

**Leasing practices in North Pacific fisheries
Bering Sea and Aleutian Island crab fisheries
North Pacific Fishery Management Council
June 2009**

In August of 2005, fishing began under the rationalization program developed by the North Pacific Fishery Management Council for the Bering Sea and Aleutian Islands crab fisheries. In the years leading up to implementation of the program, in excess of 200 vessels typically participated in the Bristol Bay red king crab fishery, while over 150 vessels typically participated in the Bering Sea *C. opilio* fishery. Under the new program, fewer than 100 vessels participated in either of these fisheries in any year. This consolidation has affected crews in the fisheries in several ways. While some changes may be viewed as benefiting crew, many crew have lost positions in the fisheries; others have seen their incomes affected by deduction of lease payments from the vessel revenues prior to computation of crew shares. These concerns have drawn the continuing attention of the Council, since implementation of the program. To begin the process of addressing these concerns the Council has taken several steps. The Council has defined alternatives to amend the program that include options to increase the portion of the harvest share pool that must be held by persons active on vessels in the fisheries. In addition, the Council adopted the following motion, requesting a discussion paper examining the effects of leasing on crew in fisheries, including the crab fisheries:

Leasing restrictions: A paper addressing factors affecting lease rates in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries. Include a discussion of how the extraction of rents by quota holders through lease payments has changed payments to crew under the crab rationalization program. Provide examples from other programs of provisions that limit leasing activity and suggestions of how to achieve some reductions in either the extent of leasing activity or the lease rate in these two rationalized crab fisheries.

This paper is the staff response to the Council's request. The paper begins with a discussion of the defining of "leasing" citing pitfalls that might arise in trying to curtail undesirable practices, if a narrow definition of leasing is used. The discussion of a leasing definition is followed by a section examining the leasing and transfer practices in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (the major crab fisheries) and the effects of those practices on crew. The paper then examines transfers and consolidation in the halibut and sablefish IFQ fisheries and the American Fisheries Act Bering Sea pollock cooperative program, the other fisheries in the North Pacific governed by share-based management programs from which lessons may be drawn.¹ The paper concludes with a discussion of possible measures (including both management measures and private measures that could be adopted by crews) to mitigate against the negative effects of leasing practices in the crab fisheries. In all cases, the discussion focuses on catcher vessels. Limited information is available and can be released concerning the catcher processors in the crab fisheries and other fisheries considered in this paper. In addition, compensation of catcher processor crews tends to be more complex and varied as some crew work as vessel crew and in processing.

What's a lease?

Prior to implementation of the rationalization program, the major crab fisheries were managed under the License Limitation Program (LLP). With the transition to the rationalization program, license holders in the crab fisheries were allocated quota shares (QS) that annually yield individual fishing quota (IFQ) that

¹ Although the Central Gulf of Alaska rockfish fishery and the Bering Sea non-pollock catcher processor fleets are governed by share-based management, those programs are relatively new and provide limited insight into the effects of transfers on crew.

allow the holder to harvest a portion of the total allowable catch. These transferable shares allowed former license holders to realize a return from the fishery without participation. QS holders could either divest of their interest in the fisheries by transferring those shares to others or transfer their IFQ on an annual basis to others who entered a vessel in the fishery. Annual transfers of interests can be through direct leases of IFQ² or through transfers among members of a cooperative. In addition, QS holders could form partnerships (or jointly owned corporations) with other QS holders to enter a single vessel in the fisheries to fish their combined share holdings. NOAA Fisheries documents only transfers of QS and simple leases of IFQ among their holders. Many transfers escape documentation because of the share holding structure of the program and the business practices of share holders. For example, exchanges of IFQ among members of the same cooperative are not recorded, as IFQ are allocated to the cooperative and fished collectively by the members. In addition, transactions that appear to be transfers may not be transfers at all, but are merely restructuring of interests. For example, two QS holders may agree to form a partnership to hold their QS, while maintaining their proportional interests in the QS under a partnership agreement. These shares may be fished off a single vessel without leasing. This variety of transfers is problematic for any examination of the effects of 'leasing.' The examination requires a definition of a 'lease' and records for distinguishing leases from other forms of transfer activity. By developing a definition, transactions of interest (which may have the same effect as transactions that are defined as a lease) may be excluded from consideration.

The Council's purpose for examining 'leasing' is to determine how leasing under the rationalization program has affected crew and to develop measures to prevent adverse effects of that leasing. Given this purpose and the potential for omitting transactions that are important contributors to crew effects, this paper looks more broadly at share use and consolidation in the fisheries and their effects on crew and possible mitigation of any adverse effects. This broader approach will ensure that share use (including use that might otherwise not be defined as a lease) that carries with it adverse consequences will be considered. This broader approach is also justified by data available for examining crew effects. These data include catch, ex vessel revenues, and crew payments. The diversity of crew contracts and their terms of compensation across the fleet prevent any back calculation of crew shares using lease rates. As a result, a broader consideration of crew effects that includes consideration of the array of transactions that contribute to consolidation seems merited. Also, rules in other fisheries that may shed light on the potential for management measures to protect crew prevent transactions that might be characterized as 'leases' under a traditional definition. In some cases, participants in these other fisheries have achieved consolidation despite these leasing prohibitions. To understand whether a management measure will protect crew from detrimental effects arising from transfers, it is therefore important to broadly consider the effects of share use and consolidation.

Leasing practices in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries

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

This leverage was likely manifest in two ways. First, crew shares likely reflected some of this additional

² These direct leases will be prohibited for IFQ holders other than cooperatives after the 5th year of the program.

leverage. Most crew were paid on a share system, under which payment is a percentage of vessel revenues after deduction of specified costs (most frequently food, fuel and bait). In individual cases, some crew may have been able to negotiate a more senior position and higher share for themselves, if a vessel needed to fill that more senior position. In addition, crewmembers on average might have received a higher share percentage for their work, than would have been paid in a more competitive labor market. This market power may be evident as share percentages in the crab fisheries are similar to share percentages paid in other fisheries (such as pot fishing for Pacific cod) despite substantially higher daily revenues from the crab fisheries. Admittedly crab fishing introduces greater risks than cod fishing, which should provide for a premium for crab fishing.³ Yet, it is unlikely that any vessel owner who attempted to reduce crew shares in the fishery to a level that would compensate crew at a daily rate similar to that in other pot fisheries would have been able to retain a good crew. The magnitude of the difference in daily revenues suggests that crew may have received extraordinary shares (and pay) in the crab fisheries under the LLP.

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

In the first season under the rationalization program, former license holders used their new ability as share holders to consolidate fishing on fewer vessels. Examining data from the first three years of the program shows a substantial reduction in the fleets in the two major fisheries (Table 1). The figures reveal initial precipitous declines that, as expected, 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 GHGs in the fishery were at historic lows in the years preceding the program. Consolidation in the fisheries took place to the degree but more quickly than most predicted.

³ These risks include not only safety risks arising from the nature of the crab fishery, but also financial risk, as crew payments depend on the performance of the vessel. Crewmembers on a vessel that had a poor season, due to unsuccessful fishing or breakdown, would receive little pay.

Table 1. Catch, number of vessels, and season length in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (2001 to 2007-2008).

Fishery	Season	Catch	Number of vessels participating			Season length (in days)
			catcher vessels	catcher processors	all unique vessels	
Bering Sea <i>C. opilio</i>	2002	29,609,702	182	9	190	24
	2003	25,410,122	185	5	190	10
	2004	21,939,493	183	6	189	8
	2005	22,655,777	161	6	167	5
	2005 - 2006	33,248,009	76	4	78	212/228*
	2006 - 2007	32,699,911	66	4	70	
	2007 - 2008	56,722,400	74	4	78	
Bristol Bay red king crab	2001	7,681,106	224	8	230	3
	2002	8,770,348	234	9	241	3
	2003	14,237,375	242	8	250	5
	2004	13,889,047	243	8	251	3
	2005 - 2006	16,472,400	88	4	89	92
	2006 - 2007	13,887,531	79	3	81	
	2007 - 2008	18,324,046	72	3	74	

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

For 2005-2006, 2006-2007, and 2007-2008 catcher processor vessel count include all vessels harvesting catcher processor shares.

* The Eastern area closes 16 days prior to the Western area in this fishery.

A few factors likely contributed to the substantial consolidation that occurred in the first years of the program. The short seasons and low catches (relative to historic highs) created an environment ripe for consolidation. In addition, industry participants maintain that many of the vessels that departed in the first year of the program would have been retired from the fishery earlier, but for the prospect of the rationalization program. This lingering capacity led to a far more precipitous drop in the first year of the program. Consolidation was also stimulated by the cooperative structure under the program. Cooperatives created the framework and led to the development of harvesting associations, improving relationships and easing consolidation. Exempting cooperative participants from vessel use caps (set at 1 percent of the owner IFQ for vessels harvesting individually held IFQ) both increased the incentive for cooperative membership and effectively annulling any vessel use cap.

Comparing vessel activities before and after implementation of the program brings to light further changes in the fleet dynamics in the fisheries (see Table 2 and Table 3). Considerable consolidation 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. While quota was consolidated on the active vessels, 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. 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 GHFs 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 pre-rationalization harvests.⁴

Table 2. 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

Table 3. 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

This consolidation brought led the greatest effect on crew arising from the rationalization program, the loss of crew positions in the fisheries. Crew sizes are generally unchanged since implementation of the program, so vessel participation provides a direct estimate of the number of crew that have left the fisheries. Data from Crab Economic Data Reports (see Table 4 below), as well as anecdotal reports, indicate that crew sizes have changed minimally (at most one person per vessel) since implementation of the program. In some instances, vessels are reported to have added crew to reduce the burden of deck labor in the fisheries. Absent improved data, the removal of vessels from the fisheries provides a direct estimate of the number of crew jobs lost. Assuming 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.⁵

⁴ The four largest vessels in the fishery in 2001 harvested a substantially greater share than the four largest harvests in any other year. This likely occurred because some catcher processors did not acknowledge a catcher vessel strike in the fishery that year.

⁵ Note that these estimates are based on an assumption of 6 persons per crew (including captain). Crab Economic Data Reports suggest that average crews are approximately 5 persons; however, these surveys may have some biases. For years prior to implementation of the program, the surveys requested average crew size. Subsequent to the implementation the survey requests the number of paid crew per fishery. Both suggest that average crews are less than 6 persons. Further estimates of crew sizes could be derived using E-landings data, if time allowed.

Although these job losses are substantial, one must also consider the terms of employment in the prerationalization fisheries in assessing the magnitude of the loss. 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. In addition, since pay was based on performance in the derby, pay was subject to risk. Although high end of that spectrum 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.

Crab Economic Data Reports provide some indication of crew pay effects arising from the rationalization program. These data, however, should be interpreted as only providing a general reflection of conditions, as many respondents are believed to have misinterpreted questions concerning crew compensation (see Table 4). Specifically, captain and crew payment questions requested the actual amount paid to crew, not their payment before "shared expenses" (such as food, fuel, or bait) were "deducted". The following question distinguishes "deductions," which are shared expenses removed from vessel revenues prior to calculation of the crew share, from "charges," which are crew borne expenses removed after the calculation of crew shares. Most respondents are believed to have included the amount paid to crew in settlement checks without distinguishing whether "charges" might be removed before making that payment. As a result, we are uncertain of whether charges were removed by respondents, although the instructions direct a respondent to remove only deductions (not charges). The discrepancy could be significant, particularly in pre-rationalization years, when crew payments were substantially lower dollar amounts. For example, a \$1,000 plane ticket to Dutch Harbor may be the difference between a \$5,000 season and a \$6,000 season in the Bering Sea *C. opilio* 2001 season. In addition, although data are collected for most of the items deducted or charged, much of those data are of poor quality. In combination, these issues limit the ability to fully and accurately understand crew or captain pay. Despite these shortcomings, it is believed that these data provide a general understanding of the direction and gross scale of changes in crew compensation under the program. Interpreting these data also requires one to consider the circumstances in the fisheries. For example, in 1998, the Bering Sea *C. opilio* harvests exceeded 240 million pounds, more than four times the 2007 catch and more than seven times the catch for any other year covered by the data collection. Such circumstances are important to interpreting changes in crew compensation that have occurred.

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

Since crew compensation arrangements vary across the fleet, changes in crew share payments can be best assessed by examining the change in the percentage of gross vessel revenues paid to crew before and after the implementation of the program. Available data suggest that mean and median crew payments as a percentage of vessel revenues declined by approximately one-third under the rationalization program (see

Table 4). Although this decline is substantial, on average, the increase in revenues from consolidation (i.e., increase in average vessel harvest) more than compensated for additional deductions, charges, and decrease share percentages. In general, this additional compensation came at the cost of greater crew efforts harvesting those additional pounds.

In reviewing crew compensation on a fishery basis, two seasons in the Bering Sea *C. opilio* fishery stand out. In 1998, the extremely large total catch supported a very high average vessel harvest – more than twice the average vessel harvest any other year for which Economic Data Reporting data are available. This high vessel harvest level, supported a very high crew compensation. Despite the high vessel catches in that 1998, in 2007 (the second year of the rationalization program), crew compensation in the fishery approached the 1998 level. This relatively high compensation arose because of a relatively high price for crab in 2007 (\$1.71 per pound based on Economic Data Reporting data) compared to 1998 (\$0.57 per pound based on Economic Data Reporting data) and despite the lower percent of gross vessel revenues paid to crew. The 2006 year in the fishery shows an opposite price effect. In that year, crew compensation increase only slightly from levels seen in the years immediately preceding implementation of the program. In that year, crab prices dropped by more than one-third (to \$1.11 in 2006 from \$2.03 in 2004 and \$1.80 in 2005 based on Economic Data Reporting data). As a result of this price drop (and the changes in deductions, charges, and crew shares), crew compensation increased only slightly, despite a substantial increase in average vessel harvests.

Table 4. Crew size, harvest, captain pay, crew pay, and percentage of gross vessel revenues paid to crew in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries by fishery (1998, 2001, 2004-2007).

Fishery	Year	Number of vessels	Mean crew size	Mean vessel harvest (pounds)	Captain pay (\$)		Mean crew pay (excluding captain) (\$)	Crewmember pay (\$)		Percent of gross vessel revenues paid to crew (including captain)	
					Mean	Median		Mean	Median	Mean	Median
Bristol Bay red king crab	1998	185	5.2	56,089	17,543	16,499	35,862	6,921	6,179	35.4	35.3
	2001	180	4.8	36,279	21,359	18,668	40,172	8,395	6,996	35.5	35.3
	2004	218	5.3	58,822	31,483	29,865	66,482	12,417	11,596	35.7	35.7
	2005	83	4.9	194,812	63,367	53,910	120,058	24,112	21,375	25.0	22.7
	2006	77	4.9	202,058	50,384	46,818	99,381	19,899	19,423	23.7	23.1
	2007	70	5.0	269,194	75,771	68,155	150,526	29,640	27,007	22.6	21.5
Bering Sea <i>C. opilio</i>	1998	159	6.0	1,093,034	74,434	70,129	150,025	25,349	23,392	36.3	35.5
	2001	156	5.4	110,497	18,620	15,624	37,714	6,758	5,597	31.6	31.9
	2004	165	4.9	124,336	29,692	26,807	58,954	11,897	10,766	35.2	35.2
	2005	146	4.7	158,660	31,715	31,421	60,482	12,879	12,311	34.5	35.4
	2006	73	5.1	453,546	36,256	32,219	72,145	13,933	12,594	23.7	22.0
	2007	62	5.2	498,398	60,129	55,125	127,238	23,945	22,724	24.4	22.8

Source: Crab Economic Data Reporting.

Notes: Mean crew size is a count of all crew paid shares excluding the captain. Excludes any vessels on which crew were paid in excess of 75 percent of the vessel's gross revenues.

Examining compensation on vessels that participate in both the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries provides a more complete view of compensation on vessels that used in both fisheries. In 2006, when Bering Sea *C. opilio* prices were particularly low, the average crew earned substantially greater compensation than in the years preceding rationalization, with the exception of 1998, when harvests from the Bering Sea *C. opilio* fishery were substantially greater than for any other year for which data are available. Despite these reinforcing factors, the average crew on a vessel that participated in both fisheries received comparable compensation in 1998 and 2006.

Table 5. Harvest, captain pay, crew pay, and percentage of gross vessel revenues paid to crew by vessels participating in both the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (1998, 2001, 2004, 2006-2007).

Year	Number of vessels	Vessel revenues		Captain pay		Crew pay (excluding captain)		Percent of gross to crew (including captain)	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median
1998	146	783,000	742,052	93,457	88,913	189,765	176,540	36.0	35.3
2001	141	356,687	302,509	41,413	35,854	80,032	71,865	34.2	34.5
2004	160	548,336	517,390	63,883	61,549	130,808	120,434	35.7	35.6
2006	57	1,290,876	1,184,463	93,453	89,864	183,899	169,903	24.2	24.5
2007	55	2,136,090	1,892,917	139,596	141,269	288,535	267,431	23.0	21.9

Source: Crab Economic Data Reporting.

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

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

Table 6. Number of vessels deducting or charging vessel operating expenses from crew compensation (1998, 2001, 2004-2007).

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

Year	Observers				Gear				Fish taxes			
	Deducted	Charged	Neither	Unreported	Deducted	Charged	Neither	Unreported	Deducted	Charged	Neither	Unreported
1998	48	0	97	88	38	8	160	27	199	6	15	13
2001	57	0	91	80	31	8	164	25	203	6	9	10
2004	65	0	92	92	40	10	169	30	216	9	13	11
2006	28	0	41	29	10	3	74	13	96	1	5	0
2007	22	0	17	48	0	0	5	0	82	2	2	1

Source: Crab EDR data

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

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

While the treatment of most vessel operating expenses has remained relatively constant, a notable change in deductions and charges since program implementation is the additional deduction of quota expenses. Prior to program implementation, a small portion of the fleet deducted CDQ quota expenses prior to the payment of crew compensation. Since implementation of the program, most of the fleet deducts IFQ quota expenses. As noted earlier, the magnitude of deductions on any vessel are not consistently reported. In addition, the number of vessels and percentage of the fleet deducting CDQ quota expenses has increased substantially. It is not known at this time whether this change has arisen from the redistribution

of CDQ quota among more vessels, or if the change is caused by shifting of additional expenses to crew. These additional charges are believed to be largely responsible for the decrease in the percentage of gross vessel revenues paid to crew.

Table 7. Number of vessels deducting or charging expenses for acquired quota from crew compensation (1998, 2001, 2004-2007).

Year	CDQ				IFQ			
	Deducted	Charged	Neither	Unreported	Deducted	Charged	Neither	Unreported
1998	18	0	88	127				
2001	19	0	83	126				
2004	24	0	89	136				
2006	34	0	18	46	78	1	15	8
2007	28	0	7	52	67	1	12	7

Source: Crab EDR data

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

Anecdotal reports reinforce this conclusion, as most participants assert that these changes are applied simply to reflect the change in vessel owner revenues arising from the costly acquisition of shares to harvest. Many crew are said to have received full crew share on IFQ 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. As a result, sellers of quota (either through leases or sales of QS) receive a large portion of the revenues from their shares. In the transfer of quota received in the initial allocation, these revenues may be used to pay outstanding vessel mortgages or other vessel related costs (if the vessel is maintained for use in other fisheries). Any remaining amounts are profits to the share holder. Revenues from transfers after the initial allocation would be used, in part, to cover the holder's cost of acquiring that quota.

Although most changes in deductions, charges, and crew share percentages are to cover quota costs, anecdotal reports suggest that in some cases these changes have arisen from opportunistic vessel owners exerting negotiating leverage on crew. In these later cases, vessel owners have been able to exploit fleet contraction (and the surplus of available crew) to reduce crew compensation. The extent of these practices, however, is not known.

Examining changes in crew compensation with changes in pounds of harvests suggests that quota costs are the primary determinant of percentage of gross vessel revenues paid to crew (see Table 8). It may be expected that vessels that harvest greater amounts of crab will incur greater quota costs. The deduction of these costs prior to payment of crew will effectively reduce the percentage of gross vessel revenues paid to crew. Prior to implementation of the rationalization program, crews received a relatively similar share of gross vessel revenues regardless of a vessel's catch. Vessel harvests varied greatly, with crew on vessels harvesting in the highest quartile harvesting and earning between two and three times the amount harvested and earned by crew on vessels in the lowest quartile. Since implementation of the program, two changes in these relationships are notable. First, vessel harvests vary more greatly across the fleet. In the Bristol Bay red king crab fishery, average harvests of vessels in the highest quartile are now between four and five times the average harvest of vessels in the lowest quartile, while in the Bering Sea *C. opilio* fishery, average harvests of vessels in the highest quartile are between five and six times the average harvests of vessels in the lowest quartile. While catch is more consolidated in all quartiles, vessels in the highest quartile are able to amass a substantially greater portion of the total catch through quota transfers

than could be amassed under the competition of the pre-rationalization derby fisheries.

The second effect is a change in the percentage of gross vessel revenues paid to crew. In the quartile with the lowest harvests, crews in the Bering Sea *C. opilio* fishery received a comparable percentage of gross vessel revenues before and after implementation of the rationalization program. In the Bristol Bay red king crab fishery, crews in the lowest harvesting quartile have received slightly less of the gross vessel revenues than received prior to the rationalization program, but continue to receive in excess of 30 percent of the gross vessel revenues. The absence of a noticeable change in the percent of gross vessel revenues paid to crew since implementation of the program suggests that most of the quota harvested on these vessels are fished without deduction or charge of quota fees or an adjustment in crew share payments. In the second quartile of harvests in both fisheries, vessel harvests are approximately double those in the first quartile. Crew on these vessels are paid a lower percentage of gross vessel revenues (in the mid-20s on average). The combination of additional harvests and a lower percentage of gross vessel revenues results in an increase in compensation of approximately one-third over the lowest quartile. In general, this relationship continues. Vessel harvests generally increase by between 50 percent and 100 percent with each successive quartile. In addition, average crewmember compensation increases by approximately one-third on average. As a result, average crewmember pay on vessels in the highest harvesting quartile are more than double that of crew in the lowest quartile, while harvests in the highest quartile are between three and five times the harvests in the lowest quartile. Crew pay as a percentage of gross vessel revenues also declines in each successive quartile, suggesting that quota fees take an increasing share of vessel revenues as a vessel acquires additional quota to harvest. These declines result in pay to crew being over 30 percent of gross vessel revenues on vessels in the quartile harvesting the least crab and 20 percent or less of gross vessel revenues on the vessels in the quartile harvesting the most crab. Overall, these data suggest that as a vessel consolidates catch, a greater share of its harvests is subject to quota fees. The increase in catch supplements crew incomes, but at a lower rate than the vessel's initial allocation quota, which are fished with no (or lower) quota fees.

Table 8. Crewmember pay and percent of gross vessel revenues paid to crew by quartile of pounds harvested in the Bristol Bay red king crab and Bering Sea *C. opilio* fisheries (1998, 2001, 2004-2007).

Fishery	Year	Number of vessels per quartile	First quartile of pounds harvested			Second quartile of pounds harvested		
			Mean pounds harvested	Mean to single crewmember	Percent of gross to crew (including captain)	Mean pounds harvested	Mean to single crewmember	Percent of gross to crew (including captain)
Bristol Bay red king crab	1998	46	24,336	3,330	34.1	42,386	5,450	36.2
	2001	45	14,294	3,564	33.3	25,315	6,271	36.5
	2004	54/55	27,624	6,145	35.5	47,322	10,526	34.4
	2005	20/21	61,177	13,352	32.8	111,565	20,884	28.6
	2006	19/20	67,866	12,101	30.5	126,775	17,640	26.6
	2007	17/18	98,619	20,079	32.9	192,984	26,205	22.8
Bering Sea <i>C. opilio</i>	1998	39/40	533,558	14,754	37.7	925,200	21,632	35.6
	2001	39	45,411	2,510	27.4	77,238	4,722	30.5
	2004	41/42	65,903	6,477	34.2	96,395	9,663	34.7
	2005	36	84,930	7,502	32.4	122,265	11,330	36.1
	2006	18/19	152,887	7,726	30.8	308,944	10,731	22.4
	2007	15/16	185,828	15,082	32.8	351,032	20,301	24.4

Table 8, Cont.

Fishery	Year	Third quartile of pounds harvested			Fourth quartile of pounds harvested		
		Mean pounds harvested	Mean to single crewmember	Percent of gross to crew (including captain)	Mean pounds harvested	Mean to single crewmember	Percent of gross to crew (including captain)
Bristol Bay red king crab	1998	60,576	7,347	35.0	96,188	11,459	36.1
	2001	35,584	8,482	36.5	69,924	15,263	35.6
	2004	62,559	13,330	36.7	97,283	19,568	36.3
	2005	209,205	26,434	21.5	390,937	35,266	17.3
	2006	209,534	21,693	20.7	393,957	27,748	17.2
	2007	294,186	32,097	18.9	482,900	39,784	16.1
Bering Sea C. <i>opilio</i>	1998	1,214,389	27,480	35.1	1,685,001	37,263	36.9
	2001	114,553	7,099	34.0	204,786	12,703	34.5
	2004	128,889	13,027	36.3	204,208	18,266	35.4
	2005	155,342	14,165	35.7	270,019	18,408	33.8
	2006	480,274	15,223	21.8	850,049	21,625	20.1
	2007	506,536	24,619	21.3	931,170	35,267	19.5

Source: Crab Economic Data Reporting.

Notes: Pay to single crewmember is based on count of all crew paid shares excluding the captain. Excludes any vessels on which crew were paid in excess of 75 percent of the vessel's gross revenues.

While generally, the effects of the change to the rationalization program on crew have been driven by consolidation and related quota charges, it is important to recognize the effects differ across the fleet. In the most common case, crew are reported to have received historic share payments for quota received in the initial allocation by the vessel owner, supplemented with shares from the discounted base revenues on acquired quota; however, other circumstances are said to exist, which are not revealed by aggregated data. In some instances, vessel owners received little quota in the initial allocation. In these instances, crew received virtually all share payments from the discounted revenue base (i.e., after deduction of quota fees). In addition, in some instances vessel owners are reported to have charged quota fees on quota received in the initial allocation, lowering the base on which shares are calculated for all quota fished on the vessel. Depending on the level of quota fees, crew could receive substantially reduced payments from the historic shares, despite a vessel fishing mostly quota received in the initial allocation. Although some instances of crew compensation moving away from a traditional crew share format to a wage labor or salary format were reported in the first year of the program, it is believe that the most (if not all) crew in the fisheries are currently paid on a traditional crew share basis.

Overall, data and anecdotal reports suggest that remaining crew positions in the fisheries are more stable and better paying under the rationalization program. Crew typically know the amount of quota that will be harvested and terms of payment prior to beginning fishing, allowing them to project income for a season. Prior to implementation of the rationalization program, compensation hinged entirely on success in the limited access derby fishery. The consolidation of catch under the rationalization program has reportedly allowed some crew to rely exclusively on crab fishing for their incomes. Other crew are reported to work on the crab vessel in other fisheries or tendering, relying on employment from their crab fishing vessels for all of their income. Vessel owners hiring crew generally give priority to crew willing to work in all crab fisheries 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 fellow

crew. Although these benefits arise for crew remaining in the fishery, many crew have lost the relatively high paying, short term work in the crab fisheries since implementation of the program.

Leasing (and transfers) in the halibut and sablefish IFQ program

The halibut and sablefish IFQ program contains a general prohibition on leasing (or the transfer of unused IFQ). To allow for a transition, leasing was permitted during the first three years of the program. In addition, leasing continues to be permitted for freezer vessel IFQ (or effectively, catcher processor IFQ), and, for a limited period, by survivors on the death of a QS holder. With the exception of the freezer vessel fleet, the leasing prohibition could be argued to have prevented leasing from affecting crew, but consolidation through other means permitted by the program can affect crew in the fisheries in a manner similar to leasing. For example, QS holders outside of Southeast who received an initial allocation can use a ‘hired skippers’ to fish, provided the QS holder owns at least a 20 percent interest in the harvesting vessel. In some cases, QS holders are said to have joined interests to jointly own a vessel to consolidate catch on a single vessel, effectively removing a vessel from the fishery and reducing crew employment. In cases in which one owner has a minimal involvement in the management of the vessel, these arrangements are functionally leasing arrangements. In other cases, purchasers of QS have deducted mortgage payments from gross revenues prior to compensating crew, effectively reducing their crew payments, in a manner similar to a quota fee charged against leased quota.

The halibut and sablefish IFQ program includes two types of share caps to limit the extent of consolidation. These individual use caps are intended, in part, to ensure that investment in fishery resources is spread among a minimum number of persons in each management area. The second type of cap is a vessel use cap, which prevents a vessel from fishing in excess of specified amounts of IFQ. The vessel use cap is intended, in part, to ensure that a minimum number of vessels participate in the fishery in each year. In the IFQ program, the two types of caps are generally set at the same levels. In the sablefish fishery, no individual may hold or use (and no vessel may harvest) more than 1 percent of the combine QS in all areas. In addition, no individual may hold or use (and no vessel may harvest) more than one percent of the combine QS in Southeast Alaska (i.e., for harvest east of 140°W longitude) the most sought after QS in the fishery. In the halibut fishery, individual use caps prohibit an individual from holding or using (and a vessel from harvesting) in excess of one-half of one percent of the combined quota in two separate groupings of management areas (2C, 3A, and 3B is one grouping and 4A, 4B, 4C, 4D, and 4E is the other). In addition, no individual may hold or use (and no vessel may harvest) more than one percent of the QS in the eastern most management area (area 2C), where QS is most sought.

In addition to share caps, the ‘block program’ is also intended to ensure that the market for shares remains fluid and open to newcomers. Under the block program, small initial allocations of quota (which would yield less than 20,000 pounds of fish at the 1994 TAC level) are not divisible and no person is permitted to hold in excess of two blocks or one block and any other amount of unblocked quota. An exception allowed persons to “sweep up” or consolidate extremely small allocations into a single block, as long as the resulting block would yield less than 1,000 pounds of halibut or 3,000 pounds of sablefish based on the 1994 TACs.

A unique influence on crew and their treatment in the halibut and sablefish fisheries is the Deep Sea Fishermen’s Union. The union, which was founded in early 1900s, has maintained a negotiated crew agreement with the Fishing Vessel Owners Association, an organization of halibut and sablefish vessel owners. Although a large portion of the fleet and crews operate independently of the union and the vessel owners association, the union contract has served as the starting point for many crew agreements throughout the fisheries. The agreement has influenced both the structure of crew contracts and the amount of compensation. Yet, in recent years, fewer vessels are said to abide fully by the union contract. As a result, most crew are believed to be compensated at a rate lower than reflected by the union contract.

The contribution of the transition to IFQ management to the decline in effectiveness of the union in representing crew interests is not known; however, extending the seasons may have decreased the ability of crew to act collectively, as is necessary for effective collective action by the union. In addition, some crew compensation arrangements differ greatly from the union contract in structure. These variations make it difficult to generalize. Where known, these different structures are described.

To understand the effects of the IFQ program on crew, it is helpful to consider crew circumstance prior to the program. Historically, the vessel owners charged a 'boat share' (or a percentage of vessel revenues, usually about 30 percent) prior to payment of crew in the fishery. In most cases, this boat share was taken from gross revenues after deduction of certain fees, such as observer costs, fish taxes and moorage fees. The remaining amount was typically paid to crew (which may include an owner operator) after payment of operating costs, such as food, bait, and fuel. This payment system typically left crew a crew of 6 with approximately 45 to 55 percent of the gross revenues after taxes and fees. On other vessels, crew were compensated with each receiving a share of the vessel's gross revenues after deduction of expenses (including taxes, fees, fuel, and food). This individual crew shares were approximately 6 to 10 percent of the gross revenues after deduction of expenses, resulting in a slightly lower portion of the vessel's gross revenues. In the pre-IFQ derby fishery, payments to crew depended greatly on the vessel's success in the race for fish. With relatively large numbers of participants in the years immediately preceding implementation of the program, crew on the best highline vessels that participated in several management areas and in both halibut and sablefish might receive payment of approximately \$30,000 with the best payments at most \$50,000 annually. In earlier years, with fewer vessels participating, some crew would have received as much as \$80,000 annually. In all cases compensation depended on several factors, including a crewmember's experience, vessel performance, and the vessel's contract.

A few changes occurred with transition to the IFQ program (and since that transition). To consider the treatment of crew, it is helpful to first discuss crew compensation for the harvest of quota received in an initial allocation. Some vessel owners have maintained the same compensation structure under the IFQ program as used prior to the program. These vessel owners continue to charge a 'boat share' and operational cost deductions (without additional deductions for quota received in the initial allocation). In many cases, the boat share is increased to approximately 40 percent of the gross revenues after deduction of taxes and fees. In some cases, vessel owners are reported to have increased boat shares substantially beyond the 40 percent charge that is more typical. This greater adjustment effectively charges crew for the use of the quota received in the initial allocation. In other cases, some vessel owners have modified the payment structure to deduct a quota fee for the use of initial allocation quota from vessel revenues prior to paying either a boat share or crew. Although these changes in compensation did not arise from leasing, they effectively reduce revenues available to compensate crew, by charging for the use of initial allocation quota by the vessel in a manner similar to a lease fee that might be charged on quota acquired subsequent to the initial allocation. The number of vessel owners charging quota fees on initial allocations is said to have increased in recent years.

Overall, very few (if any) vessel owners are believed to compensate crew without a deduction (or adjustment) for harvesting quota that were not received in the initial allocation.⁶ In the freezer vessel fleet, where leases are allowed, lease payments are typically deducted from gross revenues in a manner similar to either fees and taxes or operational cost deductions, and in both cases, a prior to the payment of crew. In addition, throughout the halibut fleet, quota are stacked on vessels through a variety of non-lease transactions. In some cases, vessel owners purchase QS, deducting a percentage of revenues from the

⁶ In some cases, owners have sold QS in one area and used the revenues to acquire shares in another area to concentrate fishing activity. In many of these instances, the owner has considered the newly acquired QS to be effectively part of the initial allocation and has not charged a fee on the new QS.

vessel revenues in the manner of fees or taxes or operational costs prior to paying crew shares. Most vessel owners charge a fee of between 40 and 50 percent for these acquired shares. In other cases, crew who acquire quota fish that quota on a vessel for a fee, which is also deducted prior to paying crew at approximately a 50 percent rate. Fees in some cases are reported to be substantially higher than these rates – as high as 60 percent to 70 percent. These high fees are most often observed on vessels that received little or no initial allocation of QS, and therefore, have QS base to support the vessel's operation. Under some loan structures, these deductions in the first few years of the loan period are reported to be less than the full mortgage payment, as the high price of quota may result in mortgage payments that exceed the revenues until a portion of the principle is paid down.

A few observations concerning transfers of quota should be considered. Persons who received an initial allocation are better positioned in the quota market, since revenue received from initial allocation quota can subsidize additional purchases. Entrants, with no initial allocation to use as a basis to support additional purchases, are disadvantaged, and may face artificially high prices caused by this subsidization. This quota price effect also has consequences for crew, as new entrants are forced to pass on higher quota costs to crew through higher boat shares (or lower crew shares). An additional feedback has likely arisen in some parts of the fleet. As more newcomers charge quota fees (or pay reduced crew shares), crew compensation rates decline. This decline may affect the crew market, increasing the willingness and ability of recipients of initial allocations to charge quota fees on initial allocations (or increased boat shares). The result is a decline in crew compensation across a larger part of the fleet, than simply on those vessels bearing additional quota costs.

A more recent practice has been for vessels to consolidate catch through contracting "walk-on" QS holders (or QS holders who come on board a vessel while their IFQ is fished, thereby satisfying owner-on-board requirements). In some cases, these walk-ons crew on the vessel; in others, they simply ride along on board the vessel during the trip. Lease fees are typically charged on the shares of walk-ons in the manner and amounts of other QS that was not received in the initial allocation. Whether a walk-on works on the vessel can depend on both whether the walk-on is interested in crewing and whether crew would be displaced by the walk-on. Working walk-ons are typically compensated in the manner of other crew.

Beyond the norm, some vessels have changed crew compensation terms entirely from the crew share arrangement that dominated prior to the IFQ program. In some instances, crew are compensated a flat amount per thousand pounds of catch. Payments are believed to range from \$150 per thousand pounds to \$250 per thousand pounds. Depending on the rate and ex vessel prices, this compensation can be more or less generous than the more standard crew share structure. Compensation at the low end of the scale is likely comparable to shares paid to crew with substantial lease (or mortgage) fees, while compensation at the high end of the scale is comparable to payment of crew on vessels with a reasonable initial allocation and more generous crew share.⁷ As with other participants, crew that bring quota to a vessel receive separate compensation for those shares, improving their return from the fishery.

Crew circumstances differ greatly across the fleet, with the variety of arrangements. Most vessels that concentrate on halibut and sablefish fisheries that received a reasonable initial allocation tend to have good crew who are satisfied with their compensation. Some crews, however, are discouraged with additional quota fees that have been introduced on initial allocation quota in recent years. Vessels that fish a variety of fisheries other than halibut and sablefish (such as seine vessels) may charge higher lease fees on QS on average, but most tend to have good crew that are satisfied with their compensation. Crew

⁷ In rare cases, some vessels fishing IFQ are reported to pay crew a daily wage, rather than a crew share as is typically paid. These payment arrangements are believed to be among the poorest crew compensation in the fisheries.

compensation (and satisfaction) tends to be lowest on vessels that received little in the initial allocation and have little reliance on other fisheries. In general, the high costs of QS cut into crew payments on these vessels. Despite these costs, some vessels have entered the fishery and have managed to put together a reasonable portfolio of shares and have maintained good crew.

Under the all of various crew payment structures, crew shares, as a percentage of gross revenues, are reported to have declined since implementation of the IFQ program. On an average vessel crew shares have fallen by approximately 10 percent of gross revenues. Despite this decline, the annual income of a typical crewmember is said to have increased substantially, with the consolidation of quota on fewer vessels and the increases in halibut prices. It is said that a typical crewmember now makes between two and three times the income of a typical crewmember in the years immediately prior to implementation of the IFQ program. Although this describes the norm in the fisheries, some crew are reported to have seen a large drop in their shares of revenues under the program. These drops are typically seen fishing for a vessel owner who received little in the initial allocation, who therefore must support mortgage payments from vessel revenues. Some opportunistic vessel owners have also used the IFQ structure to increase their return from the fisheries through reducing crew shares. These vessel owners typically have less reliable crew, but are able to continue in the fisheries.

Table 9. Halibut fishery vessel participation, catch, price, and revenue per vessel (1992-2008).

Halibut									
Year	1992	1993	1994	1995	1996	1997	1998	1999	
Number of vessels	3,452	3,393	3,450	2,057	1,962	1,925	1,601	1,613	
Catch (lbs)	51,829,522	48,136,903	44,449,185	32,502,416	35,567,687	49,312,973	51,405,493	56,436,529	
Catch per vessel	15,014	14,187	12,884	15,801	18,128	25,617	32,108	34,989	
Price (\$/lbs)	0.96	1.23	1.93	1.97	2.19	2.13	1.29	2.00	
Revenue per vessel (\$)	14,417	17,391	24,841	31,185	39,754	54,472	41,310	69,803	

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number of vessels	1,586	1,460	1,393	1,338	1,304	1,276	1,255	1,211	1,156
Catch (lbs)	51,769,153	55,758,769	58,122,339	57,411,780	57,264,375	56,976,000	52,906,045*	50,155,033*	47,321,739
Catch per vessel	32,641	38,191	41,725	42,909	43,914	44,652	42,156	41,416	40,936
Price (\$/lbs)	2.52	1.99	2.19	2.84	2.97	3.00	3.75	4.33	
Revenue per vessel (\$)	82,137	75,905	91,357	121,845	130,371	134,114	158,009	179,249	

Source: NMFS/RAM catch data.

Table 10. Sablefish fishery vessel participation, catch, price, and revenue per vessel (1992-2008).

Sablefish									
Year	1992	1993	1994	1995	1996	1997	1998	1999	
Number of vessels	1,166	969	1,191	616	565	530	477	463	
Catch (lbs)	48,400,987	49,313,981	44,827,268	40,935,864	33,196,479	28,651,250	27,636,101	25,410,370	
Catch per vessel	41,510	50,892	37,638	66,454	58,755	54,059	57,937	54,882	
Price (\$/lbs)	1.89	1.67	2.36	3.23	3.30	3.53	2.34	2.83	
Revenue per vessel (\$)	78,454	84,989	88,826	214,647	194,067	190,828	135,573	155,316	

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number of vessels	450	436	416	409	396	378	372	373	362
Catch (lbs)	27,624,505	26,355,159	27,091,941	30,838,900	33,695,316	35,765,226	30,849,437	30,080,328	26,872,648
Catch per vessel	61,388	60,448	65,125	75,401	85,089	94,617	82,929	80,644	74,234
Price (\$/lbs)	3.04	3.04	3.06	3.46	2.95	3.14	3.33	3.10	
Revenue per vessel (\$)	186,680	183,821	199,282	260,887	251,013	297,381	276,152	249,997	

Source: NMFS/RAM catch data.

While individual and vessel use caps in the fishery have prevented consolidation by their terms, quota prices are considered very high in the halibut and sablefish fisheries. High prices have a clear effect on crew, who in most payment arrangements are paid after a deduction for quota not received in the initial allocation. Strong operations (particularly those that received a sizeable initial allocation) are reported to have well-paid and well-qualified crew. Yet, at the fringe, vessel operators with little initial allocation to rely on and little support from other fisheries may have more difficulty maintaining a good experienced

crew, because of the operating expense of acquiring quota. Owner on board requirements and limits on hired skippers have also changed the nature of the fishery for some participants. In some cases, participants have worked around these rules by partnering in vessel ownership or other unorthodox arrangements, such as walk-on agreements. In addition, exempting recipients of an initial allocation from the owner on board requirement has limited the effect of that provision to some extent.

The block program has also ensured that small amounts of quota are available for entrants (particularly crew who wish to become quota holders). While facilitating small scale entry, these small blocks (and the limits on block and unblocked share holdings) can complicate efforts of participants to increase their interests in the fisheries.

The burdens of quota fees on crew have also changed the nature of the fishery for crew. In the past, a substantial number of crew could participate in the fishery strictly as crew, and without investment in the fishery. Those wishing to evolve into an owner could invest in the fisheries through acquisition of a portion of a vessel (and possible licenses used to support activities in limited entry fisheries). Under the IFQ program, crew without quota have their share reduced by charges for quota held by both the vessel owner and other crew. These new charges have increased the incentive for crew to purchase into the fishery by acquiring quota. Crew who hold no quota are less attractive (as a crewmember) to the vessel owner than a potential crewmember who holds quota. In addition, a crewmember without quota will receive less income from the fishery than crew who hold shares, as they may see their crew compensation reduced to support quota holdings of others.

Leasing (and transfers) in the Bering Sea pollock fishery

The American Fisheries Act (AFA) introduced a share-based management program to the Bering Sea pollock fishery. Catcher processor fishing under the program began in 1999, while catcher vessel fishing under the program began in 2000. Under the program, each eligible vessel is annually eligible to join a cooperative, which receives an exclusive allocation of pollock to be harvested collectively by its members. A cooperative's allocation is determined base on the harvest histories of its members. Eligible vessels that choose not to join a cooperative are permitted to fish in a limited access fishery, which is prosecuted as a derby fishery. The management and allocations are structured on a vessel basis. To participate, a person must own an eligible vessel. While annual allocations to a cooperative are divisible and may be exchanged within and among cooperatives in a sector, long term interests are not divisible and are associated with the eligible vessel. So, to enter the fishery a person must acquire one of the eligible vessels (or an interest in an eligible vessel).

The effects of the AFA management on crew have been notably influenced by a few structural aspects of the program. By maintaining a vessel-based system of eligibility and allocations, the program has limited the transfer of both long-term and annual allocations. Since long term interests are not divisible, entry generally requires a large scale purchase. Maintaining large scale units has limited the number of transfers. By keeping the interests large and indivisible, only crew that have a goal of developing into a full scale owner have an incentive to invest in the fishery. This structure (together with the industrial nature of the fishery) has created a clearer division between owners and crew in the fishery, than exists in programs that included smaller allocations and allow for greater divisibility of long term shares. The vessel-based structure has also likely dampened the extent of transfers of annual allocations. Since a vessel must be owned (and maintained in existence) to receive an allocation in the fishery, few vessels (particularly catcher vessels) have been removed from the fishery. TAC increases and the redistribution of the TAC among sectors that followed the implementation of the AFA also limited the incentive to consolidate in the catcher vessel sector. Under the AFA, catcher vessels (including those delivering their catch to motherships) are allocated 60 percent of the pollock TAC. In the years immediately preceding the AFA, catcher vessels harvested less than 45 percent of the TAC. The TAC in the fishery also increased to

historic highs immediately following the implementation of the AFA. These two factors also reduced the incentive for participants to consolidate catch on fewer vessels. Despite the nature of the pollock fishery and share structure of the AFA, transfers have occurred and continue to occur in the fishery. Since vessel transfers require large investments, most acquisitions have been by well-funded investors, including Community Development Quota (CDQ) groups. These acquisitions have resulted in consolidation of ownership in the fisheries. With ownership consolidation, some consolidation of fishing has occurred, but not to the extent observed in most other share-based fisheries (see Table 11).

Table 11. Number of catcher vessels, catch, and revenue in the Bering Sea pollock fishery (1997-2007).

pollock						
Year	1997	1998	1999	2000	2001	2002
Number of catcher vessels	104	99	113	99	106	97
Catch (1,000 mt)	498	495	544	615	746	799
Catch per vessel (mt)	4,788	5,000	4,814	6,212	7,038	8,237
Ex vessel price (\$/lbs)	0.102	0.070	0.096	0.118	0.109	0.116
Revenue per vessel (\$)	1,076,778	771,610	1,018,876	1,616,039	1,691,178	2,106,507

Year	2003	2004	2005	2006	2007
Number of catcher vessels	91	93	90	90	91
Catch (1,000 mt)	808	792	797	798	722
Catch per vessel (mt)	8,879	8,516	8,856	8,867	7,934
Ex vessel price (\$/lbs)	0.107	0.106	0.125	0.128	0.129
Revenue per vessel (\$)	2,094,515	1,990,114	2,440,370	2,502,074	2,256,396

Source: NMFS Economic SAFE (2001-2008).

Note: Catch and prices includes non-target catch, which is less than 1 percent in any year, and CDQ catch.

Leasing under the AFA management has occurred in a few different ways, often differing with the owner's circumstance. In some circumstances, an owner of multiple vessels (or a group of vessel owners) has elected to remove a vessel from the fishery, transferring its quota to other vessels in its cooperative. In some cases, the available quota may be used to top off loads or to prevent overages. In some cases, the vessels are retired altogether (but tied up to maintain their interest in the AFA fishery); in other cases, the vessels are used in other fisheries. In cases of the owner of a single vessel, the annual allocation from the removed vessel is often transferred through a market lease. Market leases rates vary with seasons and may vary across participants. Reliable information concerning specific lease rates is unavailable. In cases of vessels owned, in whole or in part by a processor, the annual allocation may be transferred to other vessels in the processor's cooperative at below market rates. Processors may use these leases to coordinate fleet activity and maintain timely landings at their plants. Overall, lease arrangements are generally unique to the owner and vary across participants.

Prior to implementation of the AFA crews were compensated through a typical crew share basis under which a crew share percentage is applied to vessel revenues after deduction of expenses. On most vessels, this compensation system has been maintained since implementation of the AFA. In rare instances, some owners are reported to have changed crew compensation from a crew share system (such as a wage type system) since implementation of the AFA. Crew share percentages are typically applied after deduction of expenses, which differ across the fleet. For example, in a few instances, fuel costs are not deducted to limit the incentive to save on fuel costs at the expense of fish quality. Lease costs are typically charged as deductions prior to payment of crew shares.⁸ In addition, in the case of some vessel transfers, it is reported that an ownership fee may be deducted prior to payment of crew shares. Also, for companies that

⁸ In at least one instance, it is reported that a vessel owner compensated crew with a portion of lease revenues after transferring an annual allocation to another vessel for harvest; however, this compensation is extraordinary.

employ vessel managers, a vessel management fee may be deducted. These types of fees are reported to have increased with the increase in ownership consolidation in recent years. It is also reported that in many cases, crew share percentages have declined since implementation of the AFA. Although these changes typically accompany changes in ownership, the reduction in crew share percentage is reported to be fairly common throughout the fleet.

Despite changes in crew share percentages and increases in deductions for leases, vessel ownership, and management fees that pervade the fleet, annual crew compensation has not declined under the AFA. Good, experienced crew receive upwards of \$100,000 in annual income. In the first few years after implementation of the program, annual crew compensation is reported to have risen with increases in ex vessel prices and TACs and the greater share of the TAC allocated to catcher vessels. With the recent decline in TACs, annual crew compensation is reported to have dropped to levels comparable to pre-AFA years. Despite any changes in crew shares and compensation, AFA crew jobs remain coveted. Under the AFA, allocations improve employment certainty and improve crew jobs by allowing participants to slow their rate of fishing. Crew positions are generally long term jobs with a high degree of professionalism and little turnover.

Conclusion

A change to a share-based management program will have consequences for crews in a fishery. Most often, fleet contraction that is induced by the transition reduces the number of crew positions (although some remaining vessels may choose to employ more crew to reduce the burden arising from increasing vessel harvests). Fleet contraction may be limited directly by capping the amount of quota that may be fished by a vessel, or indirectly by making allocations to vessels, thereby requiring that a vessel be maintained to participate in the program. Each of these mechanisms comes with consequences for both crew and other stakeholders in the fishery. For example, vessel caps will prevent not only the possible negative effects of fleet consolidation on crew who lose their positions, but may also limit the extent to which vessel owners and remaining crews benefit from the production efficiencies that can arise from that consolidation. Similarly, making allocations to vessels (instead of share holders or license holders) may require vessel owners to incur added expenses associated with maintaining a vessel to receive the allocation, even if the vessel is not used in the fishery. So, while these provisions may bring benefits, those benefits need to be weighed against the costs that would arise in their absence.

In considering the source of effects of share-based management programs on crew and whether certain measures may mitigate negative effects, it is helpful to consider the markets that drive those effects and how those effects may evolve. From the outset, much of the change is driven by share holder decisions. Fleet contraction, undertaken to reduce costs, typically creates a surplus of crew. The fleet contraction arises through competition among vessels to acquire and harvest quota in the fishery. This vessel competition defines the remaining fleet. Historic participants that receive a large initial allocation are clearly advantaged in the competition, as their purchases may be subsidized by revenues from shares received in that allocation. Crewmembers with experience on one of these remaining vessels often retain their positions, because of their experience and relationship with the vessel. This pattern may provide a benefit to remaining crew, as established relationships (including crew share contracts) typically are the starting point for defining vessel owner/crew relationships going forward. Many crews receive their historic share percentages on quota received by the vessel owner in an initial allocation. For any shares acquired by the vessel (whether leased or purchased), quota fees are typically deducted from revenues prior to applying crew share percentages, reducing crew payments for harvest of these acquired shares. On many vessels, crew accept these deductions without question, as acquired quota come to the vessel at a lease or mortgage cost. Crew on vessels with a reasonably sizeable initial allocation may view their compensation for harvesting these acquired shares as a windfall, above and beyond their expected annual income.

On vessels that fish little initial allocation quota, the circumstances often differ. On these vessels, deducting quota charges prior to applying crew share percentages may substantially reduce the crews' share of the vessel's gross revenues on all harvests. In some cases, owners facing these quota costs may reduce the crew share percentage or change the structure of crew payments altogether (to daily or annual payments or payments per pound of catch), rather than deduct quota fees. Crew on vessels that fish little initial allocation quota may be dissatisfied with the change in compensation. If the fleet has seen substantial contraction, the crew may have little or no leverage to negotiate higher payments. These crew are likely to receive a substantially lower percentage of gross vessel revenues than prior to implementation of the share based program. Despite quota fees or changes in compensation structure, some of these crews may receive greater annual compensation under share-based management, if the positive effects of ex vessel prices increases or increased catch on a vessel exceed the negative effects of any quota fees or compensation structure changes.

In time, the harvest of most quota will be subject to fees that effect payment of crew. Transfer of interests in quota will occur (either gradually or rapidly depending on the rules governing those transfers). Even if all quota is not transferred, a shift in the crew market may occur. The additional fees charged by some share holders based on their quota costs could induce a change in payment to all crew, as vessel owners become aware of the reduced payments to crew across the fleet. So, even vessel owners that do not have quota costs may consider changing their payments to crew based on the perceived willingness of other crews in the fishery to accept reduced compensation.⁹ In short, transfer costs may be expected to change the overall market for crew jobs. The spread of these additional charges may affect the crew market generally by emboldening share holders who do not have quota costs to charge quota fees (or reduce crew shares). Although this trend may be suggested by experiences in transition of share-based management programs, the extent to which crew pay changes will depend on the characteristics of that labor market.

The crew labor market may sustain added deductions or charges in the form of quota fees, if crew pay has declined across a substantial part of the fleet. On the other hand, it is possible that resistance to these charges by qualified crews could limit the ability of vessel owners to impose these costs, if those crews are difficult to replace. In these circumstances, if vessel owners are unable to hire crew that they find acceptable, it may necessitate an increase in crew pay. For example, some vessel owners are reported to have shifted from crew share payments to other arrangements with lower pay shortly after implementation of a share-based management program. In some cases, it is reported that vessel owners moved back to a share-based pay (or increased pay to crews), after crews walked off and owners were unable to find acceptable crews. As information concerning failed attempts to reduce pay becomes known across the fleet, it is possible that others can be deterred from attempting to make similar reductions in crew payments. The potential for this type of walk off to be effective will depend on the availability of qualified crews, which can be influenced by several factors. At the time of a large fleet contraction, it is likely that many crew will be available to work in a fishery. As time passes, displaced crew will move on to other work providing greater potential for remaining crew to assert bargaining leverage against vessel owners. In addition, collective action by crews may influence pay if those actions limit the availability of replacement crews. The effectiveness of these acts will clearly depend on the circumstances.¹⁰ The overall effect on the market will depend on several factors, some of which may mitigate perceived negative effects on crew. The degree of fleet contraction and changes in timing of fishing (including extension of

⁹ Some may view charging crew for quota received in an initial allocation as unfair. Yet, it is unclear why persons who sell quota received in the initial allocation should reap the entire windfall from their shares, while persons who maintain a vessel and fish their own share holdings should receive less return from their shares (or have an obligation to share that return with crew).

¹⁰ For example, more temporal distribution of fishing (which may be induced by share-based management) and widespread geographic distribution of crews and vessels may limit the ability of crews to organize.

the fishing season) can affect not only the number of crew demanded in a fishery, but also the characteristics of desirable crew. For example, in extended crab fishing seasons the ability to work extremely long hours without rest (once highly valued in the derby fishery) might be of less value relative to reliability and willingness to work on a vessel through all of its fishing operations. These changes in demands on crew (and any associated change in risks) may also drive some changes in crew compensation.

In considering regulatory measures to curtail the effects of transfers (including leases) on crew, it is helpful to consider the effects of those measures on the market for crew and the transition of that market. Certain factors can affect the level and rate of change in the crew market in the transition to share-based management. For example, the rapid and extreme change in the crew market in the crab fisheries arose primarily from the rapid consolidation. Rapid fleet contraction created a surplus of qualified crew and a dearth of crab vessels on which to work. In this environment, a vessel owner whose crew turns down an offer of reduced pay may have alternative crew to offer positions. In addition, transfer of quota may induce owners of remaining vessels to offer a lower percentage of gross vessel revenues to crew, as the removal of value from the fisheries by payments to inactive quota holders in the fishery leaves less revenue for the owners of active vessels. Limits on consolidation would have slowed the rate of crew job losses, but also might have reduced the rate of change of crew pay (as a percent of vessel revenues) by decreasing the surplus of available crew and decreasing the downward pressure on crew pay that arose from the quota costs of vessels that consolidated shares to harvest. Whether a consolidation limit (or vessel cap) can prevent this effect in the long run is uncertain. In the long run, all quota are likely to have been transferred (as opposed to leases of annual allocations). These transfers may induce additional quota charges against crew pay by persons acquiring that quota. Whether these charges against crew pay can be resisted depends on the availability of qualified crew willing to work at the lower pay rate.

Attaching share privileges to vessels, as done by the AFA pollock cooperative program, may have a similar effect to vessel caps. Requiring a person to maintain a vessel to receive an allocation may have led more vessel owners to continue to participate, thereby slowing consolidation in the fishery. Slower consolidation may have reduced the pressure on (and ability of) participating vessel owners to reduce crew pay (as a percent of vessel revenues) by keeping crews active. Whether this effect will persist is uncertain, since vessel owners might be inclined to tie up vessels or deploy them in other fisheries, if that provides a greater return from their interest. Once a vessel is removed, it is likely that quota fees will be charged for the use of the vessel's allocation, which will have a similar effect to leasing. Yet, these vessel based allocations might soften the transitional effects by reducing the rate of consolidation (and the effect of related quota fees on crew pay).

While short run effects of these measures may be desirable, it is also important to consider long run effects. Although consolidation under share based management has reduced pay to crews as a percentage of revenues, it is important to keep in mind that in some instances (including in the crab fisheries) individual crew pay may increase with consolidation. This occurs if the effect of additional vessel revenues on crew pay outweighs the decline in crew pay arising from quota fees (or the transfer of value to share holders prior to paying crew). These two competing effects should be considered when developing a program (including measures intended to prevent consolidation and other effects that could change crew labor markets). For example, limits on consolidation may limit the effect of the share-based management program on crew employment, but it may also limit potential production efficiency benefits from retirement of vessels. If quota fees are likely to be charged against crew in the long run, the efficiency benefit of allowing consolidation could lead fewer but better paying crew jobs.¹¹

¹¹ Programs that include the auctions of shares should also be carefully evaluated, as auctioned shares will remove the resource value of the fishery for the public. If implemented comprehensively from the start of a program, an

Many stakeholders support owner on board (or active participation¹²) provisions as a means to protecting crew interests. This position is based on a belief that a participating crewmember will have a better perspective of fairness and better appreciation of work on a vessel and therefore will reward crew with better pay. Whether this belief is well-founded is not known. It is possible that this motivation may exist, but it is also possible that share holders confronted with quota costs will view it as necessary to pass on a portion of those costs to crews. Owner on board requirements may also lead to a faster transition, as share holders unwilling to comply with on board requirements will divest of their holdings. These transfers could shorten the transition period, during which a portion of the quota pool is fished without quota fees. Owner on board (and active participation) provisions, however, also serve another social or cultural purpose by requiring share holders to maintain a particularly connection to a fishery. These social effects arise independent of any possible effect on crew.¹³ In considering owner on board requirements, it is important to consider the effect of that requirement on the character of the fishery. As shares transition among holders, it is possible that two types of crew may develop in a fishery, those holding shares and those without shares. Share holding crew may have a very different standing in the fishery, than crew who hold no shares. In this environment, it is possible that the management program is inducing persons to invest in the fishery by buying shares who might otherwise avoid risks and costs associated with those purchases. On the other hand, creating an environment in which crew have the ability to protect their positions through an investment in the fishery may be desirable. Making certain that share holdings are of appropriate size is important to having such measure achieve this purpose. In considering owner on board requirements, any action should strive to appropriately weight the different interests at play.

Similarly, some stakeholders support vessel ownership requirements that require a share holder to own a threshold interest in the vessel that harvests any held shares. These direct ownership requirements may be characterized by some as a prohibition on leasing. Alternative measures could require a person to hold a threshold interest in a vessel active in a fishery in order to maintain share holdings. This type of requirement may could be used to achieve a similar objective to owner on board (or active participation requirements), but it is unclear whether the requirement would benefit crews.¹⁴ The measure may be desirable, particularly if used in tandem with an active participation requirement, for ensuring that share holders maintain an interest in the fishery beyond their quota holdings (through either vessel ownership or active participation on a vessel in the fishery). Yet, vessel ownership requirements might be ineffective, as share holders may choose to simply maintain a paper interest in a vessel. That interest may expose the

auction that recovers a large share of the resource value will remove that value from a vessel's revenues. A share of this cost is likely to be passed on to crew immediately through quota fees. The change in crew pay may be more rapid than the effect in the crab fishery, under which many recipients of initial allocations appear to deduct no quota fee on shares received in the initial allocation. In the long run, the differences in crew effects of auctions and allocations based on history are likely to be minimal, as all vessels are likely to adjust crew pay based on quota costs. Implementing an auction in a limited way or after an initial adjustment period, however, would allow time for the fleet to adjust and crew labor markets to stabilize.

¹² Active participation requirements may require a share holder to participate in the fishery in a prescribed manner (typically on board a vessel) but do not require a person to be on board a vessel for harvest of all shares held by that person. Active participation provisions may be favored in fisheries in which an owner on board requirement is impractical. For example, in industrial fisheries (like the crab fisheries), all vessels may not participate in all fisheries in all years, as TACs fluctuate. A person may be active in several of the fisheries, but not be active in all fisheries, thereby meeting the spirit (but not the letter) of an owner on board provision. In such fisheries, it may be more appropriate to apply active participation requirements, than owner on board requirements.

¹³ Even these effects might be subverted, by persons comply the rule by being on board the vessel when shares are harvested, but have no active role in the harvest of the fish. This practice is burdensome and is likely adopted by only a small minority of share holders.

¹⁴ It is possible that the requirement could be costly to crews in some instances, if quota holders are required to expend additional amounts on vessel ownership that are passed on to crew through increased quota fees.

share holder to liability in certain situations, but the involvement in the fishery would not approach the vessel management interest that is likely the rationale for behind the policy.

Transfers of shares (including transfers that might be characterized as leases) typically occur under avenues permitted in all share-based management programs. Evidence from fisheries in the North Pacific suggests that constraints on transfers are effective, but only to the extent of their terms. More stringent limitations have a greater effect, but cannot close all transfer avenues, including some avenues that may be intended to be closed. Whether the limits are serving their purpose depends on the objective of the decision maker and the creativity of fishery participants in working within the rules. For example, owner-on-board requirements have fostered a system of “walk-on” share holders, who at the extreme may simply ride along on a vessel while their quota is harvested by hired crew. Although each share holder requirement or limitation will affect the actions of share holders, the result may not be the one intended by the policy maker. To the extent that rules affecting transfers are intended to affect crew pay, those rules are particularly uncertain, since these rules effect crew markets only indirectly. In addition, effects are difficult to predict because of the vagaries of crew labor markets, which often overlap not only with other fishery crew markets, but other labor markets.

In considering measures to constrain transfers (or share holdings) and fleet consolidation in a share based management program, it is helpful to consider the markets in which the effects of those constraints are manifest. Primary effects will arise in the market for shares; secondary effects will be in the crew labor market. The interaction of these markets, as constrained by governing rules, will determine the effects of the program on crew. The quota markets between share holders and vessel operators will affect the extent of quota fees deducted or charged against crew compensation in the fisheries. Constraining these markets for a period of time may ease transitional effects, such as a rapid decline in crew jobs or the charging of quota fees on a large portion of the harvest at the onset of a program. These measures may, in turn, provide for a more orderly transition of crew markets, as crew unable to secure a position or unwilling to accept changes in terms of employment depart the fishery over time. In addition to slowing the rate of change in the transition crew compensation may be affected in the long run by limiting the amount of surplus crew competing for jobs during the transition. In other words, remaining crew may have improved negotiating leverage, if fewer displaced, experienced crew are available for remaining jobs at any given time. Even with measures to limit the shock of a transition, crew pay in the long run will depend primarily on the ability of crew to command pay based on skills needed to prosecute the fisheries and the competition for crew positions. In considering the development of a share based management program and the adoption of measures intended to improve crew circumstances, the presence of crew market (and the limits on ability of regulatory measures to control that market should be considered). The competing effects of these measures, including their effects on factors other than crew, should be carefully considered in evaluating the benefits and costs of the measures and their appropriateness for a fishery.