAC)	11 Oct (TAC)		

Source: NMFS

Table 14-3 provides counts of the non-AFA crab vessels, by sideboard category in the Gulf Pacific cod fishery from 1995 to 2007. 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.[75] 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 Gulf Pacific cod has ranged from 476 in 1995, to 258 in 2006.

[75] Note that the two Pacific cod prohibited vessels fishing in the 2006 and 2007 sideboard fishery due to the vessel appealing its sideboard restriction. While the vessels appeal their sideboard restriction, the vessels was not limited by Pacific cod sideboards.

Table 14-3 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

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 14-4 provides Gulf Pacific cod catch for non-AFA crab vessels by sideboard category, while Table 14-5 provides annual percent of Gulf Pacific cod caught by each vessel group. Overall, the total catch of Gulf Pacific cod has declined during the 1995 to 2007 period. In 1995, the combined catch of Gulf Pacific cod by all vessels was 68,182 mt, while the combined catch in 2004 was 34,353 mt. However, catch of Gulf Pacific cod by non-AFA crab vessels does not follow this trend; rather the decline in catch appears to be limited to the other Pacific cod vessels. For the Pacific cod exempt non-AFA crab vessels, on average their percent of the total GOA Pacific cod catch is 3.5 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 1.3 percent, with catch ranging from 53 mt in 1998, to 1,632 mt in 2005. Since sideboard regulations were not implemented until March 2006, these vessels were permitted to participate in the 2006 fisheries. For the non-AFA crab vessels that are restricted by Pacific cod sideboards, on average their percent of the total Gulf Pacific cod catch was 8.7 percent, with catch ranging from 2,422 mt in 1997, to 10,724 mt in 2000. In more recent years, catch for this group of vessels has ranged from 3,000 mt to 5,000 mt. Finally, non-crab vessels on average account for 86.6 percent of all Gulf Pacific cod catch, which ranged from 65,214 mt in 1997, to 25,383 mt in 2005.

Table 14-4 GOA Pacific cod catch (mt) of non-AFA crab vessels by sideboard category

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

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 14-5 Percent of GOA Pacific cod catch by sideboard category

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%
Average	**3.5%**	**1.3%**	**8.7%**	**86.6%**

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

The Council is currently considering an amendment package to modify harvester sideboards under the program. These changes are intended to relieve vessels with strong historic dependence on non-crab fisheries from the limitations of the sideboards. The proposed alternatives would extend the sideboard exemptions to additional vessels.

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.

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