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Recreational Leasing of Alaska Commercial Halibut Quota

*The First Two Years of the Guided
Angler Fish Provision*

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Abstract

The Pacific Halibut Catch Sharing Plan creates a process for allocating halibut between the Alaska commercial and recreational charter sectors. A provision intended to allow for “flexibility” creates an inter-sectoral trading market, permitting charter operators to lease commercial halibut pounds to relax client harvest restrictions. Here we evaluate the first two years of lease market activity and participation. We find the program may provide beneficial flexibility to some commercial quota holders, with the number of transfers to the charter sector being greater than transfers within the commercial sector for some types of commercial quota. We also identify a high proportion of self-leasers. However, transfers to the charter sector are on average smaller than within-sector commercial transfers, and total poundage leased by the charter sector is low compared to commercial transfers. Finally, the value-per-pound may be higher in the charter sector, as commercial-to-charter transfer prices approach the commercial ex-vessel price.

Key Words: Alaska halibut, commercial fishery management, Individual Transferrable Quota, intersector quota allocation, Guided Angler Fish, GAF provision, recreational fishery management

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Introduction

In NOAA's 2010 Catch Share Policy, the agency expresses support for development of catch share programs in charter and head boat sectors, while acknowledging that experience with recreational catch share programs is limited (NOAA, 2010). The Catch Share Policy also encourages fishery management councils to assess programs facilitating inter-sector transfers (NOAA, 2010).

In this paper we evaluate the first two years of the inter-sector quota trading market created by the Guided Angler Fish (GAF) transfer provision of the Catch Sharing Plan (CSP) in the Alaskan Halibut fishery (NOAA Fisheries 2013), the first significant federal catch share program implemented in the United States that includes recreational fishermen. Implemented in 2014, the GAF program has been in effect for two full years. The program is unique in that it allows for inter-sector transfers, permitting recreational users to lease commercial quota. The goal of the GAF provision is to allow Alaska recreational charter (guided) operators more flexibility in offering their clients improved halibut angling opportunities (NOAA Fisheries, Alaska Region, 2014). With the GAF provision, permitted Alaska charter operators are able to lease halibut from the commercial sector in the form of a GAF to relax harvest restrictions for halibut harvested by charter angler clients.

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Examining the early outcomes of the GAF Program is critical given recent efforts to implement catch shares in other recreational fisheries. The Gulf of Mexico Fishery Management Council is considering catch shares for the For-Hire component of the Reef Fish fishery and has examined a catch share program for the red snapper fishery (NOAA 2015). In 2014, the Gulf of Mexico Fishery Management Council began the two-year Gulf Headboat Collaborative Pilot Program, the first within-sector recreational catch share program for the Gulf of Mexico red snapper and gag head boat fishery (NOAA 2015). Additionally, the Rhode Island For-Hire Fluke Cooperative Pilot Program, a voluntary pilot program, was implemented for the 2013 and 2014 seasons in the Rhode Island fluke fishery (Rhode Island Fish for the Future 2014).

The challenges with intersector quota allocation between recreational and commercial sectors are well-known (see Abbott (2014) and citations therein). This is especially true in the Alaskan Halibut commercial and charter fisheries where various sector allocation programs were proposed over the last 20 years (see, e.g., Wilen and Brown (2000) and Call and Lew (2015)). Past analyses highlight the myriad of design and evaluation considerations, as well as the tradeoffs between different allocation systems and restrictions. However, with few empirical examples to draw lessons from, the realized impacts of various designs remain unresolved.

To date, the GAF program has faced opposition from the charter halibut community, with charter permit holders generally holding a negative view of the CSP and the GAF leasing program, and a majority believe the leasing program negatively impacts their business (Lew, Putman, and Larson, 2016). On the other hand, a small minority (about 15%) view the program favorably. A review of comments on the CSP and GAF provision prior to implementation suggest that support for the provision tended to come from commercial operators (see e.g. SEAFA (2011), ALFA (2012), and UFA (2013)) while most recreational stakeholders were opposed to the provision (e.g., ACA (2012)). The divergent views, along with proposals from the recreational sector to change the design of the program¹, highlight the importance of evaluating

¹ The NPFMC is currently considering an alternative sector allocation design: the CATCH (Catch Accountability Through Compensated Halibut) project, a collaboration between the Alaska Charter Association (ACA) and the South East Alaska Guides Organization (SEAGO). The CATCH proposal is an alternative to the GAF program that would seek to increase halibut resources available for harvest by charter anglers in Areas 2C and 3A by establishing a recreational quota entity (RQE) that would act on behalf of the recreational sector to purchase halibut quota shares from the commercial sector and hold it in a common pool (Yamada and Flumerfelt, 2014). This pool would give the charter industry a mechanism to permanently increase their halibut allocation and would increase stability in the guided charter industry (Yamada and Flumerfelt, 2014). The goal would be to maintain the historic daily bag limits while eliminating the instability and unpredictability of the current GAF program design (Yamada and Flumerfelt, 2014).

the impacts of the program to date, even if there is not be sufficient datapoints to statistically measure the impacts.

Using a unique confidential dataset of commercial quota holdings and transactions and GAF transfers over the first two years of the GAF program, we investigate participation, activity, and market performance of the program. Our analysis builds on the work of Lew, Putman, and Larson (2016), NPFMC (2016), and Scheurer (2016). For example, we follow this earlier work by discussing the impacts on the recreational charter sector but we also examine the characteristics of commercial sales and sellers, such as the type of commercial quota sold as GAF and the characteristics of the commercial quota sellers. Additionally, we compare the size, number, and price of commercial and GAF transactions within commercial quota submarkets. Finally, using quota transfer data, we compare commercial-to-commercial and GAF prices.

We find that the commercial quota pounds transferred are concentrated within two commercial quota submarkets, each of which is associated with smaller-scale commercial fishermen. Although the poundage transferred is small relative to the entire commercial quota market, we find that at the submarket level the number of GAF transfers can be a sizable portion of total transfers, reaching 50% of transfers in some submarkets. Finally, in terms of relative prices, preliminary evidence is that on a per-pound basis, there exists a gap between the charter willingness-to-pay and commercial quota market prices for the smaller quota holders.

In the remainder of the paper we provide an overview of the GAF provision, the commercial IFQ program, and the data used in our analysis. We then provide a summary of the transfers occurring during the first two years of the GAF program.

The Guided Angler Fish (GAF) Provision of the Catch Sharing Plan

The Guided Angler Fish (GAF) provision of the Catch Sharing Plan (CSP) allows charter halibut permit (CHP) holders to lease individual fishing quota (IFQ) from commercial fishermen in the Alaska Halibut fishery on a yearly basis (NOAA, 2014). This GAF provision, which was implemented in 2014, works in conjunction with the Charter Halibut Limited Access Program (LAP). The LAP program, implemented February 1, 2011, requires all recreational charter operators with clients that catch and retain halibut to have a valid CHP on board those trips (NOAA, 2016a).

Each CHP is valid for a specific regulatory area (Area 2A or 3A; Figure 1 is a map of the fishing areas) and for a maximum number of anglers (called endorsements). At the end of 2014, there were approximately 565 individuals holding at least one CHP in either Area 2C or

3A; there were an approximately equal number of CHP holders in each area, and seven individuals held permits in both areas (see NPFMC (2016) for more detail on CHP permit holders). Regulations restrict CHP holders to five CHPs, unless they received “grandfathered” CHPs during the initial allocation process.

Anglers (charter clients) in the guided charter sector face harvest restrictions that vary by area and year (see IPHC (2014), NOAA (2015), and NOAA (2016b) for more detail on specific regulations). For example, in 2016 in Area 2C, charter anglers had a one fish daily bag limit and a reverse slot limit that requires halibut to be less than 43 inches or greater than 80 inches (NOAA, 2016b). In Area 3A, charter vessel anglers have a two-fish daily bag limit with a maximum size limit of 28 inches for one fish, an annual limit of four halibut, a limit of one trip per day per vessel, and a weekly closure on Wednesdays (NOAA, 2016b).

Generally, a charter operator holding GAF can use the GAF to allow a client angler to harvest halibut up to the limits imposed on unguided anglers, which for 2016 is two halibut of any size per day with no day of the week restriction (NOAA, 2016b). Therefore, in Area 3A for example, GAF can be used to retain a second halibut larger than 28 inches that does not count against the annual limit, or it can be used to harvest a halibut of any size on a Wednesday. In Area 2C, a GAF can be used to harvest one halibut of any size, which can be in addition to the one fish with the reverse slot limit allowed for all charter anglers or in place of it should the fish be outside the permitted size.

The GAF provision allows transfers of commercial sector individual fishing quota (IFQ) to CHP holders subject to several restrictions. Transfers must be submitted to the Restricted Access Management Program of the National Marine Fisheries Service (NMFS) for review and approval, and transfers are not official until NMFS has approved the transfer (NOAA, 2014). A commercial fishing operation that possesses IFQ can sell their quota if they have at least one unit of halibut quota share and are in possession of an IFQ permit for halibut harvesting in Area 2C or 3A (NOAA, 2014). A CHP holder is eligible to receive IFQ if they have at least one CHP in the same management area as the IFQ that will be transferred (NOAA, 2014).²

There are also several restrictions regarding the quantity of IFQ that can be transferred to GAF and that can be held. IFQ holders in Area 2C are limited to transferring up to the greater of

² Those who hold military charter permits and community quota entities are also eligible to receive IFQ as GAF (NOAA, 2014).

1,500 pounds or 10 percent of their initially issued annual halibut IFQ for use as GAF (NOAA, 2014). In Area 3A, IFQ holders may transfer up to the greater of 1,500 pounds or 15 percent of their initially issued annual halibut IFQ (NOAA, 2014). CHP holders are limited to accepting 400 or fewer GAF if they are endorsed for six or fewer anglers or 600 or fewer GAF if they are endorsed for more than six anglers (NOAA, 2014).³

IFQ are issued in pounds but GAF are issued as number of halibut (NOAA, 2014). Each year prior to the start of the fishing season, the NMFS establishes a conversion factor for transferring IFQ to GAF for each area based on the average net weight of GAF harvested in that area in the previous year. At the end of the season, unused GAF are returned to the IFQ permit holder, using the same conversion factor that was applied during the initial transfer (NOAA, 2014). There are two ways to return quota; the GAF permit holder can submit an application for voluntary return that will occur on September 1st, or the NFMS automatically returns unused quota to the original IFQ holder 15 days before the end of the commercial season (NOAA, 2014).

GAF transfers must occur before GAF halibut are caught, and GAF cannot be transferred or subleased within the charter sector (NOAA, 2014). If an IFQ holder also holds CHP, they are allowed to transfer IFQ to themselves (NOAA, 2014). However, owners of CHP and IFQ are not allowed to fish commercial and charter halibut on the same vessel on the same day (NOAA, 2014).

Commercial Halibut Individual Quota Program Background

In this section we provided a brief overview of the commercial IFQ program with an emphasis on elements most relevant for evaluating the impact of the GAF program on the commercial sector. A more detailed summary of the program is available in Kroetz, Sanchirico, and Lew (2015).

The commercial halibut individual quota program was implemented in 1995 and operates as an individual transferable quota (ITQ) program. At the beginning of the program, commercial fishermen were granted shares of area-specific total allowable catches (TAC) based on past participation in the fishery (in the halibut fishery there are seven management areas; Figure 1).

³ We examined whether the transfers to a particular CHP holder approach the limit a CHP permit can accept (the limits are listed in Scheurer 2016, NOAA 201); none come close.

The shares are called quota shares (QS) and are issued as percentages of the area TAC. A fisherman owning shares can expect to receive an allocation of individual fishing quota (IFQ) pounds each year equal to the percentage of the TAC owned.

There are limitations on use and transfer of QS and IFQ pounds in the fishery. First, generally IFQ pounds cannot be bought or sold alone. However, participants can transfer IFQ pounds so long as the associated QS that accompanies the pounds is all transferred. Second, QS holdings are generally divisible, other than “block” restrictions. At the inception of the program participants receiving relatively small quantities of quota were allocated their share as a “block.” These blocks must be bought and sold as a unit. This differs from unblocked QS for which there is no limit on the size of a transfer. In addition, the number of blocks a participant can hold is limited, and those holding more than one block of QS may not hold unblocked QS. In practice, this results in small-scale fishermen tending to only hold blocked QS.

The use of IFQ pounds can also be restricted based on the characteristics of the vessel it is fished from. All QS carries a class designation related to vessel length and type that is then passed on to the IFQ pounds allocated each year. There is one class of IFQ pounds, Class A, that can be fished on any type (catcher-processor or freezer vessel) and any length of vessel. Class B, C, and D IFQ pounds must be fished on a catcher-vessel meeting length limitations (with D vessels smaller than C and C less than B). Table 1 summarizes the quantity of IFQ pounds transferred in 2014 by blocking status and class in Areas 2C and 3A.

Data

We use confidential quota transfer data, supplemented with data on permit ownership and attributes, as well as other publicly available data, in the analysis. One source of data, the halibut commercial transfer database, is described in detail in Kroetz, Sanchirico, and Lew (2015). Since the inception of the program, transfers have been recorded by NMFS. The transaction data include the buyer, seller, number of QS (asset) units transferred, number of IFQ pounds (current year allocation, akin to a lease), QS/IFQ characteristics including area, class, and blocking designation, price paid, reason for transfer, and the relationship between the buyer and seller.

We also have GAF transfer data for 2014 and 2015, the first two years of the GAF transfer provision. The fields in the database are similar to those in the commercial transfer database and include information on the buyer and seller, the number of IFQ pounds transferred, the attributes of the IFQ pounds (area, class, blocking), the price per pound paid, the reason for the transfer, and the relationship between the buyer and seller. Table 2 contains summary

statistics describing GAF program transfers. The database contains 384 transactions designated as part of the GAF program.

There are two types of transfers that are unique to the GAF program: self-transfers and “return” transactions. We treat these transfers separately in our analysis. First, we identify self-transfers, where the GAF recipient and the IFQ owner have the same NMFS ID, a unique identifier assigned by NMFS. There are 75 transactions that meet this criteria and none have a price listed. Second, we identify “return” transactions, which are associated with the provision that unused quota be transferred back to the IFQ holder if unused. We identify these transactions in the database as any transaction where the IFQ pounds on a GAF permit are transferred to a commercial IFQ permit. There are 127 of these records; they all occur in September or October, and none of these transactions have prices.

Of the 257 GAF provision transfers from the commercial to charter sector there are recorded prices for 186 transactions, 80 occurring in 2014 and 106 occurring in 2015. The vast majority of transactions occurred in Area 2C.

Fundamental to the transfer market is the need to convert IFQ, measured in pounds, to GAF, measured in fish. When a transfer occurs between the two sectors IFQ pounds are converted to GAF halibut. The conversion factors are area-specific and in 2014 were based on past yearly harvest, but in 2015 and 2016 were based on the weight of the GAF landed in the previous season.

To gauge market participation, we count the number of unique individuals transferring from the commercial sector (transferors) and receiving in the charter sector (transferees). We find that participation is increasing over the two years and that Area 2C has three times more participants than Area 3A. Finally, there is significant heterogeneity in the use of GAF by the charter sector across years and areas. Relatively more GAF was harvested in 2014, and more GAF is used in Area 2C relative to 3A.

Analysis

In this section we present summary statistics and figures to provide a characterization of the GAF transfer market. We focus on characterizing the supply and demand for GAF. More information on the individual sectors is available in Kroetz, Sanchirico, and Lew (2015), NPFMC (2016), and the Appendix.

Commercial IFQ transferred as GAF

To understand the functioning of the GAF transfer provision we begin by examining characteristics of the commercial quota sold as GAF and compare GAF and commercial transfer number and volume. This is important because IFQ pounds purchased by the charter sector are unavailable to commercial fishermen. Therefore, the dominant pathway through which the provision could impact the commercial sector is through purchase and movement of IFQ pounds from the commercial to the charter fleet resulting in changes to the scale and number of commercial fishing operations. Furthermore, should the profitability of a pound fished by a charter boat be higher than that for the marginal pound when fishing commercially, the market price for quota could increase.

The total number of GAF transactions and pounds is small (Table 2), therefore, we explore the GAF transfers within submarkets (Table 3) relative to commercial submarket transfers (Table 1) and the TAC. Examining quantities traded within submarkets yields insight into the scope of the policy impact. Additionally, this focus on submarkets is appropriate due to the significant limits that exist on the use of quota in the fishery.

Most IFQ transferred to GAF comes from smaller vessel class (the 2C Class D Blocked, 2C Class C Blocked, 2C Class C Unblocked, 3A Class D Blocked, 3A Class C Blocked, and 3A Class C Unblocked) submarkets. The number of GAF transactions comprise a significant percentage (Figure 2), sometimes over 50%, of the number of transactions in the Area 2C submarkets we examined (Class C Blocked and Unblocked, Class D Blocked).⁴ However, when graphed in terms of pounds transferred, the GAF transfers are a much smaller percentage, consistent with the fact that GAF transfers are comprised of fewer pounds on average than commercial-to-commercial transfers (Figure 2). A useful reference point is the TAC. In the Area 2C, Class C, Blocked submarket commercial transfers make up ~3-9% of the 2008-2015 TACs, whereas GAF pounds transferred comprise less than 2% of the TAC; in Area 2C, Class D, Blocked submarket commercial trades total ~6-11% of the TACs from 2008-15, whereas GAF transfers total less than 4%.

⁴ We include IFQ that is moving one way or another through official channels (self and market leases), any IFQ regardless of the type of commercial transaction (e.g., lease or Full-IFQ), and do not remove family sales or self-transfers.

GAF Quantity Transferred

One of the dominant characteristics of GAF transfers is that they are small relative to IFQ pounds transferred within the commercial sector (Table 4). While Area 3A transfers tend to be larger than those for Area 2C, GAF transfers are on-average approximately one-sixth the size of transfers within the commercial industry. These transfers to the charter sector arise from 43 IFQ owners in 2014 and 47 in 2015.

Regarding the nature of the activity in the market, important questions are what share of the IFQ quota holdings are being converted into GAF and whether the limits on how many pounds of IFQ can be converted into GAF are binding. Figure 3 shows the share of IFQ quota being converted for different size IFQ holders.

An IFQ owner may be limited in how much IFQ can be transferred in three ways. First, the owner may own fewer than 1,500 pounds and therefore cannot trade more than they own. Second, the owner may own greater than 1,500 pounds but fewer than 15,000 pounds (10% equals 1,500) in Area 2C or 10,000 pounds (15% equals 1,500) in 3A and therefore is constrained by the 1,500 pound limit. Third, the owner may own greater than 15,000 pounds (10% equals 1,500) in Area 2C (or 10,000 pounds (15% equals 1,500) in 3A) and be bound by the 10% (15% limits).

Just under half of the IFQ owners that transfer IFQ pounds to GAF were allocated fewer than 1,500 pounds of GAF. The vast majority of the owners that own fewer than 1,500 pounds transfer 90% or more of their pounds (14 out of 19 in 2014 and 15 out of 19 in 2015). There are 23 owners in 2014 and 25 in 2015 that own greater than 1,500 pounds. Of those, only nine (five in 2014 and four in 2015) own more than 15,000 pounds (10% equals 1,500) in Area 2C or 10,000 pounds (15% equals 1,500) in 3A. Of those that hold between 1,500-15,000 pounds in 2C or 1,500-10,000 pounds in 3A, many hold only slightly more than 1,500 pounds and transfer close to their full allocation.

Self-Leasing

Of the 257 trades between the commercial and charter sectors in 2014 and 2015, 40 are self-leases—i.e., the same individual transfers their IFQ pounds to their charter operation. This is possible because regulations allow an individual to own one or more CHPs as well as

commercial halibut QS and IFQ.⁵ In Table 6 we decompose the universe of 2014 CHP holders (565 individuals) into those who own commercial QS and those who do not. Of the 565 CHP holders, 40 also own commercial QS in an area that matches at least one of their CHP, and therefore are eligible to transfer IFQ to their charter operation.

We then examine whether eligible individuals leased to themselves. If an individual holds at least one CHP and own at least one pound of IFQ in the same area, we consider them a potential self-leaser. We find that CHP holders who can self-lease take advantage of it rather than engaging in a lease with another IFQ holder: in 2014 of the 40 CHP holders who could self-lease 14 did, while fewer than three engaged in market leases (see Table 6). The breakdown is similar by area.

Transfer Prices

We compare GAF prices paid per pound to commercial transfer prices⁶ and ex-vessel prices. We calculate average per-pound GAF prices by averaging the prices listed for transfers with reported prices and that meet our criteria for an “arms-length” transfer (e.g., we drop self-transfers, and transfers between family members). Because commercial transfer prices include IFQ as well as a percentage of future TACs, we assume that expectations for the future are similar to that for the current period to calculate an implied lease price (equal to the asset price per pound multiplied by a discount rate). We assume a range of discount rates (5%, 9%, and 15%).⁷

When presenting commercial quota prices we focus on Class D blocked IFQ transfer prices for two reasons. First, Kroetz, Sanchirico, and Lew (2015) find that Class D blocked QS has the lowest per-unit value in the fishery. Therefore, we expect Class D blocked IFQ owners

⁵ We analyze self-leasing at the permit-holder level, using the NMFS ID associated with each CHP and IFQ permit to determine whether the individual owns both a CHP and IFQ in the same area. Because both CHP and QS are area specific, we only count an individual as “owning quota” if the area designation of the quota matches that of at least one CHP.

⁶ We only consider transfers that include IFQ pounds and QS quantities. See Kroetz et al. (2015) for more information on the different types of transfers.

⁷ We collected data on Canadian halibut asset and lease prices (DFO, 2016). For the years where both asset and lease prices are available, the rate of return ranged from 6.43% to 10.59%, with an average rate of return of 9%. We present a price series based on a 15% discount rate to bracket the GAF prices.

to be willing to sell for the lowest price. Second, the Class D quota owners are a significant source of GAF in each area (see previous section).

We find that the per-unit price paid by the charter sector for GAF is higher than that observed in the commercial sector for within sector IFQ transfers under the assumption that expectations about the future are similar to the current period and assuming a discount rate of 9%. The GAF price per pound would approximately equal the commercial price per pound with a discount rate between 9% and 15% (Figures 4a and 4b).

Another relevant and interesting comparison is between the GAF price and the commercial ex-vessel price.⁸ The commercial ex-vessel price should represent an upper-bound on the willingness-to-pay of a commercial fishermen for a pound of IFQ. Specifically, the commercial fishermen will receive the ex-vessel price upon landing, and will occur expenses in the harvesting process. The proximity of the GAF price to the ex-vessel price, particularly in Area 2C, reveals a high willingness-to-pay for halibut pounds by the charter sector that may be greater than that in the commercial sector (Figures 4a and 4b).

Conclusion

Analyzing the number and volume of transfers at the submarket (unique quota area, class, and blocking combination) level suggests that the impacts of the program on the commercial sector are complex and heterogeneous. In several IFQ submarkets and years, GAF transfers make up over half of the total number of transactions. These submarkets are also those with the smallest-scale fishermen. This suggests differential impacts of the GAF leasing provision, with small-scale fishermen the most likely commercial fishermen to experience an impact. Any changes to the program are also likely to be borne by small-scale commercial fishermen, as those leasing GAF tend to own relatively small quantities of IFQ and tend to lease the entire amount as GAF.

We also find that the charter sector leases very little GAF relative to the program limits. Across the years and areas a CHP holder never approaches the limit on the GAF they could lease in. This is interesting in light of the high GAF transfer prices we observe, both relative to commercial quota prices and the ex-vessel price. Given the small quantities leased relative to

⁸ We use area-specific ex-vessel prices from CFEC and AKFIN, available: <https://alaskafisheries.noaa.gov/fisheries-data-reports?tid=287>.

commercial leases, it may be a higher per-unit price reflects additional transaction costs from engaging with charter operators. Another political-economy explanation that could be explored in future work is that some charter operators are not engaging in the program because of their negative perception of it (Lew, Putman, and Larson, 2016) and lack of participation could lead to program changes. Further analysis could also examine whether IFQ prices change in the submarkets due to the GAF provision.

Finally, there are interesting questions related to how the program has and may evolve over time. First, uncertainty over the future of the program may impact how fishermen responded in the early years, potentially discouraging them from investing time in understanding the program and market. Second, the lack of an ability to buy permanent allocations may impact the ability of charter operators to plan for the future and therefore diminish the value of inter-sector trades; at the least there is transaction cost to returning to the market for quota each year.

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Tables and Figures

Table 1: 2014 Commercial IFQ Pounds Transferred and Number of Transfers by Area, Class, and Blocking Status

The number of transfers for each submarket (area/class/blocking combination) is shown in parentheses.
Totals are not reported due to confidentiality.

	Area 2C		Area 3A	
	Blocked	Unblocked	Blocked	Unblocked
Class A	14,453 (7)	3,178 (3)	Confidential	Confidential
Class B	16,820 (9)	9,568 (6)	27,198 (11)	77,806 (17)
Class C	154,519 (74)	25,358 (11)	157,231 (96)	198,824 (27)
Class D	51,416 (42)	Confidential	44,690 (48)	Confidential

Table 2: GAF Transfers

	Area 2C		Area 3A	
	2014	2015	2014	2015
Total Transfers	92	121	19	25
Pounds Transferred	29,498	36,934	11,654	10,337
Transfers with Prices	71	93	9	13
Commercial Transferors	33	38	10	10
Charter Transferees	32	34	10	10
Conversion Factor (Scheurer, 2016)	26.4	67.3	12.8	38.4
GAF Harvested (pounds)	800	269	428	143

Table 3: 2014 Pounds Transferred as GAF and Number of Transfers by Area, Class, and Blocking Status

The number of transfers for each submarket (area/class/blocking combination) is shown in parentheses.
In 2015 the distribution of trades and quantities transferred is similar; see the Appendix for specific numbers. Totals are not reported due to confidentiality.

	Area 2C		Area 3A	
	Blocked	Unblocked	Blocked	Unblocked
Class A	-	-	-	-
Class B	-	-	1,408 (3)	Confidential
Class C	11,897 (39)	4,148 (12)	2,996 (4)	1,665 (5)
Class D	13,453 (41)	Confidential	2,934 (6)	Confidential

Table 4: Average IFQ Pounds in Transfer, by Transfer Type

The number of transfers used to calculate the average is in parentheses.

	Area 2C		Area 3A	
	2014	2015	2014	2015
Commercial to Charter (GAF)	320 (92)	305 (121)	613 (19)	413 (25)
Commercial to Commercial	1,811 (152)	1,842 (124)	2,571 (201)	2,731 (204)

Table 5: Individuals (identified by NMFS IDs) with a CHP in 2014

Totals are not reported due to confidentiality.

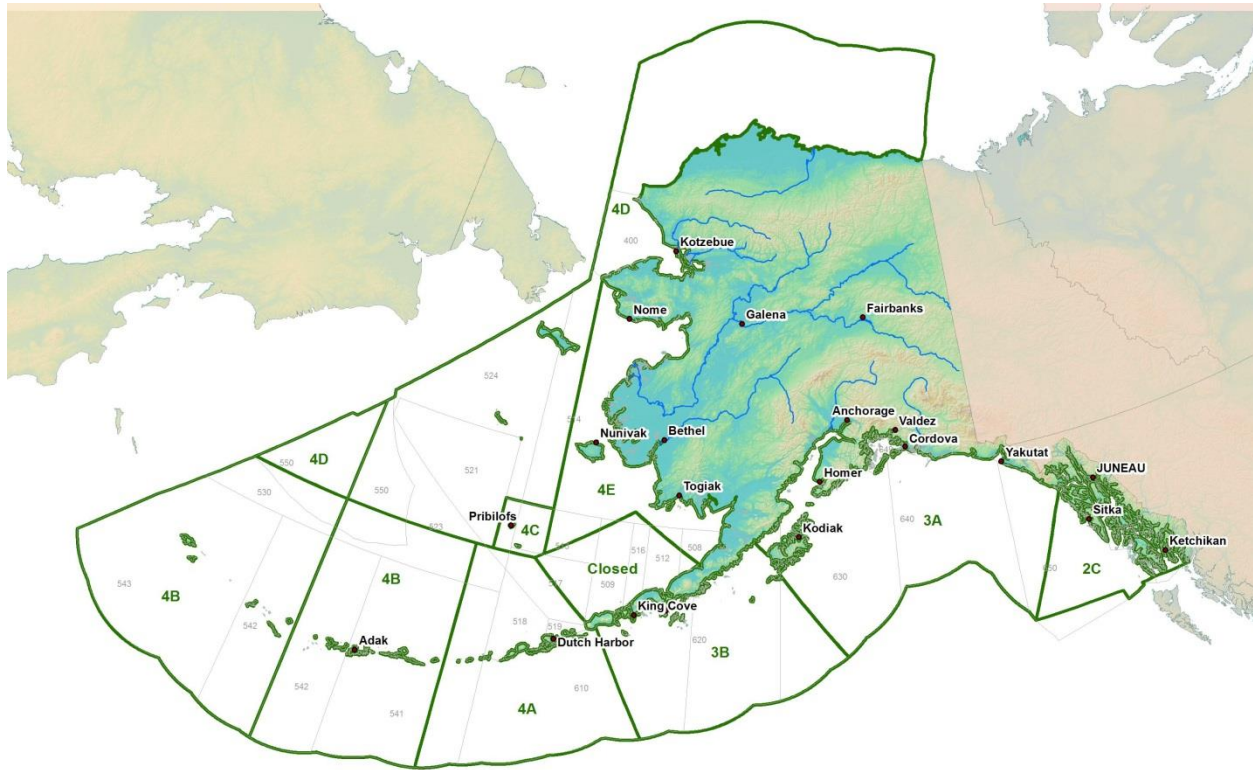
	Do Not Own Quota	Own Quota
Area 2C	239	19
Area 3A	281	19
CHP in Both Areas	5	Confidential

Table 6: 2014 Self-Lease Potential and Observed Leasing Activity

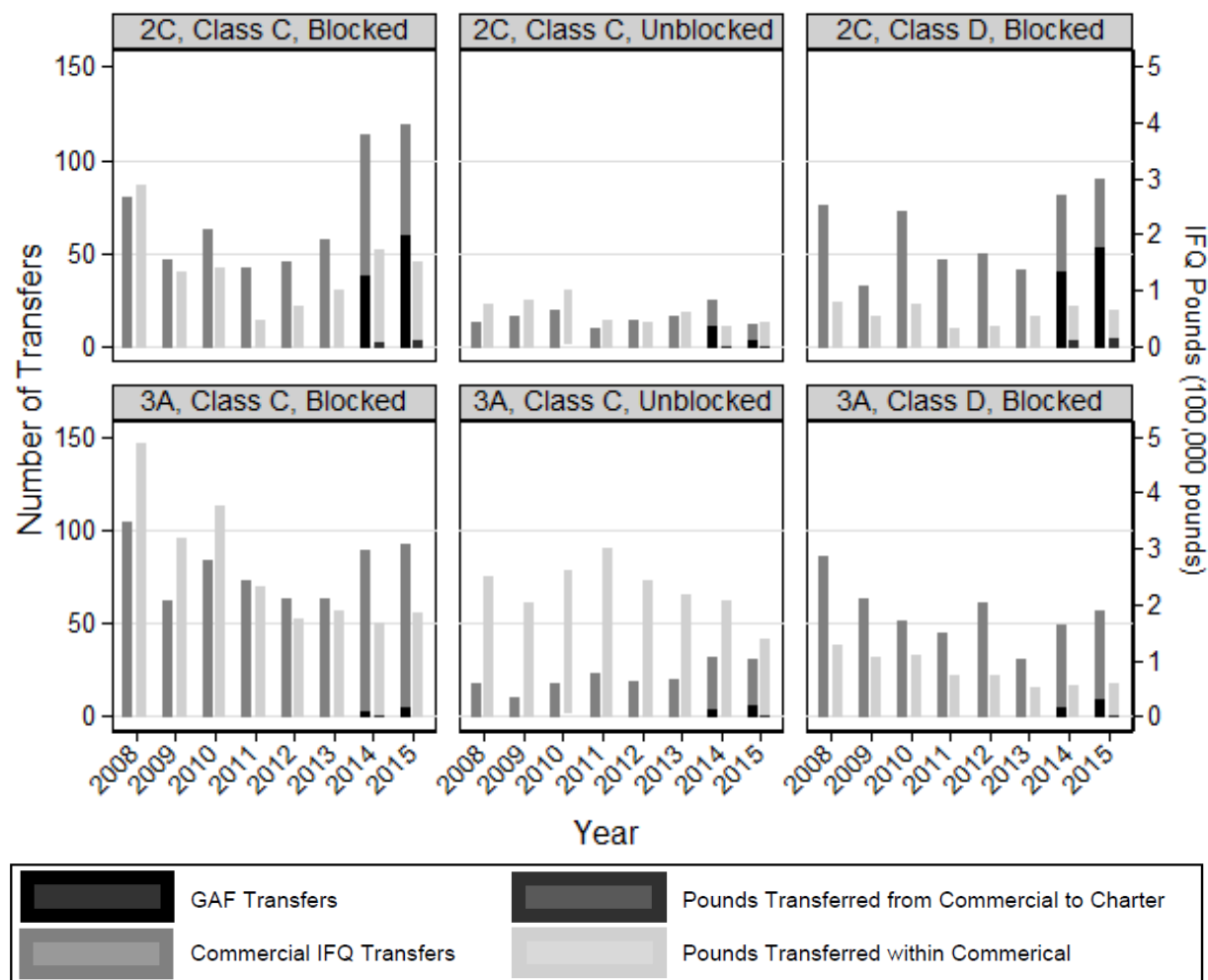
The percentages are based on the self-leasing potential (own both commercial IFQ and a CHP permit) and observed leasing activity for the 2014 CHP holders. Totals are not reported due to confidentiality.

	Open-Market Lease	Self-Lease	Did Not Lease
Could Self-Lease	Confidential	14 (2%)	24 (4%)
No Self-Lease Potential	24 (4%)	0 (0%)	501 (89%)

Figure 1: Pacific Halibut Fishing Areas



Available: <https://alaskafisheries.noaa.gov/maps>.

Figure 2: Number of Transfers and Pounds Transferred by Sub-market and Year

Note: For each year the bar on the left represents transfers and the bar on the right pounds.

Figure 3: Individual Transfers to Charter Sector Relative to Commercial IFQ Holdings

Each bar represents the average IFQ owned and average pounds transferred of 3-5 individuals who lease IFQ to the Charter sector. Individuals are grouped to preserve confidentiality and the groups are formed by grouping the three smallest IFQ owners, the next three largest, and so on.

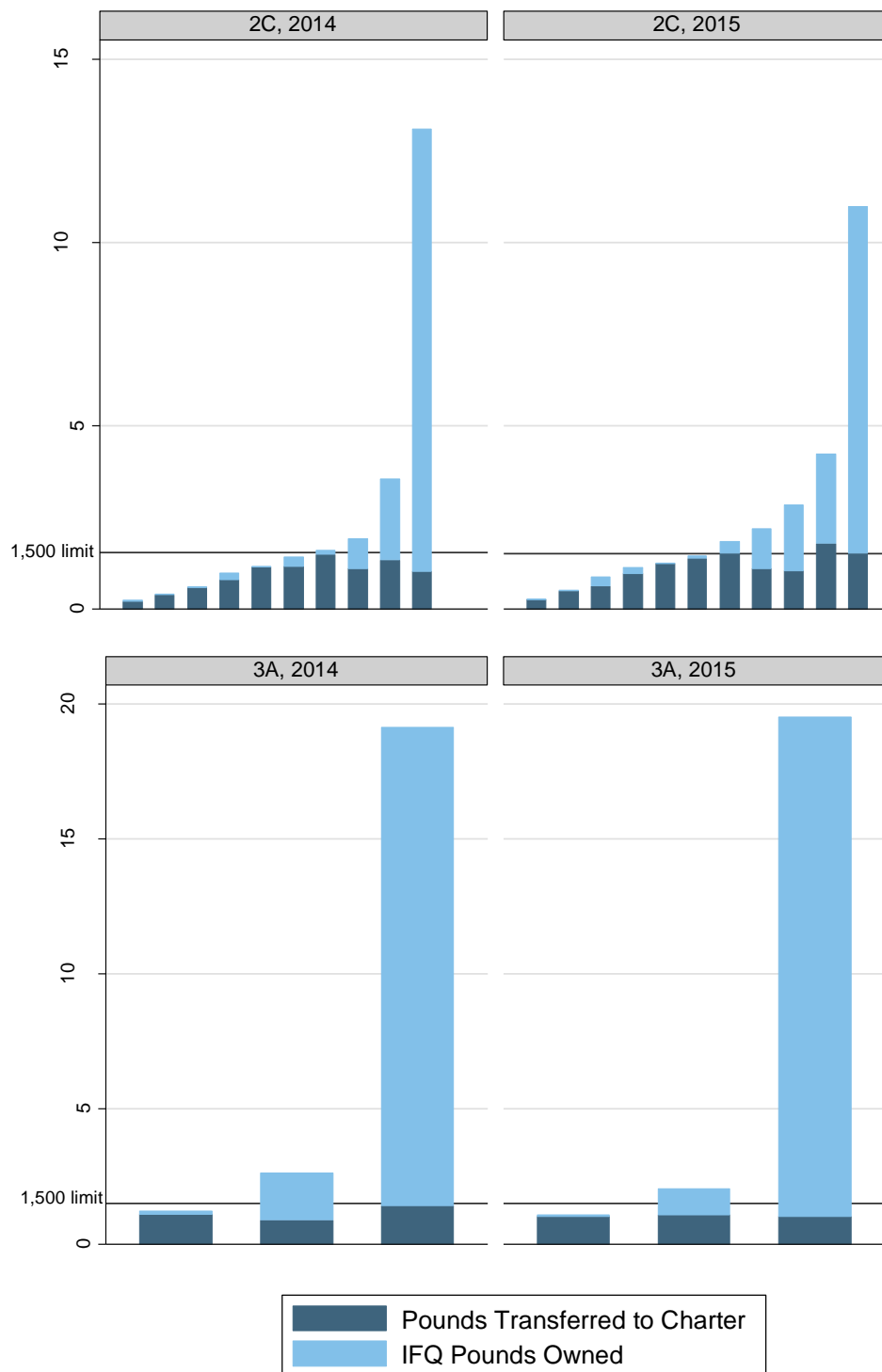
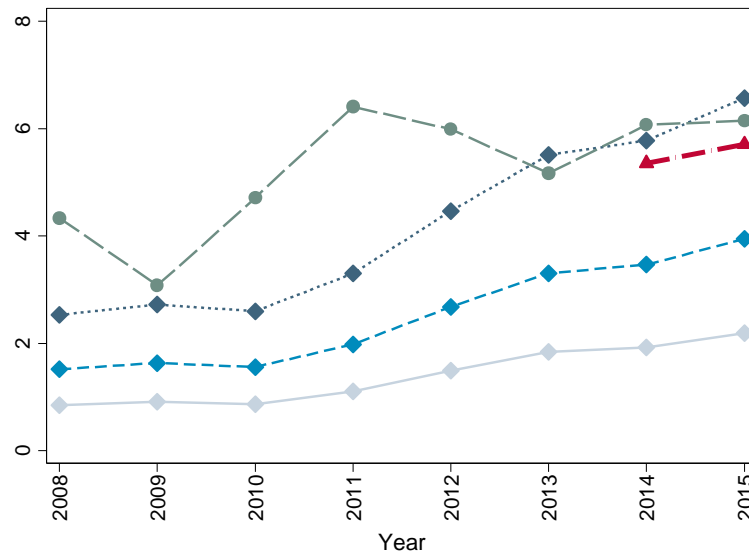
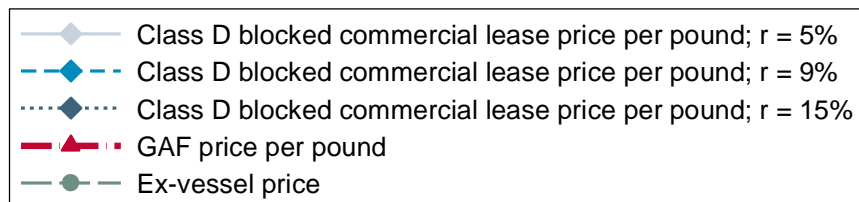
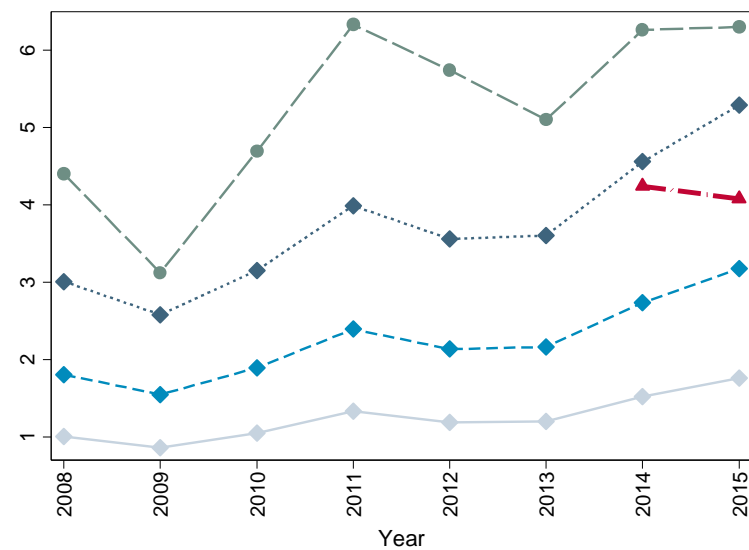


Figure 4: Real Implied Commercial IFQ Price per Pound ($r=5\%$; 9% ; 15%), GAF Price-per Pound, and Ex-Vessel Price per Pound

(a) Area 2C



(b) Area 3A



Appendix

Charter Sector Background

As described in the paper, a CHP is required to retain halibut on guided charter trips. Without GAF, the guided charter sector faces restrictions that vary by area and year (Table A.1). The limits for guided charter trips (the focus of the GAF program) are generally more restrictive than those for unguided trips.

There are also restrictions on the number of anglers that can be brought out on a trip. Each CHP has a maximum number of anglers associated with it. The permits can be stacked, allowing a fisherman to take up to the sum of the number of anglers associated with the permits held. There are just under 1,000 permits in the fishery, with many participants owning more than one permit.

Table A.1: Regulations for Sport Halibut Fishing

		2014	2015	2016
Area 2C	Guided	Bag limit: 1 fish per day Size restriction: length ≤44" or ≥76"	Bag limit: 1 fish per day Size restriction: length ≤42" or ≥80"	Bag limit: 1 fish per day Size restriction: length ≤43" or ≥80"
	Unguided	Bag limit: 2 fish per day No size restriction	Bag limit: 2 fish per day No size restriction	Bag limit: 2 fish per day No size restriction
Area 3A	Guided	Bag limit: 2 fish per day Size restriction: one fish must be ≤29" if two fish are retained Trip limit: 1 trip per day	Bag limit: 2 fish per day Annual limit: 5 fish Size restriction: one fish must be ≤29" if two fish are retained Thursday closure Trip limit: 1 trip per day	Bag limit: 2 fish per day Annual limit: 4 fish Size restriction: one fish must be ≤28" if two fish are retained Wednesday closure Trip limit: 1 trip per day
	Unguided	Bag limit: 2 fish per day No size restriction	Bag limit: 2 fish per day No size restriction	Bag limit: 2 fish per day No size restriction

Source: IPHC 2014, NOAA 2015, NOAA 2016b

In Table A.2 and Table A.3 we provide basic summary statistics regarding CHP holders. We present statistics for 2014; 2015 statistics are similar. For a more in-depth examination see NPFMC (2016). As of the end of 2014, there were approximately 565 individuals holding at

least one CHP in either Area 2C or 3A. There were an approximately equal number of CHP holders in each area, and seven individuals hold permits in both areas (Table A.2).

We also examine CHP holders in terms of whether or not their permits are transferrable and the number of anglers they are endorsed for. In Table A.3 we group individuals who hold only non-transferrable permits and those who hold at least one transferrable permit. Most individuals hold at least one transferrable permit (Table A.3). We also group those who only hold permits authorized for 6 or fewer angler and those who hold at least one permit certified for more than 6 anglers. Additionally, most do not hold a permit that is endorsed for more than six anglers (Table A.3).

There is significant heterogeneity in the use of GAF by the Charter sector across years and areas (Table A.4). Relatively more GAF was harvested in 2014, and more GAF is used in Area 2C relative to 3A.

Table A.2: 2014 Individual (NMFS ID) CHP Holders by Area

	Number of CHP Holders
Area 2C	258
Area 3A	300
CHP in Both Area	7
TOTAL CHP Holders	565

Table A.3: 2014 Permit Attributes

	At least one Transferrable CHP	Non-Transferrable CHPs	Total
At least one Permit with 7 or more Angler Endorsements	73	8	81
All Permits 6 or Fewer Angler Endorsements	372	112	484
TOTAL	445	120	565

Table A.4: GAF Harvested by Year and Area

	2014	2015
Area 2C	800	428
Area 3A	269	143
TOTAL	1,069	571

Commercial Sector Overview

Commercial quota carry an area, class, and blocking designation (see summary of the program in the main text and for more detailed information see Kroetz, Sanchirico, and Lew (2015)). We provide an overview here using 2014 data. In Table A.5 we summarize the number of QS owners by QS designation. The number of owners is slightly higher in Area 3A (1,278 compared to 977 in Area 2C), and the distribution of ownership by vessel class and blocking designation varies by area. In both areas the largest number of individuals hold Class C quota, followed by Class D, Class B, and Class A (Table A.7).

We provide a general sense of the characteristics of transfers in Table A.6 and Table A.7 by summarizing the 2014 holdings and transfers, respectively. We focus on transfers that include IFQ (excluding those that only include QS) when calculating the summary statistics. In both Areas 2C and 3A over half of transfers and over half of the IFQ pounds transferred carry a Class C designation (meaning halibut must be fished on a vessel between 35 and 60 feet in length). Among the Class C transfers, a significant portion is blocked. In Area 2C, the second largest number of transfers and transfer of poundage carries a Class D designation, and the third largest Class B. In Area 3A, Class D ranks above Class B by number of transactions, but in terms of poundage the order is preserved.

Table A.5 2014 Commercial Quota Share Owners

The total per area is not the sum of the CHP holders by class and blocking status because it is possible to own more than one type of quota.

	Area 2C		Area 3A	
	Blocked	Unblocked	Blocked	Unblocked
Class A	17	10	20	18
Class B	32	25	109	200
Class C	577	121	661	220
Class D	341	3	363	11
TOTAL	977		1,278	

Table A.6 2014 Commercial IFQ Transfers by Area, Class, and Blocking Status

Totals are not reported due to confidentiality.

	Area 2C		Area 3A	
	Blocked	Unblocked	Blocked	Unblocked
Class A	7	3	Confidential	Confidential
Class B	9	6	11	17
Class C	74	11	96	27
Class D	42	Confidential	48	Confidential

Table A.7 2014 Commercial IFQ Pounds Transferred by Area, Class, and Blocking Status

Totals are not reported due to confidentiality.

	Area 2C		Area 3A	
	Blocked	Unblocked	Blocked	Unblocked
Class A	14,453	3,178	Confidential	Confidential
Class B	16,820	9,568	27,198	77,806
Class C	154,519	25,358	157,231	198,824
Class D	51,416	Confidential	44,690	Confidential

Overlap in Quota Ownership between Submarkets

There are no restrictions on owning and fishing quota in multiple regions. Furthermore, although there are owner-on-board restrictions in the fishery, it is possible for individuals to own and fish quota of different size classes. This can be accomplished through owning (a percentage of) multiple vessels, or by taking advantage of fishing up/down provisions that allow IFQ to be fished on a vessel of a length that does not match the IFQ designation.

To characterize overlap in QS ownership between submarkets (area/class/blocking combinations), we begin by identifying areas with high GAF leasing. We then identify submarkets where 5% or more of the individuals that own quota in the high GAF leasing areas also own quota in the submarket. We list the ownership (if the 5% threshold is met) in Table 1.8. Further work could include examination of vessel overlap between regions, using landings data to summarize the extent to which vessels fish in multiple regions.

There is significant overlap in quota ownership between the smaller class categories in Areas 2C and 3A, and to a lesser extent Area 3B (Table A.8).

Table A.8: Overlap in commercial quota ownership between submarkets

			Submarkets with high overlap											
			Area 2C				Area 3A				Area 3B			
			Class B		Class C		Class D		Class B		Class C		Class D	
Sub-markets with high GAF leasing activity			Unblocked	Blocked	Unblocked	Blocked	Blocked	Unblocked	Blocked	Unblocked	Blocked	Blocked	Unblocked	Blocked
Area 2C	Class C	Blocked		577	72	36			125	46				
		Unblocked	7	72	121		7	39	21					
	Class D	Blocked		36		341								
Area 3A	Class C	Blocked		125	39		39	661	106	45		98		
		Unblocked		46			51	106	220		23	51	34	
	Class D	Blocked						45		363				25

* bold denotes number in high-GAF submarket

* The number of commercial IFQ quota owners in each submarket is in-bold. Numbers are presented only for those submarkets where 5% or more of the participants in the high-GAF submarkets (rows) also hold quota share in the submarket.

Sector Overlap

Regulations allow an individual to own one or more CHP as well as commercial halibut QS and IFQ. In Table A.9 we break the universe of CHP holders (565 individuals) into those who own commercial QS and those who do not. Because both CHP and QS are area specific, we only count an individual as “owning quota” if the area designation of the quota matches that of at least one CHP. Of the 565 CHP holders, 40 also own commercial QS in an area that matches at least one of their CHP, and therefore are eligible to transfer IFQ to their charter operation.⁹

Table A.9 Individuals (identified by NMFS IDs) with a CHP and QS in 2014

Totals are not reported due to confidentiality.

	Do Not Own Quota	Own Quota	Total
Area 2C	239	19	258
Area 3A	281	19	300
CHP in Both Areas	5	Confidential	Confidential

GAF Transfers

In this section we summarize the transfers that occur between the commercial and charter sectors in terms of number of transfers and pounds transferred, number of individuals engaged in transfers, whether regulatory limits on transfers bind, characteristics of the IFQ transferred as GAF, whether self-leasing occurs, quantities transferred, and transfer prices.

Fundamental to the transfer market is the need to convert IFQ, measured in pounds, to GAF, measured in fish. When a transfer occurs between the two sectors IFQ pounds are converted to GAF halibut. The conversion factors for 2014 through 2016 are listed in Table A.10.

Table A.10: Annual Guided Angler Fish (GAF) Conversion Factor (in pounds of IFQ per GAF)

	2014	2015	2016
Area 2C	26.4	67.3	65.1
Area 3A	12.8	38.4	36.1

Source: Scheurer 2016

⁹ These numbers are lower than the 43 individuals in 2C and 37 in 3A reported in NPFMC (2016). Possible explanations include that the NPFMC (2016) count of individuals holding CHPs is higher and that the NPFMC (2016) counts do not require the IFQ permit holder and CHP holder to hold permits in the same area.

Number of Transfers and Pounds Transferred

We begin by summarizing the number of transfers and quantity transferred by area (Tables A.11-A.14). There are significantly more transactions and IFQ transferred in Area 2C relative to 3A. We also track whether the transactions were between the same entity (same NMFS ID) and whether some or all of the IFQ were returned. See the description of the program in the main text for details on how unused GAF can be voluntarily turned back into IFQ and returned to the original IFQ owner, or, at the end of the fishing season are automatically returned.

In both areas it is common that at least some IFQ are returned. Self-leasing varies by region; it is the dominant form of leasing in Area 3A in both years, but represents a smaller share of total leases in Area 2C. We also calculate how many pounds are returned (out of total pounds transferred). The percentage is higher for self-transfers (Table A.14).

Table A.11: Number of Leases for GAF: Area 2C

Totals are not reported due to confidentiality.

	Transferred, none returned	Transfer with some GAF returned
2014		
Self-Lease	Confidential	11
Market Lease	49	30
2015		
Self-Lease	6	Confidential
Market Lease	71	42

Table A.12: Number of Leases for GAF: Area 3A

	Transferred, none returned	Transfer with some GAF returned	Total Transfers
2014			
Self-Lease	-	9	9
Market Lease	-	10	10
TOTAL	-	19	19
2015			
Self-Lease	-	10	10
Market Lease	5	10	15
TOTAL	5	20	25

Table A.13 Pounds (fish) Leased: Area 2C

Total GAF fish in parentheses. Totals are not reported due to confidentiality.

	Transferred, none returned	Transfer with some IFQ returned	Total Transferred	% of Total Pounds Transferred Returned
2014				
Self-Leases	Confidential	5,468	5,812	70%
Market Leases	12,717	10,969	23,686	18%
2015				
Self-Leases	1,753	Confidential	2,696	32%
Market Leases	19,547	14,691	34,238	21%

Table A.14 Pounds (fish) Leased: Area 3A

Total GAF fish in parentheses.

	Transferred, none returned	Transfer with > 1 IFQ returned	Total Transferred	% of Total Pounds Transferred Returned
2014				
Self-Leases	-	5,840	5,840	69%
Market Leases	-	5,814	5,814	72%
TOTAL	-	11,654 (910)	11,654 (910)	71%
2015				
Self-Leases	-	5,416	5,416	60%
Market Leases	1,346	3,575	4,921	35%
TOTAL	1,346 (35)	8,991 (234)	10,337 (269)	48%

Market Participation

To gauge market participation, we count the number of unique individuals transferring from the commercial sector (transferors) and receiving in the charter sector (transferees) (Table 1.15). The number of unique transfers and transferees in 2C is approximately triple that in 3A.

Table A.15: GAF Transferors and Transferees

The NMFS ID is used to identify a unique transferor and transferee.

	Area 2C		Area 3A	
	2014	2015	2014	2015
Unique Transferors	33	38	10	10
Unique Transferees	32	34	10	10

Are Regulatory Limits on Transfers Binding?

An important factor in understanding the GAF market is whether the restrictions on transfers bind. We begin by examining whether the transfers to a particular CHP holder approach the limit a CHP permit can accept (the limits are listed in Table A.16). None come close (Figure A.1).

To examine transfers relative to the limit on transfers from an IFQ owner to the charter sector we first calculate yearly IFQ ownership using RAM data on QS ownership and the area-specific QS to IFQ ratios. Aggregating IFQ pounds by area and NMFS ID we establish total IFQ ownership for each individual (NMFS ID). Linking the ownership data to the IFQ owner engaged in each transaction allows us to compare, for each year and owner, total transfers to the charter sector and total ownership. There are 42 IFQ owners in 2014 and 44 in 2015 that transfer to the charter sector.

An IFQ owner may be limited in how much IFQ can be transferred in 3 ways. First, the owner may own fewer than 1,500 pounds and therefore cannot trade more than they own. Second, the owner may own greater than 1,500 pounds but fewer than 15,000 pounds (10% equals 1,500) in Area 2C or 10,000 pounds (15% equals 1,500) in 3A and therefore is constrained by the 1,500 pound limit. Third, the owner may own greater than 15,000 pounds (10% equals 1,500) in Area 2C or 10,000 pounds (15% equals 1,500) in 3A and be bound by the 10%/15% limits.

Just under half of the IFQ owners that transfer IFQ pounds to GAF were allocated fewer than 1,500 pounds of GAF. The vast majority of these owners that own fewer than 1,500 pounds transfer close to 100% of their pounds (we use a 90% threshold for the summary statistics). About 14 out of 19 in 2014 and 15 out of 19 in 2015 with 1,500 pounds or fewer transfer 90% or more of their pounds.

Of the remaining 23 owners in 2014 and 25 in 2015 only 9 (5 in 2014 and 4 in 2015) own more than 15,000 pounds (10% equals 1,500) in Area 2C or 10,000 pounds (15% equals 1,500) in 3A. Of those below this limit, many are close to the limits (Figure A.2), in 2014 12 of 23 are within 100 of 1,500 and in 2015 13/25.

Table A.16: Maximum Transfers of ITQ to GAF

The table lists the maximum IFQ pounds that a CHP holder can accept, along with the corresponding limit in terms of GAF, by the angler endorsement of the CHP.

Endorse -ments	2014				2015				2016			
	2C		3A		2C		3A		2C		3A	
	GAF	Lbs	GAF	Lbs	GAF	Lbs	GAF	Lbs	GAF	Lbs	GAF	Lbs
1-6	400	10,560	400	5,120	400	26,920	400	15,360	400	26,040	400	14,440
>6	600	15,840	600	7,680	600	40,380	600	23,040	600	39,060	600	21,660

Source: Scheurer 2016, NOAA 2014

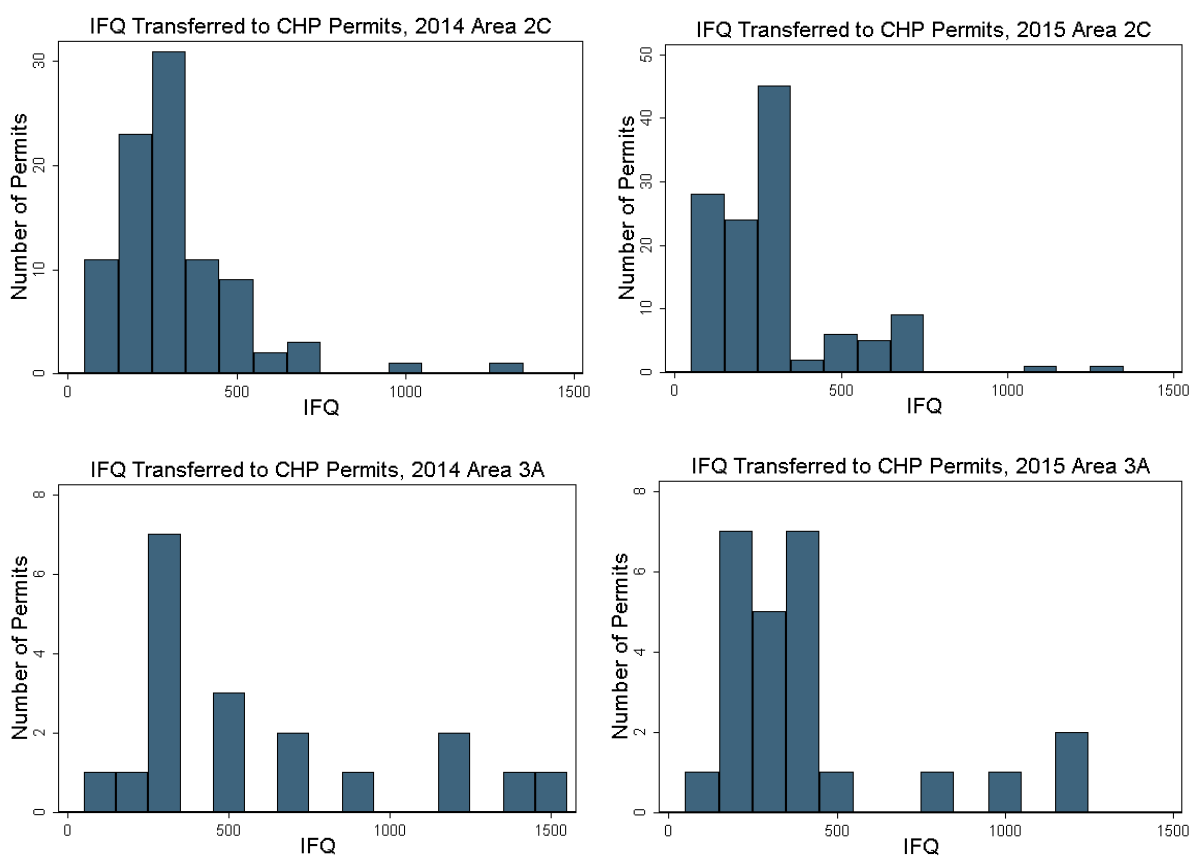
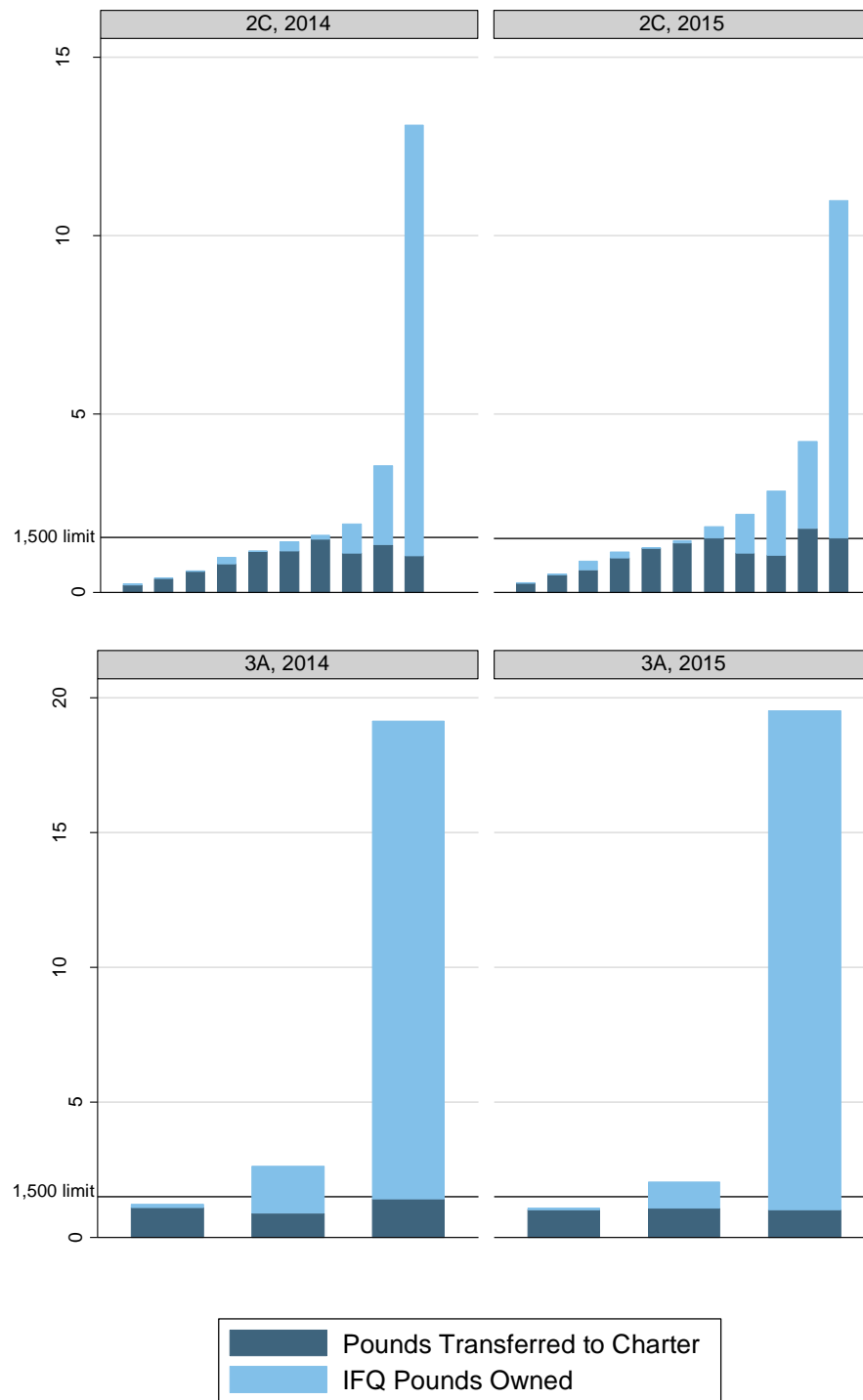
Figure A.1: IFQ Transferred to each CHP

Figure A.2: Individual Transfers to Charter Sector Relative to Commercial IFQ Holdings

Each bar represents the average IFQ owned and average pounds transferred of 3-5 individuals who lease IFQ to the Charter sector. Individuals are grouped to preserve confidentiality and the groups are formed by grouping the three smallest IFQ owners, the next three largest, and so on.



Characteristics of IFQ Sold as GAF

Understanding the impact of the GAF provision on the commercial sector requires understanding the characteristics of quota being sold as GAF. In the following tables (Tables A.17-A.20) we summarize transfers in terms of IFQ characteristics. Both in terms of number of transactions and pounds transferred for GAF, most are Class C or D. In Area 2C the vast majority of transactions and IFQ are from blocked quota share.

Table A.17 Number of Leases, by Characteristics of IFQ Sold for GAF: Area 2C

Totals are not reported due to confidentiality.

	Class B		Class C		Class D	
	Blocked	Unblocked	Blocked	Unblocked	Blocked	
2014						
Self-Leases	-	5	Confidential	-		7
Market Leases	-	7	38	-		34
2015						
Self-Leases		-	Confidential	-		6
Market Leases	3	4	58	-		48

Table A.18 Number of Leases, by Characteristics of IFQ Sold for GAF: Area 3A

Totals are not reported due to confidentiality.

	Class B		Class C		Class D	
	Unblocked	Blocked	Unblocked	Blocked	Unblocked	Blocked
2014						
Self-Leases	-	-	3	Confidential	-	4
Market	3	Confidential	Confidential	Confidential	-	Confidential
2015						
Self-Leases	-	-	3	3	-	4
Market Leases	Confidential	-	4	3	-	6

Table A.19 Pounds Sold for GAF, by Characteristics of IFQ: Area 2C

Totals are not reported due to confidentiality.

	Class B		Class C		Class D	
	Blocked	Unblocked	Blocked	Unblocked	Blocked	
2014						
Self-Leases	-	1,479	Confidential	-		3,805
Market Leases	-	2,669	11,369	-		9,648
2015						
Self-Leases		-	Confidential	-		2,358
Market Leases	1,280	1,886	15,168	-		15,904

Table A.20 Pounds Sold for GAF, by Characteristics of IFQ Sold: Area 3A

Totals are not reported due to confidentiality.

	Class B		Class C		Class D	
	Unblocked	Blocked	Unblocked	Blocked	Unblocked	Blocked
2014						
Self-Leases	-	-	999	Confidential	-	2,639
Market	2,651	Confidential	Confidential	Confidential	-	Confidential
2015						
Self-Leases	-	-	1,076	2,074	-	2,266
Market	Confidential	-	1,921	731	-	1,577

Self-Leasing

Another important aspect of transfers from the charter to the commercial sector is self-leasing, or when the same individual transfers their IFQ pounds to their charter permit. We analyze self-leasing at the permit-holder level. We use the NMFS ID associated with each CHP and IFQ permit to determine whether the individual owns both a CHP and IFQ in the same area and whether they leased to themselves. If they hold at least one CHP and own at least one pound of IFQ in the same area, we consider them a potential self-leaser. In Tables A.21 and A.22 we summarize self-leasing potential and leasing market participation. We find that CHP holders who can self-lease take advantage of it rather than engaging in a lease with another IFQ holder: in 2014 of the 40 CHP holders who could self-lease 14 did, while only 2 engaged in market leases.

We break down leasing activity by charter permit transferability and charter permit size in Tables A.23 and A.24. In general, those with transferable permits were more apt to lease. There is not a clear trend in leasing activity by permit size.

Table A.21 2014 Self-Lease Potential and Observed Leasing Activity

Totals are not reported due to confidentiality.

	Open-Market Lease	Self-Lease	Did Not Lease
Could Self-Lease	Confidential	14 (2%)	24 (4%)
No Self-Lease Potential	24 (4%)	0 (0%)	501 (89%)

Table A.22 2014 Self-Lease Potential and Observed Leasing Activity, by CHP Ownership Area

Percentages represent the percent of the column total. The rows and columns may not add to 100% due to rounding. "C" stands for confidential.

	Area 2C				Area 3A				Both Areas			
	Open-Market Lease	Self-Lease	Did Not Lease	TOTAL	Open-Market Lease	Self-Lease	Did Not Lease	TOTAL	Open-Market Lease	Self-Lease	Did Not Lease	TOTAL
Could Self-Lease	C	7 (3%)	10 (4%)	C	0 (0%)	5 (2%)	14 (5%)	19 (6%)	0 (0%)	C	0 (0%)	C
No Self-Lease Potential	16 (6%)	0 (0%)	223 (86%)	C	6 (2%)	0 (0%)	275 (92%)	281 (94%)	C	0 (0%)	3 (43%)	C
TOTAL	C	C	C	C	6 (2%)	5 (2%)	289 (96%)	300 (100%)	C	C	C	C

Table A.23 2014 Permit Transferability and Observed Leasing Activity

Totals are not reported due to confidentiality.

	Open-Market Lease	Self-Lease	Did Not Lease
At least one Transferrable CHP	23 (4%)	13 (2%)	409 (72%)
No Transferrable CHPs	3 (1%)	Confidential	116 (21%)

Table A.24 2014 Permit Size and Observed Leasing Activity

Totals are not reported due to confidentiality.

	Open-Market Lease	Self-Lease	Did Not Lease
At least one CHP with 7 or more Angler Endorsements	Confidential	Confidential	77 (14%)
All CHPs with 6 or Fewer Angler Endorsements	24 (4%)	12 (2%)	448 (79%)

Quantity Transferred

One of the dominant characteristics of GAF transfers is that they are relatively small relative to transfers of IFQ from one commercial operator to another, in terms of pounds (Table A.25). Area 3A transfers tend to be larger than those for Area 2C. Within each area, GAF transfers are generally around one-sixth the size of transfers within the commercial industry.

Table A.25 Average IFQ Pounds in Transfer, by Transfer Type

The number of transfers the average is based on is in parentheses.

	Area 2C		Area 3A	
	2014	2015	2014	2015
Commercial to Charter (GAF)	320 (92)	305 (121)	613 (19)	413 (25)
Commercial to Commercial	1,811 (152)	1,842 (124)	2,571 (201)	2,731 (204)

Transfer Prices

Finally, we summarize the prices paid when transfers occur and the price is recorded (Tables A.26 and A.27). The tables list average prices, which we calculate by averaging the prices listed for transfers with reported prices and that meet our criteria for a market transfer. When calculating the transfer price per pound we drop any self-transfers, defined as transfers where the buyer and seller have the same NMFS ID. To calculate the commercial prices we exclude any transfers where the field defining the relationship between the buyer and seller is filled in and the relationship is “family” and records where only quota share is transferred or only IFQ is transferred.

We compare GAF prices paid per pound to commercial IFQ transfer prices (Tables A.26 and A.27, Figures A.3 and A.4). We focus on Class D blocked IFQ transfer prices for two reasons. First, Kroetz, Sanchirico, and Lew (2015) find that Class D blocked QS has the lowest per-unit value in the fishery. Therefore, we expect Class D blocked IFQ owners to be willing to sell for the lowest price. Second, the Class D quota owners are a significant source of GAF in each area (Tables A.17-A.20).

We find that the per-unit price paid by the charter sector for GAF is higher than that observed in the commercial sector for within sector IFQ transfers under two assumptions. First, we assume that expectations for the future are similar to that for the current period, allowing us to calculate an implied lease price equal to the asset price per pound multiplied by a discount rate. Second, we assume a range of discount rates (5%, 9%, and 15%).¹⁰ We find that GAF price per pound would approximately equal the commercial price per pound with a discount rate between 9% and 15% (Figures A.3 and A.4).

Another relevant and interesting comparison is between the GAF price and the commercial ex-vessel price. The commercial ex-vessel price should represent an upper-bound on the willingness-to-pay of a commercial fishermen for a pound of IFQ. Specifically, the commercial fishermen will receive the ex-vessel price upon landing, and will occur expenses in the harvesting process. The proximity of the GAF price to the ex-vessel price suggests willingness-to-pay for halibut pounds may be higher in the charter sector relative to the commercial sector (Figure A.3 and A.4).

¹⁰ We collected data on Canadian halibut asset and lease prices (DFO, 2016). For the years where both asset and lease prices are available, the rate of return ranged from 6.43% to 10.59%, with an average rate of return of 9%. We present a price series based on a 15% discount rate to bracket the GAF prices.

Table A.26 Area 2C Prices (nominal USD)

Ex-vessel prices are available at <https://alaskafisheries.noaa.gov/fisheries-data-reports?tid=287>.

Year	Commercial Asset per Pound	Implied Commercial Lease Rate (r=9%)	GAF per Pound	RAM <35 ft (Class D) Blocked Asset per Pound	RAM <35 ft (Class D) Lease (r=9%)	Ex-Vessel Price per Pound
2008	18.48	1.66		15.42	1.39	4.33
2009	19.29	1.74		16.16	1.45	3.08
2010	18.99	1.71		16.07	1.45	4.71
2011	23.00	2.07		21.65	1.95	6.41
2012	31.97	2.88		29.83	2.69	5.99
2013	40.15	3.61		37.28	3.36	5.17
2014	42.67	3.84	5.56	39.83	3.58	6.07
2015	43.79	3.94	5.66	43.81	3.94	6.15

Table A.27 Area 3A Prices (nominal USD)

Ex-vessel prices are available at <https://alaskafisheries.noaa.gov/fisheries-data-reports?tid=287>.

Year	Commercial Asset per Pound	Implied Commercial Lease Rate (r=9%)	GAF per Pound	RAM <35 ft (Class D) Blocked Asset per Pound	RAM <35 ft (Class D) Lease (r=9%)	Ex-Vessel Price per Pound
2008	20.88	1.88		18.33	1.65	4.40
2009	17.84	1.61		15.31	1.38	3.12
2010	21.03	1.89		19.49	1.75	4.69
2011	29.37	2.64		26.14	2.35	6.33
2012	27.65	2.49		23.77	2.14	5.74
2013	26.95	2.43		24.37	2.19	5.10
2014	33.11	2.98	5.86	31.41	2.83	6.26
2015	40.62	3.66	4.37	35.25	3.17	6.30

Figure A.3: Real Implied Commercial IFQ Price per Pound ($r=5\%$; 9% ; 15%), GAF Price-per Pound, and Ex-Vessel Price per Pound: Area 2C

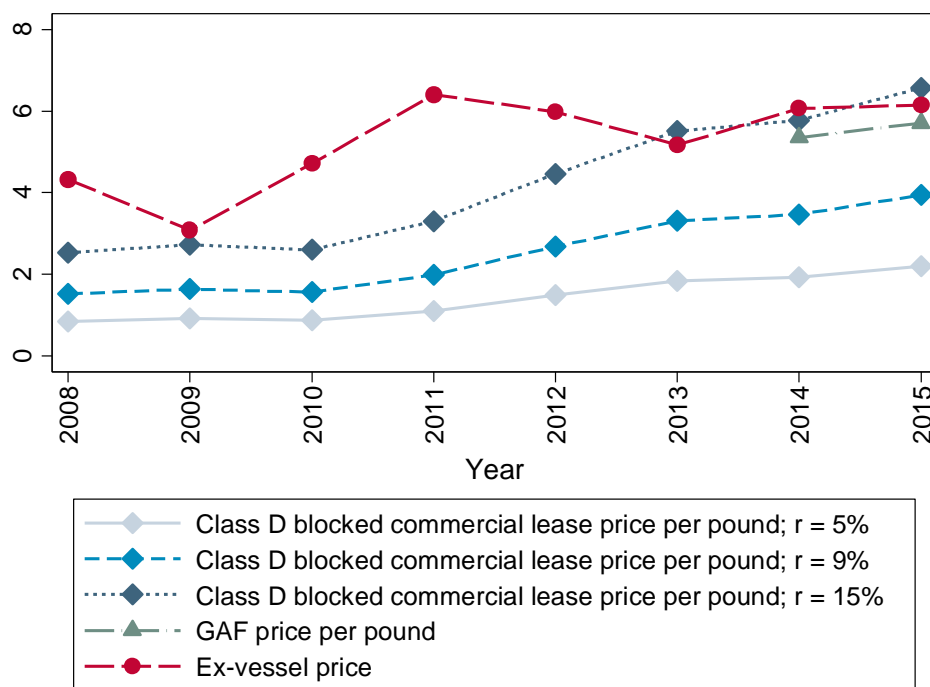


Figure A.4: Real Implied Commercial IFQ Price per Pound ($r=5\%$; 9% ; 15%), GAF Price-per Pound, and Ex-Vessel Price per Pound: Area 3A

