

CHANGES IN FLEET CAPACITY FOLLOWING THE INTRODUCTION OF INDIVIDUAL VESSEL QUOTAS IN THE ALASKAN PACIFIC HALIBUT AND SABLEFISH FISHERY

M. Hartley and M. Fina
Northern Economics
880 'H' Street, Suite 210
Anchorage, AK 99501
<MarcusH@norecon.com>

1. INTRODUCTION

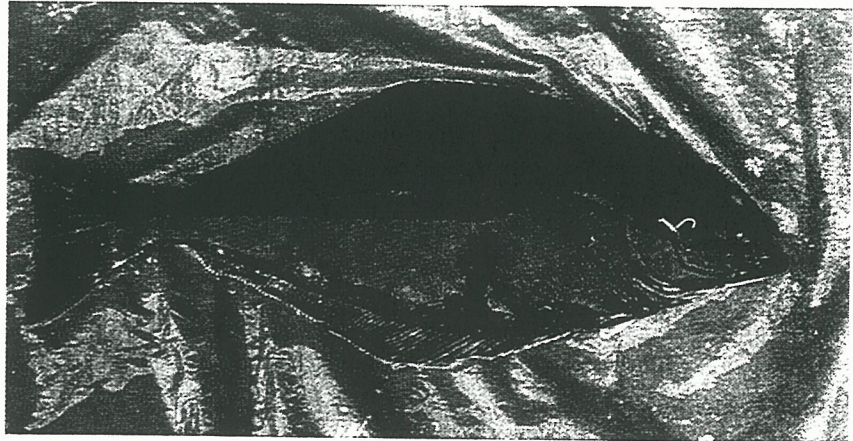
In 1995, the federally-managed commercial long-line fisheries for Pacific halibut (*Hippoglossus stenolepis*) and sablefish (*Anoplopoma fimbria*) in the U.S. North Pacific moved from open-access management with limits on the Total Allowable Catch (TAC) to management systems with individual fishing quotas (IFQs). At that time, the halibut fisheries had the greatest number of participants of any fishery managed with individual quotas. This paper examines the halibut and sablefish fisheries and the consequences of the change in management. This is the second of two papers that examine the IFQ system in the U.S. North Pacific halibut and sablefish fisheries. The first paper discussed the circumstances leading up to the IFQ programme, the development of the IFQ programme, and the initial allocation of interests in the fisheries under the programme. This second paper provides a more quantitative examination of effects of the IFQ programme, including participation levels, fleet consolidation, and other changes that have resulted from the IFQ programmes.

The transition from open-access to IFQs was a long, arduous process marked by periods of progress, followed by periods of retreat, eventually leading to approval and implementation of an effective programme. To develop an understanding of the subtleties of the IFQ programme, it is necessary follow a path similar to the path of the IFQ policymakers - taking several steps forward, then stepping back for a fresh perspective. The complexities of the open-access and IFQ-management regimes and the often-conflicting goals and objectives of the involved policy-makers complicate the task of describing programme processes and results. To aid readers in keeping important contextual information in mind as new concepts or data are introduced, this document is repetitive at times. It is hoped that readers already familiar with Alaska's sablefish and halibut fisheries, or the IFQ programme and its implementation, will not be disturbed by this necessary repetition.

2. BACKGROUND - THE PRE-IFQ FISHERY

2.1 Brief history of the halibut fishery

Alaska halibut and sablefish fisheries are regulated by similar IFQ programmes that were developed as by a single process. The fisheries differ both historically and in the manner of prosecution but in general have a high degree of overlap. This section describes the two fisheries before IFQ programme implementation, the development of the programme, and the initial allocation. The section begins with a brief historical description of the two fisheries and then describes management of the fisheries leading up to the IFQ programme, including some of the conditions that led to the IFQ programme.



Pacific halibut (*Hippoglossus stenolepis*)
can grow 260cm in length and 350kg. Oldest reported age is 42 years.
Photo: International Pacific Halibut Commission

The IFQ programmes regulate the halibut and sablefish fixed-gear fisheries. Both are primarily long-line fisheries, although some other methods are used¹. Understanding the differences and similarities between the fisheries are critical to understanding the IFQ programmes.

The halibut fishery developed earlier than the sablefish fishery. Halibut have been harvested commercially since the late 1800s. The fishery occurs relatively close to shore, as halibut can be caught in waters as shallow as 90 feet. Prior to the IFQ programme, the fishery was managed with TAC limits and season limitations. A combination of factors led to the fishery to becoming a part-time, supplemental fishery, drawing fishers from other fisheries during slow seasons. Gear for targeting halibut is relatively inexpensive, allowing fishers to enter the fishery at little cost. Seasons were timed to limit the conflict with other fisheries, so fishers were able to participate without sacrificing time in other fisheries (IPHC 1987).

The increasing number of vessels participating in the halibut fishery resulted in shorter and shorter seasons, even in periods when the TAC of halibut remained steady or increased. Short seasons for halibut limited fishers' ability to target halibut full-time. By the time that the IFQ programme was instituted, the season had been reduced to 24-hour periods in many regulatory areas (Pautzke and Oliver 1997). The inability of halibut fishers to earn their total income from the halibut fishery is reflected in catch statistics from the fishery. Between 1984 and 1990, each year an average of 3275 vessel-owners participated in the halibut fishery. An average of 70% of all vessel-owners who made landings of halibut in these years also made landings of other species. During the same years, less than 25% of the total revenue earned by vessel-owners with halibut landings was attributed to halibut.

Traditional measures of fishing capacity can be inappropriate when applied to a supplemental fishery. Before IFQs, the halibut TAC would have been harvested in a matter of days. This circumstance should not be taken as an indication of over-capacity in the halibut fishery because most of the resources employed were also used in other fisheries when the vessels were not targeting halibut.

2.2 History of the sablefish fishery

The sablefish fishery is farther offshore than the halibut fishery and this species is caught in waters 1200 to 3000 feet deep. Before 1976 (when Exclusive Economic Zone - EEZ - waters were extended to the current 200-mile limit), the Alaska sablefish fishery was dominated by foreign fleets. After extension of EEZ waters, the fishery evolved into a domestic fishery. In 1987, foreign harvests ended by regulation. By that time, domestic harvests had grown to a level equal to historic highs of the foreign fleet. As with halibut, sablefish does not have a history as a full-time fleet supporting a tenured fleet. Unlike halibut fishers, a few fishers have made a living targeting sablefish. Most of these fishers operate vessels 60 feet or more in length, enabling them to fish in less protected areas, particularly the Aleutian Islands and the Bering Sea².

The activity of sablefish fishers in other fisheries demonstrates the fishers' reliance on other fisheries. From 1985 to 1990, at least 95% of vessels with commercial sablefish landings had landings of other species and on average, generated 65% of their income from other fisheries. While data indicate that the typical sablefish fisher relied more heavily on sablefish than the typical halibut fisher relied on halibut, sablefish fishers were clearly very active in other fisheries.

The composition of the sablefish fleet was also somewhat different from the halibut fleet, with sablefish vessels tending to be larger on average than halibut vessels. From 1985 to 1990, the number of active sablefish vessels increased from 371 to more than 800. Between 1985 and 1990 an average of more than 20% of the sablefish fleet consisted of catcher-vessels greater than 60 feet in length, compared to an average of 5% in the halibut fleet. In addition, an average of 2.5% of the sablefish fleet consisted of freezer-vessels. During the same years, catcher-vessels greater than 60 feet in length and freezer-vessels harvested a combined average of 53% of the total sablefish harvest, compared to 28.5% of halibut harvests.

2.3 Halibut and sablefish fisheries management

In 1976, the *Fishery Conservation and Management Act* (now known as the *Magnuson-Stevens Fishery Conservation Act*) established the current management-regime for fisheries in U.S. EEZ waters (waters between 3 and 200 miles of the coast). The regime called for creation of the North Pacific Fisheries Management Council

¹ In the halibut fishery other hook-and-line methods are used. In the sablefish fishery some pots are used.

² Vessels more than 60 feet in length are prohibited from fishing salmon, thus limiting alternative fisheries for large sablefish vessels.

(NPFMC)³ which is tasked with making management recommendations to the U.S. Secretary of Commerce. Measures approved by the Secretary become binding regulations that are implemented by the National Marine Fisheries Service (NMFS)⁴. Management of sablefish and halibut fixed-gear fisheries in EEZ waters is under this regime⁵. While both fisheries are managed by NMFS and NPFMC, halibut TACs are determined by the International Pacific Halibut Commission (IPHC), a commission created by a treaty between the U.S. and Canada to coordinate regulation of the North American Pacific halibut fishery (Pautzke and Oliver 1997). Further information is given in Hartley and Fina (2001).

3. THE IFQ PROGRAMME AND INITIAL ALLOCATION

3.1 Introduction

The IFQ system substantially changed rights in the fisheries. At commencement of the programme, NMFS issued quota shares (QS) to fishers for each regulatory area of each fishery. At the beginning of each season, the TAC for each regulatory area of each fishery is determined⁶. The holder of QS is entitled to a portion of annual TAC in the applicable regulatory area. This annual allotment is referred to as the fisher's IFQ and is the weight⁷ of the fisher's permitted catch for the year. The amount of IFQ is equal to the area TAC multiplied by the fisher's QS, divided by the total QS pool in the area. IFQs may be fished at any time during the open-season. Under the IFQ programme, an extended season, which begins March 15 and ends November 15, was established. Unused IFQ amounts cannot be retained for use in a future year. On the other hand, recognizing that unintentional overages can occur, over-harvests of up to 10% of a fisher's IFQ are addressed by a reduction in the following year's IFQ without penalty. Fishers with 'overages' in excess of 10% are subject to enforcement sanctions, including confiscation (NMFS 1995).

Holders of QS may sell their rights⁸. Several restrictions on the sale of QS were adopted to avoid excessive consolidation and other changes in character of the fishing fleet. Although the system creates a property-right in the fishery, to avoid costly litigation in the event that the management programme is changed, the programme does not create a permanent interest in the fishery. QS remain valid indefinitely; however, if the programme is discontinued, the QS-holders will not be entitled to compensation (NMFS 1995).

Fundamental to an IFQ programme is the initial issuance of QS in the fishery. Those fishers issued shares receive a right to harvest a predetermined percentage of the TAC. This initial allocation influences both the distribution of wealth among fishers and the character of the fishery. The importance of the initial allocation was increased because of restrictions on transferability of QS. This section examines policy objectives of the initial allocation and the method by which the allocation was determined.

3.2 The initial allocation of quota shares

Several key policy objectives guided initial allocation of QS. Some of the major objectives were to:

- i. Preserve the character of the fleet
- ii. Limit and discourage corporate ownership of the fisheries
- iii. Reward active participants in the fisheries
- iv. Reward long-time participants over relative newcomers to the fisheries
- v. Reward those who invested in the fisheries over those who simply worked in the fisheries
- vi. Limit windfalls, regardless of federal policies precluding any charge for QS distributed in the initial allocation

³ The NPFMC is composed of a panel of 11 voting members (6 from Alaska, 4 from Washington, and 1 from Oregon) and 4 non-voting members. Voting members represent the fishing industry, fish processors, and federal, state, and local agencies (Pautzke and Oliver 1997).

⁴ NMFS is an agency of the National Oceanic and Atmospheric Administration (NOAA) under the U.S. Department of Commerce.

⁵ Sablefish were under jurisdiction of the NPFMC from its onset. Halibut came under NPFMC jurisdiction only after the resolution of treaty issues in 1982. Halibut is managed jointly by NMFS and IPHC. In general, IPHC is charged with monitoring stocks and setting overall catch limits. Allocation of catch limits within the three separate jurisdictions (Alaska, British Columbia, and the Pacific U.S.) is handled by the federal agencies responsible for management. In Alaska, NMFS and NPFMC determine the allocations and were responsible for developing the IFQ program.

⁶ The sablefish TAC is determined by NPFMC, subject to approval by the Secretary of Commerce. The halibut TAC is determined by the IPHC.

⁷ Halibut traditionally have been landed in headed-and-gutted form. Halibut TACs and IFQs are set in terms of headed-and-gutted weight. Sablefish TACs and IFQs are set in terms of round weight (NMFS 1995).

⁸ The right to sell IFQs (properly considered a lease of QS) was initially limited. Since 1997, sales of IFQs designated for use on catcher-vessels has been prohibited. The sale of IFQs designated for use on freezer vessels is permitted (NMFS 1995).

vii. Discourage speculative entry into the fishery.

The initial allocation recommended by NPFMC embodied these objectives. The over-riding theme was to preserve the size and character of the fleet (NMFS 1994). By allocating QS to current participants, the initial allocation served this objective and also rewarded fishers who had been active in the fisheries. By 1990, it was apparent that, in the future, entry to the fishery would be limited in some manner. Consequently, NPFMC decided that activity after 1990 would not be used in determining QS, in order to prevent fishers from entering the fishery simply to obtain QS, in essence gaining a property-right in the fishery. Knowing that seasons were short and that different fishers entered and exited the fishery each year, NPFMC chose to allocate shares to all fishers who were active between 1988 and 1990, and to base shares on catches in additional previous years, 7 for halibut and 6 for sablefish (NMFS 1995; Pautzke and Oliver 1997)⁹.

At the time of programme development, the *Magnuson-Stevens Act* prohibited any charge on issuance of QS. The absence of a charge had the added effects of preserving fleet character and deterring opposition to the programme. Requiring payment for the initial allocation might have excluded some traditional participants from the fleet simply because of their inability to afford QS. Sale of the initial allocation might have allowed corporations, banks, or owners of large industrial vessels to purchase a large part of the initial allocation. Not charging for QS, however, created potential windfalls.

To limit the windfalls, NPFMC used a broad, inclusive policy that provided an initial allocation to many more fishers than had participated in any given year. The programme issued QS to all vessel-owners active in the fisheries from 1988 through 1990. Eligible fishers received QS equal to their harvests over an even longer period - for halibut, vessel-owners were allowed to submit the best records for 5 of the past 7 years back to 1984; for sablefish, vessel-owners used the best 5 of 6 years back to 1985.

An ancillary goal of the broad-based initial allocation was to allow fishers to determine the extent of their activity in the fishery. Fishers could choose to exit the fishery by selling QS, increase activity in the fishery by purchasing additional QS or IFQs, or simply fish their initial allocations. With a broad-based allocation of initial shares, market conditions would be more likely to determine activity in the fishery.

One limiting factor in the initial allocation was that only vessel-owners and fishers leasing vessels were allocated QS. Crews were not granted shares (NMFS 1994). The objective of this rule was to reward those parties who had taken the risk to enter the fishery. Boat- and gear-owners were presumed to have invested in the fisheries. Operators who could demonstrate a leasehold interest in vessels were also thought to have invested sufficiently in the fishery to entitle them to QS¹⁰. Omitting crew members from the initial allocation also made the process workable. Unlike data for vessels and vessel-owners, no official data were available to verify participation of crew members.

A few adjustments were made to QS allocations in determining the final issuance. In regulatory areas in the Aleutian Islands and Bering Sea, the allocations were reduced to develop a Community Development Quota (CDQ) programme. The CDQ programme was designed to assist area communities by allocating them portions of the TAC. Historically, the communities have reaped little reward from the fisheries because of a lack of economic capital. By allocating portions of the TAC to the communities, it was hoped that they would become active participants in the fisheries. Fishers who had been denied QS to accommodate the CDQ programme were granted a proportional amount of QS in regulatory areas that did not have CDQ programmes, and there were proportional decreases in the QS of all other fishers in those areas (NMFS 1994).

4. RESTRICTIONS ON IFQ OWNERSHIP, USE AND TRANSFER

4.1 Ownership constraints

The development of the IFQ system and the initial allocation of rights in the fishery cannot ensure that programme goals are attained. Trading in the IFQ system allows changes in the interests in the fishery that also can affect the success of the programme. This section describes restrictions on ownership and trading under the programme intended to preclude excessive consolidation and preserve the owner-operator nature of the fishery. In general, these provisions were imposed because of concerns of policymakers that if the transfer and use of

⁹ Part of the rationale for considering several years was to avoid excluding from the fisheries those fishers who typically participated but could not participate for a year or two due to illness or other uncontrollable circumstances (NMFS 1994; Pautzke and Oliver 1997).

¹⁰ Records such as license purchase, tax records showing deductions of lease and crew payments, and other similar documents could be used to show that a vessel was being operated under a lease.

IFQ were unrestricted, the fisheries would soon be controlled by absentee owners and large corporations. Restrictions were enacted that limit:

- i. Who can own or purchase QS
- ii. The amount of QS persons can own
- iii. The number of IFQs that can be used
- iv. The areas in which particular IFQs can be used
- v. The vessel-size (as measured by vessel-length) and vessel-type (catcher-vessels or freezer-vessels) on which particular IFQs can be used.

To fully understand the nuances of many of these restrictions it is important to review the difference between QS and IFQs. QS represent the right to harvest a fixed percentage of the TAC for every year into the foreseeable future, whereas IFQs represent the right to harvest a fixed number of pounds during a specified year.

QS are based on pounds of catch during the qualification period - for example, approximately 13 748 QS would have been issued by NMFS if a participant had landed 13 748lb during the qualification period¹¹. The total number of QS issued was approximately equal to the total number of pounds that were landed during each qualifier's best years during the qualifying period (1984 through 1990 for halibut, and 1985 through 1990 for sablefish). Thus, the total number of QS far exceeds the total amount of pounds landed in any given year.

IFQs represent the pounds that can be landed in a specific year, with the total amount of IFQs equal to the TAC for the fishery for that year. The amount of IFQs that each individual receives is calculated based on that individual's holdings of QS as a proportion of the total number of QS outstanding (the QS pool).

Restrictions differed for QS and IFQs. For example, because QS represent a proportion of future TACs, they cannot be physically used or consumed. Therefore, there are no restrictions on the use of QS; restrictions on use are imposed only on IFQs. Similarly, since IFQs create no continuing right or interest but are used or consumed in a single year, the concept of leasing when applied to IFQs would have been nonsensical—once IFQs are used, there is nothing to return to the owner. Thus, leasing restrictions were imposed on QS and not on IFQs. The differences in the rights created by QS and IFQs¹² should be kept in mind when considering the different limitations applicable to each.

4.2 Eligibility to own quota-shares and caps on ownership

4.2.1 Requirements

The IFQ programme uses two basic eligibility requirements for ownership of QS and IFQs to achieve policy objectives. The first restriction is intended to ensure that all interests in the fishery are held by U.S. operators. The restriction limits ownership of QS and IFQ to U.S. citizens or corporations or partnerships formed in the U.S.

The second ownership restriction is a regulatory preference in favor of active fishers. This restriction is intended to serve that preference by defining who, in addition to initial recipients, can become owners of QS through transfers. Eligibility requirements for ownership are designed to assure that most QS are held by people directly active in the fishery. Consequently, corporations or partnerships that did not receive initial allocations can only purchase QS that are designated as freezer-vessel shares¹³ many of which are owned and operated by corporations and partnerships. QS designated as catcher-vessel QS can be owned by a corporation or partnership only if the corporation or partnership was the original QS recipient. Eligibility to purchase catcher-vessel QS is also restricted to initial recipients of QS¹⁴ and bona fide crew members. Bona fide crew members are defined by regulations as those individuals who have been directly active in the harvest of fish in a U.S. commercial fishery for at least 150 days (NMFS 1995).

4.2.2 Ownership caps

To prevent fleet consolidation, the system also established caps on the ownership of QS and on the harvest of IFQs. Ownership and harvest restrictions prohibit any single individual or single vessel from owning or harvesting more than a specified percent of the existing QS (the QS pool). In both the halibut and sablefish fisheries, ownership and harvesting caps apply to aggregations of existing regulatory areas.

¹¹ Some quota shares were allocated to CDQ groups without catch-history. These allocations were made by proportionally reducing initial allocations of quota shares based on qualifying catch.

¹² A "lease of QS" is equivalent to the "sale of IFQs"; the two terms are used inter-changeably in the industry.

¹³ QS and resulting IFQs are designated for use on either catcher-vessels or freezer-vessels, based on the type of vessel used during the qualifying period.

¹⁴ One exception is a regulatory area in Southeast Alaska, where only individuals (not corporations or partnerships) are permitted to purchase additional halibut QS.

For purposes of ownership and harvesting limits, the halibut fishery is divided into two areas. In the regulatory areas in the Aleutian Islands and Bering Sea, QS ownership and harvesting cannot exceed 1.5% of the total QS of those areas combined. In the Gulf of Alaska and Southeast Alaska regulatory areas, QS ownership cannot exceed 0.5% of outstanding QS. A special restriction caps ownership and harvesting at 1% of the QS in one regulatory area in Southeast Alaska (NMFS 1994). Southeast Alaska generally has more fishing communities and a greater proportion of halibut and sablefish fishers than other areas. This regulation was included at the request of NPFMC representatives from Southeast Alaska who believed that additional protection against consolidation was necessary in that area.

In the sablefish fishery, ownership and harvesting caps are set for two areas, Southeast Alaska and the entire fishery (including Southeast Alaska). The ownership and harvesting cap for these areas is 1% of the outstanding QS pool in the identified area (NMFS 2000b).

4.3 Restrictions imposed on the use of IFQs

4.3.1 Area-use restrictions

Perhaps the most obvious of the restrictions is one that prohibits IFQs resulting from QS issued for one regulatory area from being used in other regulatory areas. In the initial allocation of QS, all QS was allocated to the regulatory area from which the qualifying harvest was taken. Thus, QS generated from catch history in a Southeast Alaska regulatory area results in the issuance of IFQs that are legal for use only in that regulatory area. The same principle holds true for all other regulatory areas. This restriction is intended to maintain the distribution of effort across the range of the halibut and sablefish fisheries.

4.3.2 Vessel-classes

To help preserve the character of the fisheries, the programme created vessel-classes for each fishery. The programme restricts the use of IFQs to the vessel class of the underlying QS. For sablefish, three vessel-classes were created: freezer-vessels, catcher-vessels less than 60 feet in length, and catcher-vessels greater than 60 feet in length. Four vessel-classes were created for halibut: freezer-vessels, catcher-vessels less than 35 feet in length, catcher-vessels between 35 and 60 feet in length, and catcher-vessels greater than 60 feet in length. The additional classification for halibut catcher-vessels was created because of the large number of relatively small boats in that fleet¹⁵. The initial programme allowed IFQs to be used only on vessels of the same class as the vessel to which the IFQ was initially issued. This restriction is intended to maintain the distribution of the TAC among the vessel-classes (NMFS 1994). An amendment to the programme currently allows most catcher-vessel IFQs to be used by catcher-vessels of a smaller class. The amendment is thought to provide greater flexibility while still limiting any increase in the size of vessels participating in the fisheries (CFEC 1999a; CFEC 1999b).

4.3.3 Restrictions on hired skippers

The regulatory preference for owner-operated catcher-vessels extends to the regulation of who is permitted to fish IFQs. Only catcher-vessel QS-holders who received an initial allocation are permitted to hire skippers to fish their IFQs. All other catcher-vessel QS-holders are required to be onboard the vessel fishing their quota. An amendment to the programme currently requires a corporation or partnership to own at least a 20% interest in any vessel that fishes its QS (NMFS 1995)¹⁶.

The owner-operator requirements do not apply to freezer-vessel QS, which can be fished by hired skippers (NMFS 1994). The exemption was included in the programme because these vessels are generally heavily capitalized and corporate owned, making any owner-operator provisions unreasonably burdensome¹⁷.

¹⁵ Since QS were initially allocated by owner, an owner's shares were allocated to the class of the vessel that the owner had used for fishing in the last year used to determine eligibility (1988 1989 1990, or 1991). If multiple vessels had been used in the last year, the catch allocation was apportioned among the vessels used in that year, in proportion to landings.

¹⁶ Corporations and partnerships who used hired skippers before the amendment's adoption may continue to use that hired skipper, the 20% ownership requirement notwithstanding.

¹⁷ Because of the unique character of Southeast Alaska, ownership and transfer restrictions are more restrictive in that area. A special provision prohibits individuals that received initial allocations from hiring captains to fish their QS (only corporations or partnerships are permitted to do so in Southeast Alaska). Individuals receiving an initial allocation (who do not sell their IFQs as otherwise permitted) are always required to be onboard when their IFQs are fished. Although QS-holders may transfer their shares to a solely held corporation, that transfer does not affect the obligation of the QS-holder to be on the vessel fishing the IFQs (NMFS 1995).

4.4 Transfer rights

The ability to transfer QS and the IFQs created by those QS is critical to the rights of QS-holders. Provided that ownership and other restrictions are satisfied, QS may be bought, sold, and transferred. Once QS are sold, the new holder receives the annual IFQs in the same quantity as the original owner.

In general, leasing of QS¹⁸ is prohibited, although there are exceptions: freezer-vessel QS may be leased, subject to ownership cap restrictions. Also during the first 3 years of the programme, owners of catcher-vessel QS were permitted to lease up to 10% of their QS. The decision to permit QS leasing in the first few years of the programme was reached as a compromise to increase flexibility in the fishery (CFEC 1999a, b)¹⁹. The limitations on QS leasing are designed to reinforce the owner-operator preference in the eligibility requirements.

Restrictions on catcher-vessel QS-leases minimized the number of leases (or equivalently, IFQ sales) during the first three years of the programme. In the halibut fishery, less than 1% of catcher-vessel IFQs have been sold in any year. In the sablefish fishery, less than 2% of catcher-vessel IFQs have been sold in any year. Among freezer-vessels, substantial leasing has occurred in both fisheries. The quantity of freezer-vessel IFQs sold differs from year to year and across the various regulatory areas in both fisheries. In some areas as much as 90% of the freezer-vessel IFQs have been sold in a given year. In both fisheries, the sale of up to 20% of freezer-vessel IFQs, in a few regulatory areas each year has been common (CFEC 1999a; CFEC 1999b).

For any transfers, both the seller and the purchaser must file applications with NMFS. Purchasers of catcher-vessel QS must also be registered as bona fide crew members or be initial recipients. Applications must identify the parties and the type and size of transaction (the amount of QS or IFQs being transferred). Each transaction is recorded by NMFS (NMFS 1995).

4.5 The block programme

An amendment to the original programme (adopted prior to the programme's implementation) placed additional limits on the ability to transfer QS. The amendment, known as the "block programme," restricts the consolidation of small shares by single owners so as to assure that small holdings remain available for part-time fishers (CFEC 1999a; CFEC 1999b). Under the amendment, any initial allocation of QS that would have entitled the owner to less than 20 000lb of harvests under the 1994 TAC is considered a "block." Any block must be transferred as a whole and cannot be consolidated with any other block for purpose of transfers²⁰. The amendment prohibits the ownership of more than two blocks, or more than one block and any amount of unblocked QS in any regulatory area (NMFS 1995). The amendment does not directly affect QS that would have entitled the owner to more than 20 000lb of harvest (based on the 1994 TAC). These holdings of shares can be divided and combined, subject only to the other restrictions on ownership and transfer (including the percentage ownership caps) (NMFS 1995).

The prevalence of blocked QS is indicative of the number of vessels that have historically fished in the fisheries. In halibut regulatory areas, between 35 and 70% of all QS are blocked. In the sablefish regulatory areas, between 7 and 20% of all QS are blocked²¹. The amendment is likely to assure that the IFQ programme does not substantially reduce the number of entities with an interest in the halibut and sablefish fisheries (CFEC 1999a; CFEC 1999b).

5. THE FLEETS - BEFORE AND AFTER PROGRAMME IMPLEMENTATION

5.1 Fleet situation

It is clear that overall capacity in the fleet is still high if judged from the narrow perspective of how much fish the participating vessels could harvest if they were not constrained by their IFQs and by the TAC. There are several reasons why capacity in the sablefish and halibut fisheries has not declined as much as theoretically possible. The primary reason is that the majority of participants has viewed the sablefish and halibut fisheries as

¹⁸ Leasing QS, by definition, is equivalent to the sale of unused IFQs since IFQs are good only for the year in which they are issued, and once used, they may not be reused.

¹⁹ "Blocks" of QS must be sold or leased only in their entirety. This restriction, together with the 10% limitation on IFQ sales, precludes almost all leases of block QS.

²⁰ An exception, known as the "sweep-up" provision, allows consolidation of small blocks into a single block. Sweep-ups (or aggregations of small blocks) are only allowed if the resulting block creates IFQ rights of 3000lb or less of halibut, or 5000lb or less of sablefish.

²¹ These figures do not include one halibut regulatory area and one sablefish regulatory area that have a disproportionate number of shares in CDQs. These areas have even higher percentages of blocked QS because the CDQ shares are considered blocked QS.

a means of supplementing income from other major fisheries such as the salmon, crab, and groundfish fisheries, for which many of the vessels were built. These other fisheries are also seasonal, and participants are able to fish sablefish and halibut without disrupting their participation in the other fisheries. For most participants, the sablefish and halibut fisheries are two of several seasonal fisheries in which the vessels participate. A second, very important reason that large-scale fleet reductions have not occurred is that NPFMC, which designed the systems, wished to maintain the existing nature of the fisheries, and to that end, created restrictions that prevent excessive consolidation.

5.2 The pre-IFQ fleets

Before IFQ programme implementation, both the halibut and sablefish fisheries were intensively fished, with large numbers of vessels and very short seasons. The participation levels in the pre-IFQ fisheries were greatly influenced by the ease of entry into the fisheries. Both fisheries are prosecuted with sunken long-line gear that is anchored to the bottom and marked with buoys²². Long-line gear is relatively inexpensive and does not require significant investments in specialized equipment or vessels - almost any type of vessel can be outfitted to fish long line gear, including small skiffs and recreational vessels. In addition to the low equipment cost, there are few opportunity costs of participation. Prior to the implementation of the IFQ programme, fishery managers set the opening dates of the seasons to avoid conflict with seasons for other species. Thus, a vessel could participate in the sablefish and halibut fisheries and still participate in the salmon, crab, groundfish, or recreational fisheries for which the vessel likely had been designed. Entry into the fisheries was also significantly influenced by the prospect that fishery managers would soon limit entry with either licences or a quota-based system, and it was believed that demonstrated participation would ensure future participation.

5.3 The halibut fishery prior to the IFQ programme

Participation in the halibut fishery before IFQ implementation is documented in the four tables below. In general, a very large number of relatively small vessels participated in the halibut fishery between 1984 and 1990. Participation was a source of supplemental income for many vessel-owners.

Table 1 shows the number and percentage of vessels that fished halibut participated in other fisheries between 1984 and 1990, the years leading up to the establishment of the IFQ programme²³. On average, there were more than 3500 vessels participating in the halibut fisheries each year. Of these, an average of more than 2500, or 70%, also participated in other fisheries. Table 3 shows the percentage of total ex-vessel revenue that each participating vessel earned from the halibut fishery and from the other fisheries in which they participated from 1984 through 1990. During these years, the average halibut vessel earned less than 25% from the halibut fishery. Considered together, Tables 1 and 2 demonstrate that the majority of fishers active in halibut fishery

Table 1

Halibut vessels that also had landings in other Alaska fisheries 1984-1990

Indicator	1984	1985	1986	1987	1988	1989	1990
No. of owners active in the halibut fishery	3 472	2 744	3 247	3 777	3 925	3 642	4 206
No. of owners also active in other fisheries	2 036	1 885	2 338	2 912	2 893	2 346	3 178
Percentage active in other fisheries	58.6	68.7	72.0	77.1	73.7	64.4	75.6

Source: NPFMC 1992a.

Table 2

Ex-vessel value of Alaska fisheries for halibut vessels 1984-1990

Fishery	Percent of total ex-vessel value						
	1984	1985	1986	1987	1988	1989	1990
Halibut	18.8	25.6	32.1	23.4	17.7	28.6	23.8
Other fisheries	81.2	74.4	67.9	76.6	82.3	71.4	76.2

Source: NPFMC 1992a.

²² Other hook-and-line gear such as jigs and trolls are legal gears for both species in all areas, but neither are regularly used. Pot gear, which is legal within the IFQ program for sablefish in the Bering Sea and Aleutian Islands, is used only by a few vessels.

²³ These data are for the years considered in determining the initial allocation of QS. The data reflect activity in the fishery prior to the announcement of the change to IFQ management.

were active in the fishery part-time. Thus, while there were clearly more vessels than necessary to catch the halibut available to the fishery, most of the participants were using those vessels in other fisheries in addition to the halibut fishery.

Table 3 shows the number of unique vessel-owners associated with vessel length-classes for the years 1984 to 1990 - also shown are the percentages in each class by year. Table 4 is similar to Table 3, but shows total halibut catch by class rather than the number of owners by class. The tables show that, while more than 50% of participants owned vessels less than 35 feet in length, these vessels collectively harvested less than 15% of the total catch. Less than 6% of the participants used vessels greater than 60 feet in length, but those participants averaged more than 25% of the total halibut harvest.

Table 3
Halibut vessel-owners by vessel length-class 1984 to 1990

Vessel length-class	No. of unique owners						
	1984	1985	1986	1987	1988	1989	1990
≤35 feet	1 951	1 440	1 658	1 924	2 069	1 791	2 018
36-60 feet	988	926	1 199	1 412	1 449	1 429	1 713
> 60 feet	109	112	166	192	178	166	214
Unknown length	64	33	11	11	10	7	4
Freezer-vessels	-	-	-	3	6	5	8
All^a	3 077	2 479	3 001	3 489	3 649	3 346	3 883
Percent of all owners							
≤35 feet	63.4	58.1	55.2	55.1	56.7	53.5	52.0
36-60 feet	32.1	37.4	40.0	40.5	39.7	42.7	44.1
> 60 feet	3.5	4.5	5.5	5.5	4.9	5.0	5.5
Unknown length	2.1	1.3	0.4	0.3	0.3	0.2	0.1
Freezer-vessels	0.0	0.0	0.0	0.1	0.2	0.1	0.2
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: NPFMC 1992a.

^a Because some owners have vessels in more than one class, there are actually fewer owners than the sum of owners in each vessel length-class.

Table 4
Halibut catch by vessel length-class 1984 to 1990

Vessel length-class	Volume (000's lb)						
	1984	1985	1986	1987	1988	1989	1990
≤35 feet	4 686	4 998	6 637	8 383	10 066	7 569	6 993
36-60 feet	18 892	25 026	31 884	32 633	34 571	32 923	33 434
> 60 feet	11 319	14 978	18 945	15 038	16 078	14 902	12 007
Unknown length	142	179	318	217	64	70	29
Freezer-vessels	0	0	0	^a	232	552	483
All	35 040	45 181	57 784	56 271	61 011	56 017	52 946
Percent of total volume							
≤35 feet	13.4	11.1	11.5	14.9	16.5	13.5	13.2
36-60 feet	53.9	55.4	55.2	58.0	56.7	58.8	63.1
> 60 feet	32.3	33.2	32.8	26.7	26.4	26.6	22.7
Unknown length	0.4	0.4	0.6	0.4	0.1	0.1	0.1
Freezer-vessels	0.0	0.0	0.0	^a	0.4	1.0	0.9
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: NPFMC 1992a.

^a Due to confidentiality restrictions, this information is included in the >60-foot category.

5.4 The sablefish fishery prior to the IFQ programme

Before the implementation of the IFQ system, the number of participants in the sablefish fishery was only about 20% of the number of participants in the halibut fishery. Table 5 shows the number of vessels participating in the sablefish fishery from 1985 to 1990 - an average of 720 vessels each year. As in the halibut fishery, sablefish participants in general, relied more on income from other fisheries, than on income from

sablefish. In the years from 1985 to 1990, more than 95% of the vessels participating in the sablefish fishery had landing of other species. Table 6 shows the relative reliance on income from sablefish compared to income from other species - on average, 65% of the total ex-vessel revenue generated by sablefish fishers came from landings of other species.

Table 5

Sablefish vessels that also had landings in other Alaska fisheries 1985 to 1990.

	1985	1986	1987	1988	1989	1990
No. of vessels active in the sablefish fishery	371	606	868	888	768	822
No. of vessels also active in other fisheries	355	576	839	863	746	811
Percentage active in other fisheries	95.7	95.0	96.7	97.2	97.1	98.7

Table 6

Ex-vessel value of Alaska fisheries for sablefish vessels 1985 to 1990

Fishery	Percent of total ex-vessel value					
	1985	1986	1987	1988	1989	1990
Sablefish	37.4	30.0	31.9	41.0	39.0	29.8
Other fisheries	62.6	70.0	68.1	59.0	61.0	70.2

Source: NPFMC 1992a.

The makeup of the sablefish fleet, however, differs from makeup the halibut fleet. Compared to halibut, sablefish are typically found in deeper water farther from shore. Although the two fleets overlap, sablefish fishers overall tend to use larger vessels than halibut fishers do. Table 7 shows the number of vessel-owners who participated in the sablefish fishery in the years 1985 to 1990, classified by the length of their vessels. In these years, between 17 and 30% of the vessels in the fishery were more than 60 feet in length. In addition, freezer-vessels made up between 2 and 4% of the sablefish fleet. The sablefish fleet grew notably in these five years. The number of catcher-vessels less than 60 feet in length tripled from less than 200 to more than 500. During the same period, fewer than 50 catcher-vessels greater than 60 feet entered the fishery, as that portion of the fleet did not even double in size. The number of freezer catchers more than tripled, growing from 6 to 21. Sablefish catch, shown in Table 8, reveals that larger vessels are more active in the sablefish fishery than in the halibut fishery. In only one year between 1985 and 1990 did vessels less than 60 feet in length account for more than 50% of harvests in the fishery, a sharp contrast to the more than 95% of ex-vessel value of the vessels in this class in the halibut fishery.

Table 7

Sablefish vessel-owners by vessel length-class 1985 to 1990

Vessel length-class	No. of unique owners					
	1985	1986	1987	1988	1989	1990
≤ 60 feet	165	339	523	568	502	546
> 60 feet	73	109	136	120	112	116
Unknown length	-	4	10	4	7	9
Freezer-vessels	6	11	14	20	24	21
All vessel-owners^a	244	460	679	706	642	684
	Percent of all owners					
≤ 60 feet	67.6	73.7	77.0	80.5	78.2	79.8
> 60 feet	29.9	23.7	20.0	17.0	17.4	17.0
Unknown length	0.0	0.9	1.5	0.6	1.1	1.3
Freezer-vessels	2.5	2.4	2.1	2.8	3.7	3.1
All	100.0	100.0	100.0	100.0	100.0	100.0

Source: NPFMC 1992a.

^a Because some owners have vessels in more than one class, there are actually fewer owners than the sum of owners in each vessel length-class.

5.5 The IFQ fleet

Transferable-rights-based systems in fisheries promote consolidation of capital and resources invested in the fisheries as more efficient operations purchase the rights of less efficient operations. In economic theory, the less efficient operations, having sold their rights to participate, will retire from the fishery and devote their capital and resources to other industries in which returns are greater. Thus, one measure of the success of the IFQ programme is the level of consolidation that has occurred and the removal of excess vessels from the fishery.

Economic theory is able to "assume away" questions such as the initial allocation of rights, the malleability of capital and other resources, and the sometimes conflicting, non-economic goals and objectives of policy-makers. If these other issues are considered, then it becomes clear that the success of the IFQ programmes should be judged by additional measures, such as participant satisfaction.

Table 8
Sablefish catch by vessel length-class 1985 to 1990

Vessel length-class	Volume (000's lb)					
	1985	1986	1987	1988	1989	1990
≤60 feet	9 360	18 304	28 662	30 504	28 715	33 321
> 60 feet	11 520	16 969	23 220	23 246	21 503	14 492
Unknown length	0	87	172	94	91	114
Freezer-vessels	7611	7172	7 642	9 774	9 929	8 230
All vessel-owners	28 491	42 532	59 695	63 618	60 239	56 157
	Percent of total volume					
< 60 feet	32.9	43.0	48.0	47.9	47.7	59.3
> 60 feet	40.4	39.9	38.9	36.5	35.7	25.8
Unknown length	0.0	0.2	0.3	0.1	0.2	0.2
Freezer-vessels	26.7	16.9	12.8	15.4	16.5	14.7
All	100.0	100.0	100.0	100.0	100.0	100.0

Source: NPFMC 1992a.

If the IFQ programmes for the sablefish and halibut fisheries are examined from the perspective of consolidation of capital (measured by the number of owners and vessels participating in the fisheries), it might be concluded that the right-based systems did not result in sufficient consolidation to justify the implementation costs and social disruption of the programme. The initial allocation of QS in the halibut fishery issued rights to 4816 vessel-owners - 25% more than participated in 1990. In the sablefish fishery, the number of initial recipients of QS exceeded the number of participants in the 1990 fishery by more than 50%. By 1999, the number of halibut QS owners had fallen to 3649 - 6% less than the number of 1990 participants. In the sablefish fishery, the number QS owners declined to 897 by 1999 - still 30% higher than the number of participants in 1990.

While these figures demonstrate ownership interests in the fishery, they are not a proxy for the determining the number of vessels active in the IFQ fisheries. In 1999, 1613 vessels had landings of halibut compared to 4206 in 1990. In the sablefish fishery, 433 vessels had landings in 1999 compared to 822 vessels in 1990. Clearly, consolidation has occurred. The level of consolidation, however, is far short of the potential consolidation that would occur if vessels operated full-time in the fishery.

One method of approximating potential consolidation is to estimate the minimum number of vessels needed to make the number of fishing trips made currently by the existing fleet. For example, in 1999, the 1613 active halibut vessels made a total 7921 trips during the 245-day season - an average of slightly less than 5 trips per vessel. It is not unreasonable to assume that a vessel could make 25 trips during the year if it were operating full-time, and completing one trip every ten days - or 5 times as many trips as the average vessel currently makes. Similarly for the IFQ sablefish fleet, in 1999, 433 vessels made 1994 trips - again slightly less than 5 trips per vessel on average. From this perspective, it can be argued that the IFQ fleets are up to 5 times larger than necessary and that the fisheries are still severely over-capitalized.

In summary, the IFQ system initially resulted in an increase in the number of participants. This increase was followed by a period of significant consolidation. Yet, even with the post-implementation consolidations, it can be said that the IFQ fleets are still severely over-capitalized. Despite these apparent contradictions, the IFQ system has generated significant benefits to participants and is widely regarded as a success.

5.6 Participation patterns under the sablefish and halibut IFQ programmes

This section provides a detailed examination of participation patterns under IFQs for sablefish and halibut during the first five years of the programme's existence. The section presents and discusses a set of nine tables that show the initial allocation of QS, the consolidation of QS, the number of participating vessels, monthly harvest rates, and the number of trips in both fisheries.

Table 9
Initial recipients of halibut quota shares by vessel class

Vessel length-class	Number of recipients	Percent of total recipients	Percent of total halibut QS in class
≤35 ft	2 242	46	8
36-60ft	2 285	47	53
> 60ft	320	7	37
Freezer-vessels	42	2	3
Total	4 816^a	100	100

Source: NMFS 2001.

^a Some persons have received QS in multiple vessel classes. The numbers shown here are unique owners.

Table 10
Initial recipients of sablefish quota share by vessel class

Vessel length-class	Number of recipients	Percent of total recipients	Percent of total sablefish QS in class
≤60ft	805	76	37
> 60ft	204	19	42
Freezer-vessels	52	5	21
Total	1052^a	100	100

Source: NMFS 2001.

^a Some persons have received QS in multiple vessel classes. The numbers shown here are unique owners.

The tables clearly demonstrate differences in allocations received by participants with small vessels or with large vessels, as well as differences in participation levels in the two fisheries. In the halibut fishery 46% of all initial recipients owned vessels less than 35 feet. These small-vessel owners received only 8% of the total QS issued. Owners of halibut vessels between 35 and 60 feet were 47% of the initial allocation recipients and received 52% of the QS. Summing shows that 93% of the halibut QS-holders owned vessels less than 60 feet in length. In the sablefish fishery, 76% of the initial recipients of QS-owned vessels less than 60 feet and were allocated 37% of the QS available. These tables may give the appearance that the initial allocation was less than fair for small-vessel owners, but the allocation was based on participation and longevity in the fishery, and many small-vessel owners had very limited records of participation. It is also important to reiterate that the percentage of QS allocated to each vessel-class is essentially fixed at the initial allocation levels (shown in the tables) because of restrictions on transfers between vessel classes built into the programme²⁴. Thus, regardless of the consolidation of the fleet through QS transfers, no less than 8% of the halibut IFQs will be issued to owners of vessels less than 35 feet in length.

The market for QS and IFQs was quickly established after the programme was implemented. Many fishers have found through friends and personal connections, parties with whom to transact deals. Still, more than 50% of the transactions have been between parties with no business or personal relationship to one another. To facilitate the trade of QS and IFQs, NMFS maintains a website with a full listing of all QS-holders and persons determined to be eligible to purchase QS. While these listings have aided in market formation, transactions have been facilitated by a number of methods. Several well-established brokers participate in the market, facilitating almost 50% of all transactions. Also, trade journals frequently have advertisements for available shares (CEFC 1999a; CFEC 1999b).

Table 11 and Table 12 show the number of approved transactions of QS and IFQs in the halibut and sablefish fisheries, respectively. In the halibut fishery, approximately 4800 entities received an initial allocation. The 1279 QS transactions in the first year were more than 25% of the number of initial shareholders. Similarly, the sablefish fishery issued initial allocations to approximately 1000 entities. The more than 400 transfers in the first year represent more than 40% of that number. The high number of transactions suggests that even from the onset the market as been efficient with low transaction costs.

²⁴ The regulations permit IFQs designated for use on large vessels to be used on smaller vessels, but IFQs designated for use on small vessels may not be used on larger vessels.

Table 11
Number of approved halibut-quota shares and IFQ transfers 1995 to 1999

Transfer type	Number of transfers				
	1995	1996	1997	1998	1999
Regular QS/IFQs	1 217	1 397	1 004	539	611
IFQs Only ("lease") ^a	31	61	53	43	39
Sweep-up of small blocks ^b	31	63	441	148	150
Total	1 279	1 521	1 498	730	800

Source: NMFS 2000.

^a IFQ transfers were permitted on catcher-vessels only in 1995 1996, and 1997.

^b Small blocks are blocks of fewer than 3000 shares that can be "swept up" into a single block.

Table 12
Number of approved sablefish-quota shares and IFQ transfers 1995 to 1999

Transfer type	Number of transfers				
	1995	1996	1997	1998	1999
Regular QS/IFQ	352	351	388	185	237
IFQ Only ("Lease") ^a	76	51	51	57	53
Sweep-up of small blocks ^b	15	20	82	33	22
Total	443	422	521	275	312

Source: NMFS 2000.

^a IFQ transfers were permitted on catcher-vessels only in 1995 1996, and 1997.

^b Small blocks are blocks of fewer than 5000 shares that can be "swept up" into a single block.

Changes in the numbers of QS-holders in the halibut and sablefish IFQ fisheries since the IFQ programme was implemented are shown in Table 13 and Table 14. The number of halibut-QS-holders declined by 25% in the first 5 years. The number of sablefish-QS-holders declined slightly more than 10%. Consolidation of the both fisheries is also shown by changes in the fleet sizes. Table 16 and Table 17 show vessel participation in the halibut and sablefish fisheries before and after the IFQ programmes were implemented. Without question, the IFQ programmes reduced the number of vessels participating in each fishery. In the first year of the IFQ programme, the number of vessels participating in the halibut fishery dropped by more than one-third. By the fifth season, the number of vessels had dropped to less than one-half of the pre-IFQ vessel participation. In the sablefish fishery, the number of vessels dropped by more than 50% in the first year of the programme. Reduction in the sablefish fleet has occurred slowly since then, with fleet size remaining more than one-third of the pre-IFQ fleet size in the fifth season. This decline suggests that the concentration in the fleet has increased efficiency in the fishery, reducing over-capitalization from the pre-IFQ fishery. The decline in number of vessels is particularly notable, given the broadly inclusive method of the initial allocation. Despite the issuance of QS to all fishers who were active in the fisheries at any time during several years, the number of active vessels has declined every year since programme implementation (including the programme's first year).

The number of QS-holders is far greater than the number of vessels. This difference can be attributed to two factors. The first is that some holders of small numbers of QS do not harvest their IFQs at all. A survey of QS-holders in the first year of the sablefish IFQ programme found that two-thirds of QS-holders with less than 1000lb of IFQs harvested less than 10% of their IFQ allotment (Knapp and Hull 1996a). In 1998, more than 20% of halibut-QS-holders who received an initial allocation had not transferred their QS and did not fish them. In the same year, more than 15% of sablefish-QS-holders that received an initial allocation had not transferred their QS and did not fish them. These owners can be assumed to have relatively small QS holdings, since more than 90% of the TAC in the sablefish fishery and more than 85% of the TAC in the halibut fishery was harvested in 1998²⁵. The prevalence of holders of small QS in this group is obvious and predictable, as those with small

²⁵ Many of the small QS-holdings for areas of the Gulf of Alaska (GOA) are the result of the compensation that was provided to vessel-owners who qualified for QS in areas of the Bering Sea and Aleutian Islands where the CDQ program was implemented. The CDQ program reduced the TACs of sablefish and halibut available to QS-owners. NPFMC compensated initial recipients of QS in the Bering Sea and Aleutian Islands with small amounts of QS in each area of the GOA, and they could either sell or use these QS. The compensation program had the effect of spreading at least some of the burden of the CDQ program to all initial QS-recipients. However, the small allocations of QS received in compensation were often too small to be fished efficiently and many compensation shares are believed to go unharvested.

holdings are likely to be unable to cover the cost of a trip to fish their quota and are unlikely to see a significant benefit to transferring their shares after covering the costs of the transfer.

Another reason for the difference in the number of QS-holders and the number of vessels in the fishery is that not all QS-holders use their own vessels for fishing their QS. Some join with other QS-holders and fish their quotas on a single vessel. This practice allows QS-holders to reduce the overhead costs of vessel maintenance and reduces crew costs by consolidating multiple QS-holders on a single vessel. The tendency of QS-holders to share a trip also reduces overcapitalization in the fleet. This result is not necessarily inconsistent with the initial allocation and the policy objectives. A goal of the programme was to let fishers determine their own level of activity in the fishery and to reward only those who have invested in the fishery. Those purchasing QS and those willing to work with other QS-holders have shown a willingness to continue in the fishery.

Although there are no official counts of crew members who participate in sablefish and halibut trips, the willingness of QS-holders to team with others is thought to reduce the number of active crew members in these fisheries. With IFQs and the resulting change from a "race for fish," the number of crew members on a typical trip is believed to have fallen from a range of 3 to 6 to a range of 2 to 4 (including the skipper)²⁶. One survey of sablefish fishers in the year following programme implementation suggested that a slight decline in the number of crew occurred under the programme (Knapp and Hull 1996a).

While several of those fishers with the smallest QS holdings do not participate, many fishers remain active in the fishery and have significant holdings. In 1999, 240 sablefish fishers (more than 25% of the total QS-holders in the sablefish fishery) held QS, entitling them to more than 25 000lb of catch. More than one-seventh of the QS-holders in the halibut fishery held QS, entitling them to more than 25 000lb of catch. In the same year, more than half of the QS-holders in the halibut fishery were entitled to at least 3000lb of catch, and more than half of the QS-holders in the sablefish fishery were entitled to more than 5000lb.

Particularly in the sablefish fishery, fishers have increased their interest in the fishery by purchasing QS in several different regulatory areas. Doing so enables them to make more of their livelihood from the fishery and further increases fleet consolidation. This tendency is demonstrated by the amount by which the sum of the QS owners in the various regions exceeds the number of unique holders of QS (see Table 13 and Table 14). In the sablefish fishery, the sum of the number of QS-holders in the various regulatory areas is slightly less than double the number of unique QS-holders, suggesting that a large number of fishers holds QS for more than one regulatory area. In the halibut fishery, the number of unique QS-holders is approximately one-third larger than the sum of the number of QS-holders in the various regulatory areas. By owning shares in multiple regulatory areas, fishers have further reduced overcapitalization in the fisheries.

Table 13
Consolidation of halibut QS: number of persons holding shares by area and size of holdings,
Initial issuance through December 31 1999

Number of QS ^a	Number of QS-holders				
	Initial	End 1996	End 1997	End 1998	End 1999
3000 or less	2 522	2 244	1 936	1 832	1 672
3001-10 000	1 158	925	878	865	853
10 001-25 000	648	629	613	613	586
More than 25 000	500	523	537	536	538
Total (unique persons)	4 816	4 321	3 964	3 846	3 649

Source: NMFS 2000.

^a Holding sizes were calculated based on 1997 IFQ pounds.

Since IFQ programme implementation, the TACs in both fisheries have changed significantly. These changes cannot be attributed to the change in management programmes but do affect the interests of fishers in the fisheries. The TAC in the halibut fishery has grown from 37 million pounds in 1995 (the first year of the IFQ

²⁶ One concern expressed during periods of public comment was that the number of crew members necessary to conduct the fishery would be reduced. As a form of compensation for the loss of employment opportunity, NPFMC made the provision that the only persons who could purchase QS that were not initial recipients had to be "bona fide" crew members with at least 150 days of fishing experience. With this provision, crew members who might otherwise lose their jobs, can establish themselves in the fishery, and because the owner of the QS is required to be onboard when the IFQs are fished, these crew members can guarantee themselves a position.

programme) to 58 million pounds in 1999, an increase of more than 50%²⁷. This change alone has considerably increased the value of the fishery to those holding QS. The TAC increase for halibut, combined with consolidation of QS in the fishery, has resulted in a significant increase in the average value of QS held by individual fishers.

Table 14
Consolidation of sablefish QS: Number of persons holding shares by area and size of holdings, initial issuance through 31 December 1999

Number of QS ^a	Number of quota share holders				
	Initial	End 1996	End 1997	End 1998	End 1999
5000 or Less	541	497	446	417	403
5001-10 000	109	102	113	115	114
10 001-25 000	146	145	144	141	140
More than 25 000	254	252	244	246	240
Total (unique persons)	1052	996	947	919	897

Source: NMFS 2000.

^a Holding sizes were calculated based on 1997 IFQ pounds.

Table 15
Number of vessels landing halibut by area 1992 to 1999

Halibut management area	Before IFQ programme				Last 5 IFQ seasons			
	Number of unique vessels with landings							
	1992	1993	1994	1995	1996	1997	1998	1999
2C	1 775	1 562	1 461	1 105	1 029	993	836	840
3A	1 924	1 529	1 712	1 145	1 104	1 076	899	892
3B	478	401	320	332	350	357	325	323
4A	190	165	176	140	147	142	120	121
4B	82	65	74	57	64	69	47	51
4c	62	58	64	35	41	46	30	36
4d	26	19	39	27	33	33	22	29
Total (unique vessels)	3 452	3 393	3 450	2 057	1 962	1 925	1 601	1 613

Source: NMFS 2000.

Table 16
Number of vessels landing sablefish by area 1992 to 1999

Sablefish management area	Before IFQ programme				Last 5 IFQ seasons			
	Number of unique vessels with landings							
	1992	1993	1994	1995	1996	1997	1998	1999
Southeast Alaska	507	391	488	378	378	326	296	283
West Yakutat	266	196	249	228	218	218	176	162
Central Gulf	588	462	562	326	294	273	241	226
Western Gulf	103	29	19	86	81	79	66	63
Aleutian Islands	27	33	33	53	50	47	26	27
Bering Sea	72	40	31	55	49	41	28	20
Total (Unique vessels)	1 123	915	1 139	517	503	504	449	433

Source: NMFS 2000.

²⁷ The growth of the halibut TAC is not directly related to the change in management to IFQs. The halibut TAC increased because of improvements in the ability of IPHC scientists to estimate total halibut biomass and improvement in their ability to model fishery effects (NPFMC 1997).

In the same period, the TAC in the sablefish fishery declined. In 1995, the TAC was 45 million pounds. In 1998, the TAC had declined to less than 30 million pounds²⁸. This decline has reduced the effect of the concentration of QS in the sablefish fishery and has expanded the reliance of sablefish fishers on other species. This dependence on other species is clearly illustrated by the results of a survey of vessel-owners during the first year of the IFQ programme. The survey found that only 61% of sablefish harvested were taken on a trip targeting only sablefish (Knapp and Hull 1996a).

Table 17
Monthly harvest rates of IFQ halibut 1995-1999

	1995	1996	1997	1998	1999
TAC (lb)	37 422 000	37 422 000	51 116 000	55 708 000	58 390 000
Month ending	Percent of IFQ total allowable catch harvested by month				
April 14	4	12	10	8	12
May 14	7	13	12	11	14
June 14	16	14	21	13	18
July 14	9	13	10	13	11
August 14	10	11	13	14	12
September 14	16	17	13	13	13
October 14	14	10	10	12	10
November 15	12	6	8	9	7
Total	87	95	96	93	97

Source: NMFS 2000.

Perhaps the greatest change in the move from the open-access fishery to the IFQ fishery is the change in the timing of harvests. In the open-access fishery, the harvest in the most active areas took place within a few 24-hour openings. After institution of the IFQ programme, fishers were free to harvest their shares at any time during the April to November season. Table 17 and Table 18 show the distribution of harvests across the season for 1995 to 1999 in the halibut and sablefish fisheries, respectively. In both fisheries, fishers have distributed their harvests across the entire season. The lowest harvests occur in the first few and last few months of the season, when the weather is the most threatening. Allowing fishers to choose when to harvest their IFQs has further established the halibut and sablefish fisheries as part-time fisheries. Fishers now have greater choice of when to harvest their shares, to avoid conflicts with other seasons.

Table 18
Monthly harvest rates of IFQ sablefish 1995-1999

	1995	1996	1997	1998	1999
TAC (lb)	45 658 049	35 319 897	30 233 885	29 845 875	27 154 059
Month ending	Percent of IFQ total allowable catch harvested by month				
April 14	10	15	11	7	8
May 14	22	24	24	18	20
June 14	22	20	20	19	20
July 14	11	10	10	12	17
August 14	4	8	11	11	7
September 14	8	8	7	9	8
October 14	7	5	8	11	9
November 15	7	4	4	6	5
Total	91	94	95	93	94

Source: NMFS 2000.

²⁸ As in the halibut fishery, the decline in the sablefish TAC is not directly related to the management regime, but is considered a function of changes in ocean conditions. It is likely, however, that the reduction of lost gear and sablefish mortality resulting from lost gear (deadloss) has allowed the sablefish TAC to remain higher than it would have been under the previous management regime (Lowe 2001).

Specific data showing the relative dependence on IFQ species are not regularly generated by NMFS and were therefore unavailable for this analysis. The assertion that most participants in the IFQ fisheries rely on sablefish and halibut as only part of their annual round of fisheries is supported by Table 19, which shows the number of trips in the fisheries and the average number of trips per vessel for 1995 to 1999. Over the five-year period shown, the number of halibut trips has ranged between 7030 and 8205, with an average of 7517. The average number of trips per vessel has steadily increased in the halibut fishery, from 3.4 in 1995 to 4.9 in 1999. Under the very conservative assumption that a vessel can make 1 trip every 10 days (including time in port), the average halibut vessel is actively engaged in halibut fishing for less than 50 days per year. The same is true of the sablefish fishery, in which the average for 1995 to 1999 was 4.7 trips per vessel.

Table 19
Number of trips and trips per vessel in the IFQ fisheries 1995-1999

	1995	1996	1997	1998	1999
Number of trips with IFQ halibut landings	7030	7275	8205	7153	7921
Average number of halibut trips per vessel	3.4	3.7	4.3	4.5	4.9
Number of trips with IFQ sablefish landings	2706	2367	2,153	2082	1994
Average number of sablefish trips per vessel	5.2	4.7	4.3	4.6	4.6

Source: NMFS 2001.

In summary, the initial allocation in the IFQ programmes disbursed interests in the fisheries. The programmes, however, have since allowed for considerable fleet-consolidation. Despite the consolidation that has occurred, the IFQ fisheries still occupy the average vessel for only a small part of the fishing-year. Participation in other fisheries has been aided by permitting fishers to spread harvests over the nine-month season, allowing them to choose the most opportune time to fish their IFQs.

6. CONSEQUENCES OF THE IFQ PROGRAMME

6.1 Extent of changes

The previous section examined the number of owners and vessels participating in IFQ fisheries. The effects of the IFQ programme are felt much more broadly and include not only fishers but also processors, consumers, and fishery managers. This section examines several of these more indirect consequences.

6.2 Availability of fresh catch

Under the abbreviated seasons of the pre-IFQ fishery, fresh halibut and sablefish were available for only a very short period every year. Under the IFQ programme, fishers are permitted to fish their IFQs at any time during a season that begins in mid-March and ends in mid-November. The distribution of the catch throughout the year shows that fishers have taken advantage of the ability to choose when to fish their IFQs during the long season. A survey of registered buyers in the first year of the programme found that the production of fresh halibut rose 18 to 38% under the programme, benefiting consumers and marketers of fresh fish (Knapp and Hull 1996b).

6.3 Choice of processors and competition

Before the IFQ programme, processors wishing to be active in halibut and sablefish markets had to be able to handle large quantities of fish at a time. Fishers needed to bring their catch to processors able to handle it. Since the rush of fish to processors was intense, fishers had little choice of processors. Since processors were in high demand due to the intensity of the processing immediately after the short season, fishers had little leverage for negotiating a price for their catch. This circumstance was a greater concern in the halibut fishery, where almost all of the vessels participating in the opening tried to offload their catch immediately after the 24-hour period.

The processors operating prior to IFQs developed their businesses to accommodate the huge rush of fish that occurred with the short intense seasons. With IFQs, new niche processors catering to the fresh-market entered the fishery, and the larger traditional processors found themselves with excess capacity. With the additional competition to buy fish, vessel-owners are more able search out buyers willing to pay the highest

price. Existing processors, on the other hand, find themselves burdened with excess capacity and a loss of bargaining power²⁹.

6.4 Price of fish

Changes in fish prices reflect both changes in the relationships with processors and changes in the amount of fresh fish available to the market. The IFQ system has allowed fishers to time their catch to receive the best prices. In a survey of sablefish fishers in the first year of the programme, more than 75% said that price was important in determining when to fish IFQs (Knapp and Hull 1996a). In addition, most processors reported an increase in both ex-vessel and wholesale prices of sablefish in the first year of the IFQ programme. Fishers have stated that one reason they are satisfied with the programme is that they are receiving more for their catch (Matthews 1997). This response is consistent with results of a survey of sablefish fishers in which more than 50% of fishers surveyed reported a higher price for their harvests (Knapp and Hull 1996a).

Table 20 shows average ex-vessel prices and harvest volume for both halibut and sablefish 1988 to 1998. In both fisheries, prices have risen slightly since the implementation of the IFQ programme in 1995. Changes in harvest quantities and changes in the economy that affect supply and demand for fish (such as the Asian economic crisis in 1998) may account for some of the changes in prices and volumes. However, there is consensus that prices realized by fishers for halibut and sablefish have improved under IFQ management.

Table 20
Average halibut and sablefish ex-vessel prices 1988 to 1998

	Halibut										
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Average price per pound (\$)	1.22	1.50	1.79	2.00	0.97	1.24	1.931	2.01	2.24	2.11	1.27
Pounds (millions of pounds)	60.2	55.0	52.1	48.5	50.5	46.3	42.3	32.2	35.4	49.6	52.0
	Sablefish										
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Average price per pound (\$)	0.98	0.96	0.90	1.07	1.21	1.07	1.53	2.05	2.09	2.37	1.56
Volume (millions of pounds)	68.6	65.8	59.6	49.1	44.5	44.6	43.3	40.1	34.7	32.0	29.5

NPFMC 2000.

6.5 Safety

Fishing conditions in the pre-IFQ fisheries were dangerous - particularly in the halibut fishery. Several factors led to these unsafe conditions, including:

- i. The seasonal opening-dates were set by managers well in advance, and occurred regardless of weather conditions
- ii. Inexperienced fishers were drawn into the fishery by the ease of entry, the ease of catching commercial quantities, the relatively low costs of participating, and the relatively high price for fish
- iii. The chance for a big pay off for one day of fishing led to increased risk taking
- iv. The number of vessels crowded the fishing grounds, leading to a greater risk of conflicts and crashes
- v. The threat of pending entry limitations meant fishers had to participate regardless of weather conditions in order to qualify for future fishing rights.

With IFQs, the conditions that increased the risks in the fisheries have abated. Fishers have the flexibility to choose when to fish, and there are fewer inexperienced participants. In the first-year survey of sablefish fishers, more than 90% reported weather as an important factor in determining when to fish quota (Knapp and Hull 1996a). Table 21 shows safety statistics for the last eight years from the U.S. Coast Guard (USCG), which monitors safety at sea in Alaska. The statistics show a substantial drop in search-and-rescue missions for the IFQ fishery since implementation of the program. The number of fishers' lives lost has also declined slightly since the programme was implemented. Vessel-sinkings rose in the first 2 years of the programme but declined to a level similar to the pre-IFQ level in 1997 to 1999.

²⁹ Traditional processors in Alaska now recognize the consequences of IFQs and are exercising their political power to prevent new IFQ systems that do not include provisions that guarantee processor rights.

Table 21
Safety statistics from the pre-IFQ and IFQ fisheries

No. of Incidents	Pre-IFQ ^a	With IFQ programme in place				
		1995	1996	1997	1998	1999
Search and rescue missions	28	15	7	9	9	10
Vessel sinkings	2	4	7	2	0	2
Lives lost	2	1	1	2	1	1

Source: NMFS 2000.

^a Average of 1992 1993, and 1994.

6.6 Gear loss and deadloss

Fishers participating in the pre-IFQ fishery, particularly in halibut, set more gear than they could retrieve so as to ensure that they could remain active during the entire opening. If fishing was poor and there were few fish per set, then most of the gear could be retrieved during the opening. However, if fishing was good, the numbers of fish would slow the retrieval, and not all of the gear that was set could be retrieved during the short season. Because it was illegal to retrieve gear after the season ended if there were fish onboard, the gear was abandoned³⁰. Additionally, if gear fouled, the fishers would cut it free rather than waste precious time to untangle the lines.

Estimates of gear loss in the fisheries, both before and after IFQs, are inexact. In 1990, it was estimated that \$2 million worth of halibut gear was lost (NPFMC 1992a). While the lost gear created direct costs to the fisher in terms of replacement costs, a bigger problem was the loss of fish that had been hooked by the abandoned gear but were never retrieved (deadloss). It is assumed that lost gear has at least the same catch rate as gear that is retrieved. Therefore, the lost gear generated at least 2 million pounds of halibut deadloss in 1990 worth at least \$3.2 million (NPFMC 1992a)³¹.

With IFQs, estimates of gear loss have fallen significantly and are now considered inconsequential (Williams 2000). No longer do fishers set more gear than they need. Instead, they focus on catching their IFQ while minimizing costs, which translates to baiting and setting as little gear as possible. Furthermore, if gear becomes fouled, spending time to untangle it no longer reduces the amount of income earned, but instead reduces the cost of replacement gear.

6.7 Changes in cooperation and gear conflicts

Cooperation among fishers under the IFQ programme has increased operational efficiency in the halibut and sablefish fisheries. Under IFQ management, fishers do not incur any loss by advising others of favored fishing areas, since all have an assured portion of the catch that is unaffected by the success of others (Tremaine 2000; Matthews 1997). In addition, spreading out the season has reduced crowding on the grounds and has had the effect of allowing fishers to avoid conflict with others fishers. In the past, gear conflicts were thought to cost fishers substantial time and money (Pautzke and Oliver 1997).

QS-holders also appear to be cooperating by joining forces and fishing on a single vessel the IFQs of several persons. Simply comparing the number of active IFQ-holders with the number of vessels in the fisheries reveals significantly more active IFQ-holders than vessels. This cooperation is believed to have a significant impact on fishing costs.

6.8 Crew size and crew share

The IFQ programme has affected crews in ways that suggest a reduction in the number of active crew members under the programme. This decline, however, has not necessarily reduced the returns to crew members active in the fisheries. It is in fact estimated that payments per individual crew member have increased under the IFQ programme.

Data on the number of crew members in the fisheries are not collected by management agencies, so it is not possible to generate statistically accurate estimates of the changes in the number of crew or in the payments to crew members. However, the number of crew members on a typical trip is generally believed to have declined from a range of 3 to 6 before IFQs, to a range of 2 to 4 (including the skipper). Combined with the decrease in the number of active vessels, estimates of the number of active crew members in the halibut fishery

³⁰ Abandoned gear could be retrieved after the season ended if special permission from fishery managers was obtained. If gear was retrieved after the season, all hooked fish were required to be returned to the ocean.

³¹ Biologists at IPHC accounted for deadloss in their stock assessment models and reduced the TACs so that gear losses would not result in overfishing (Williams 2000).

fell from 10 500 in 1994 to 3200 in 1999³². While the number of crew members has declined, if the number of trips per vessel is factored in, total halibut crew member trips appear to be approximately equal for the two years, at about 15 500³³.

Payments to crew members are typically between 5 and 10% of gross returns. Using an assumed crew payment percentage of 6% for each crew member and the ex-vessel prices and volumes shown in Table 20, it is estimated that the average total payments to halibut crew members during the three years before IFQs were \$11 million, compared to an estimated \$9 million for the first four years under IFQs. These estimates translate to \$1095 per crew member in the pre-IFQ fishery and \$2512 per crew member in the IFQ fishery. For sablefish, estimated average total crew payments in the pre-IFQ fishery were equal to average total crew payments in the IFQ fishery at \$17 million per year³⁴. The decline in the number of active sablefish vessels and reductions in crew size after IFQ implementation is estimated to have increased average payments per individual crew member from \$3,165 in the pre-IFQ fishery to \$8342 in the IFQ fishery.

6.9 Administrative burdens

Both buyers and fishers have stated that the programme imposes extra administrative burdens and costs on their operations. To ensure that catch is monitored, fishers are required to communicate to NMFS by radio their approximate catch at least 6 hours before landing. The requirement is particularly troublesome for small vessels that make short day trips, forcing some to approximate their catch before leaving the port. Tracking requirements and paperwork are also thought to be overly burdensome by both fishers and processors (Matthews 1997).

6.10 Enforcement

One concern in changing management of the fishery to an IFQ system was that the enforcement might be more costly and complicated than management by season closures. The short season in the pre-IFQ fisheries simplified monitoring and enforcement. Since fishers were permitted unlimited catch during the open season, the enforcement officers needed only to monitor activity in the fishery without regard to catch-limits. Under the IFQ programme, the season is protracted, with fishers active throughout a 9-month period. Different limits are imposed on different fishers by their IFQ holdings. Consequently, enforcement agents must monitor each fisher's harvest level throughout the season to prevent 'overages'.

Monitoring is conducted both at the dock and at sea. Dockside-monitoring has been simplified by requiring that all buyers be registered with NMFS. Buyers are required to report all purchases to NMFS through an automated system that records prices and weights of deliveries. In addition, requiring 6-hour advance notice of any delivery provides monitoring agents with the opportunity to be onsite at the time of landing. While some reports of leakage (unreported catch) have been received by enforcement agents, the problem is believed to be minor (Matthews 1997). At-sea boardings under the IFQ programme are much less burdensome than under the 'fishing derby' regime of the pre-IFQ fishery. Fishers in the IFQ fisheries are far less concerned about or constrained by the time away from fishing during an at-sea boarding, given the expansive time period allowed for fishing in the IFQ fishery (Matthews 1997).

High-grading - the discard of low-value catch (typically smaller fish) in favor of high-value catch - was also a concern at the outset of the IFQ programme. Catch-rates and the price structure of the industry, however, were thought to erase any incentive for high-grading in the fisheries. The relative rate of catch of low-value fish was thought to be high enough, and the price difference between low- and high-value fish was thought to be small enough, that the expense of replacing discarded low-value fish would result in little or no increase in net revenues to the fisher (NPFMC 1992b).

In addition to the monitoring by NMFS and USCG, the system is thought to have created some self-monitoring. Some fishers believe that by providing them with an interest in the fishery, the system has led to self-policing. Fishers now consider violations by other fishers as devaluing their interest in the fishery by reducing the TAC in future years (Matthews 1997).

Enforcement activities over the last two years appear in Table 22. In the 1999 IFQ season, NMFS enforcement officers boarded 26% of all vessels landing fish under the two programmes. Enforcement officers found approximately 95% compliance on these vessels, with most violations being logbook violations and overages (NMFS 2000a).

³² These estimates use the number of active halibut vessels from Table 15 and assume that average crew size fell from 3 in 1994 to 2 in 1999.

³³ The number of trips per vessel in 1994 is assumed to have been 1.5 and the number of trips in 1999 was 4.9, as estimated in Table 19.

³⁴ Assumes 5-person crews before IFQs and 4-person crews after IFQs, with 6% of gross revenue paid to each crew member.

Table 22
Enforcement activities in the sablefish and halibut IFQ programmes 1998 to 1999

Year	Number of incidents by agency and type				
	USCG at-sea boardings	Alaska enforcement division of NMFS			Cases initiated
		Dockside inspections	Violations detected	Offloads monitored	
1998	276	463	38	413	196
1999	236	158	22	339	258

Sources: NMFS 1999; NMFS 2000a.

7. SUMMARY AND CONCLUSIONS

Prior to the implementation of the IFQ programme, the consensus among stakeholders in Alaska's halibut and sablefish fisheries was that the existing management regime was not working. Fishers often compromised their safety by fishing the season regardless of the weather, as the one-day openings were a major disincentive to waiting for the weather to improve before starting fishing. TAC-management was imprecise because of the absence of limitations on individual fishers. Vessels were over-equipped as fishers attempted to maximize their catch during the short opening. Gear losses were excessive as fishers abandoned gear that had not been retrieved by the end of the fishing periods. Deadloss was also excessive because of the persistence of abandoned gear, which continued to catch fish long after the season ended. With only a few short openings, fresh fish were often unavailable. After considering several alternatives and after several years of evaluation and negotiation, managers of the fishery adopted and implemented the IFQ programme in the halibut and sablefish fisheries.

The IFQ programme clearly improved conditions in the fisheries. Fishers have the flexibility of fishing their IFQs at the times that they choose, allowing them to operate safely and time their fishing to obtain the best price for their harvests. Less efficient operations have sold their harvest-rights to more efficient operations, and vessel-owners are now fishing cooperatively-sharing "hot-spot" information and fishing IFQs from a single vessel rather than from two or more. The longer seasons, cooperation, and efficiency-gains from rights-transfers have reduced the cost of crew and gear. Since harvests are no longer restricted by short seasons, gear losses and deadloss have been reduced to minimum levels.

Consumers also have benefited from the IFQ programme. Fresh halibut is available for most of the year, and sablefish is becoming more widely known. Before the programme, fresh halibut was available for only a short period each year. The slower pace of fishing has resulted in better fish-handling, and the overall quality of the catch has improved. Although consumer prices may be slightly higher, the improvement in product quality and the availability of fresh fish have compensated for the price rise.

The programme, however, is not without its critics. Fishers excluded from the system or those who received small initial allocations believe that the system widened socio-economic disparities in the industry. Crew members are particularly frustrated by the system because they were not awarded fishing-rights, and for many, the IFQs eliminated a short but lucrative employment opportunity. Shoreside processors who were operating in the pre-IFQ fishery are also dissatisfied with the new system. The exclusive allocation of harvest-rights to fishers weakened the processors' bargaining position and created opportunities for new small-scale competitors.

Concerns have also been raised that the sablefish and halibut IFQ-system is overly complex, prevents an "optimal" level of consolidation, and remains extremely over-capitalized and inefficient. The response to these concerns is that the IFQ use, transfer, and ownership restrictions were incorporated into the programme primarily to retain the character of the fishery. Use of IFQs is restricted to vessels of the same size as the vessel from which the entitlement to the initial allocation arose. Restrictions allow transfer only to holders of an initial allocation or bona fide crew members. In addition, limits on the number of shares that can be owned or used in by a single vessel or owner prevent fleet-consolidation and the concentration of interest in the fisheries. These restrictions assured continuity between the pre-IFQ fisheries and the IFQ fisheries. The restrictions, however, may be criticized for preventing the development of an economically optimal fishery, which some economists believe would enable a minimum number of vessels to target a single species year-round. The programme was developed to serve the needs of existing fishers as well as maintain social conditions and promote economic efficiency. Consequently, the lack of economic efficiency should be considered a policy choice rather than a defect in the IFQ programme.

Any programme that attempts to allocate interests in a fishery must limit the interests of some people and will therefore draw criticism. In addition, these limitations will be tailored to serve identified policy objectives, which may draw further disagreement. The IFQ programme may be criticized on both of these grounds. Yet, the

programme allows new entrants, improves efficiency by allowing the purchase of QS, within limits designed to preserve the character of the fishery. The programme represents a compromise intended to serve and balance several policy and personal interests. By any objective measure, the programme resulted in marked improvements in Alaska's halibut and sablefish fisheries. Safety, TAC-management, over-capitalization, gear loss, deadloss, and product price and quality all improved with IFQ management. The objectives of the programme in large part were met, and therefore the system should be considered a success.

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