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An Analysis of the Pacific Groundfish Trawl Individual Fishing Quota (IFQ) Quota Pound (QP) Market Through 2019

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U.S. DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northwest Fisheries Science Center

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Abstract

This report describes the structure of the quota pound (QP) market and QP pricing through 2019. QP transfers made in the years 2011 through 2019 are analyzed. The report updates prior published analyses. The role of an efficient QP market is at least threefold (Holland 2016): 1) It allocates QP to its highest value use. 2) It influences behavior, e.g., incentivizing individuals to avoid constraining species. 3) It provides information to fishing businesses, fishery managers, and other stakeholders to support business planning and policy decisions. As this analysis shows, the forms of compensation used in interfirm QP transactions are quite diverse, and transfers are not dominated by cash sales with individual species prices. Rather, barter and contractual arrangements, including risk pools, are common; multispecies trades are also common. The analysis in this report suggests that the QP market for Pacific groundfish individual fishing quotas (IFQ) may not have been operating efficiently, particularly for species that are caught incidentally and are potentially constraining for some individuals; there are, however, fewer of those now, since most overfished stocks have rebuilt.

Introduction

The Pacific Coast Groundfish individual fishing quota (IFQ) program allocated quota shares (QS) for 29 IFQ stocks and individual bycatch quota (IBQ) shares for Pacific halibut to individual QS owners. Each year, QS owners are allocated quota pounds (QP) based on the share of total sector QP that their QS represents. QP must be transferred from a QS account to a vessel account in order to be used to balance catches. QP can also be transferred between vessel accounts. QS were not initially transferable, but became so in 2014. NOAA Fisheries provides a publicly available listing of IFQ account holders and their QS and QP holdings and a web-based system to implement transfers of QS and QP between account holders.[1] The website also provides regularly updated information about total catches of IFQ species and remaining QP. In 2016, a table was added to the website showing year-to-date weighted average prices from cash sales of QP as well as weighted average prices from previous years.

IFQ rules require fishers to balance all IFQ species catch with QP, whether the fish is landed or discarded. Fishers whose catches exceed their QP holdings must acquire QP from other quota holders or cease fishing and potentially face penalties. Since fishers have limited ability to control the species composition of their catch, a well functioning QP market is essential to enable them to match QP to catches. Transferability of QP also offers the possibility for fishers to adjust their QP portfolios to better fit the mix of species they see as most profitable to target.

This report describes the structure of the QP market and QP pricing through 2019. QP transfers made in 2011–19 are analyzed. The report updates prior published analyses (Holland 2016, Holland and Norman 2016). Businesses have been able to buy and sell QS to adjust their annual QP allocations since 2014, but, to date, there has been insufficient activity in the QS market to make an analysis of the market useful. Therefore, this report focuses solely on the QP market.

Catches of IFQ species during the first nine years of the program have been far below the total QP allocated for all but a few species (Table 1). Catches exceeded 80% of allocated QP in more than one year for only four stocks (Pacific whiting, sablefish north of lat 40°10′N, petrale sole, and widow rockfish). Catch of sablefish from the Southern area was 86% of total QP in the first year of IFQ, but has declined dramatically after that and has averaged only 17% of total QP since 2013. Catches for canary rockfish did reach 95% of total QP in 2015, but this was reportedly due to a single very large accidental catch event rather than targeted fishing. The reasons why many species allocations are only partly harvested are not completely clear and likely vary from species to species. A lack of processing capacity, markets for fish, or prices too low to make harvest economical, may have limited catch of some target species. However, concerns about availability of QP to cover incidental catch of certain species caught along with key target species may also have discouraged targeting of these species. Prior to implementation of the IFQ program, there was substantial concern that very small total quotas for several overfished rockfish species might constrain catches of other IFQ species. Species of concern initially included bocaccio, canary rockfish, cowcod,

[1] https://www.webapps.nwfsc.noaa.gov/ifq/

darkblotched rockfish, Pacific ocean perch, widow rockfish, and yelloweye rockfish. However, during the first six years of the IFQ program, catches did not exceed 50% of total QP in aggregate for any of these potentially constraining rockfish species (except for canary rockfish in 2015, as noted above). Anecdotal reports indicate that fishers may have opted not to target certain species in shelf areas because of the risk of exhausting QP allocations for species like yelloweye and canary rockfish and being forced to tie up if they could not find QP on the market. This suggests a possible failure of the market to distribute QP effectively and a lack of confidence in the QP market as a source of QP should an individual need to acquire more. This analysis can neither confirm nor dispute this hypothesis explicitly, but it does present evidence that the market is highly complex and arguably inefficient to date.

Availability of sablefish QP may be limiting catch of Dover sole and various rockfish that are targeted jointly with trawl gear in the so called DTS (Dover sole, thornyhead, sablefish) fishery. Sablefish QP from the trawl IFQ program are also used to target sablefish with fixed gear (longlines and pots). Concerns that the fixed gear sector has increased demand for sablefish QP, resulting in limiting catch of Dover sole and rockfish, have led the Pacific Fishery Management Council (PFMC) to explore options to limit the amount of QP that can be used with fixed gear. This policy is still in development. The QP price for sablefish remains well below the ex-vessel value, so it appears that trawlers must still have a substantial margin between sablefish QP and ex-vessel price to make the DTS fishery profitable, as they are not currently purchasing all sablefish quota sold in the QP market.

Many of the rebuilding rockfish species have now been rebuilt and total quotas have increased dramatically—sometimes twentyfold (Table 2). This has enabled the emergence of a midwater trawl fishery targeting widow and yellowtail rockfish. Widow rockfish catches averaged over 95% of total QP in 2018 and 2019, and yellowtail rockfish catches were above 75% of total QP. Catches of canary rockfish, Pacific ocean perch, and darkblotched rockfish have also increased substantially as the total quotas were increased once they were rebuilt. Processors had indicated that market demand had been constraining the catch of these rebuilt fisheries, but market campaigns such as Positively Groundfish[2] appear to have had some success in rebuilding these markets. Although widow rockfish is now fully utilized, the QP price remains at only 10–15% of the ex-vessel price in recent years.

[2] https://www.positivelygroundfish.org/

Table 1. Catches as a percentage of total IFQ QP allocations, 2011–19.

IFQ Species	2011	2012	2013	2014	2015	2016	2017	2018	2019
Arrowtooth flounder	20%	24%	56%	50%	52%	47%	12%	9%	7%
Bocaccio rockfish S of lat 40°10′N	9%	13%	16%	10%	43%	47%	30%	58%	40%
Canary rockfish	14%	25%	24%	23%	95%	45%	25%	45%	44%
Chilipepper rockfish S of lat 40°10′N	21%	20%	32%	29%	16%	6%	6%	16%	27%
Cowcod S of lat 40°10′N	1%	5%	19%	18%	25%	19%	25%	28%	34%
Darkblotched rockfish	36%	33%	40%	32%	39%	39%	36%	51%	50%
Dover sole	35%	30%	33%	27%	13%	14%	15%	13%	12%
English sole	1%	1%	3%	5%	4%	6%	3%	3%	2%
Lingcod	16%	19%	—	—	—	—	—	—	—
Lingcod N of lat 40°10′N	—	—	25%	21%	16%	24%	46%	35%	21%
Lingcod S of lat 40°10′N	—	—	3%	4%	7%	6%	4%	10%	16%
Longspine thornyheads N of lat 34°27′N	49%	44%	54%	45%	24%	22%	30%	14%	11%
Minor shelf rockfish N of lat 40°10′N	3%	7%	5%	6%	3%	3%	21%	24%	40%
Minor shelf rockfish S of lat 40°10′N	3%	14%	23%	11%	5%	2%	1%	3%	8%
Minor slope rockfish N of lat 40°10′N	17%	24%	23%	21%	19%	13%	13%	16%	22%
Minor slope rockfish S of lat 40°10′N	14%	30%	28%	26%	16%	11%	13%	17%	4%
Other flatfish	17%	15%	17%	18%	11%	14%	10%	10%	8%
Pacific cod	22%	32%	13%	13%	33%	35%	4%	1%	1%
Pacific halibut (IBQ) N of lat 40°10′N	28%	39%	29%	24%	39%	36%	41%	37%	42%
Pacific ocean perch N of lat 40°10′N	39%	41%	41%	33%	39%	40%	45%	41%	13%
Pacific whiting	98%	96%	99%	83%	47%	61%	87%	77%	86%
Petrale sole	93%	98%	92%	97%	98%	95%	100%	101%	98%
Sablefish N of lat 36°N	94%	91%	95%	92%	96%	93%	99%	90%	95%
Sablefish S of lat 36°N	86%	44%	14%	29%	22%	24%	13%	5%	10%
Shortspine thornyheads N of lat 34°27′N	50%	46%	55%	46%	42%	48%	48%	42%	36%
Shortspine thornyheads S of lat 34°27′N	17%	1%	7%	5%	1%	4%	0%	0%	0%
Splitnose rockfish S of lat 40°10′N	3%	4%	3%	4%	2%	1%	1%	2%	1%
Starry flounder	2%	1%	0%	2%	1%	2%	1%	0%	0%
Widow rockfish	40%	41%	40%	60%	54%	54%	52%	97%	94%
Yelloweye rockfish	10%	5%	6%	5%	3%	4%	14%	11%	15%
Yellowtail rockfish N of lat 40°10′N	24%	29%	25%	40%	32%	26%	58%	76%	74%

Table 2. Total IFQ QP allocations (including carry-over), 2011–19.

IFQ Species	2011	2012	2013	2014	2015	2016	2017	2018	2019
Arrowtooth flounder	27,406,105	22,983,349	9,526,038	7,643,603	7,041,410	6,687,458	24,362,403	24,234,535	28,076,090
Bocaccio rockfish S of lat 40°10′N	132,277	145,206	178,290	190,355	197,810	201,192	684,470	676,432	1,765,241
Canary rockfish	57,100	63,328	93,250	99,275	104,238	104,763	2,235,708	2,235,708	2,102,328
Chilipepper rockfish S of lat 40°10′N	3,252,370	3,220,871	2,695,881	2,352,883	2,652,161	2,637,280	4,234,639	4,069,292	4,052,758
Cowcod S of lat 40°10′N	3,968	4,343	2,576	2,397	3,362	3,446	3,375	3,340	5,089
Darkblotched rockfish	552,997	602,256	639,808	671,700	689,820	700,916	1,119,066	1,142,876	1,451,524
Dover sole	49,018,682	53,755,736	53,805,330	53,746,651	106,158,995	110,672,436	110,908,752	111,064,314	110,261,541
English sole	41,166,808	23,148,128	15,397,843	11,598,189	20,179,330	14,631,287	20,411,719	15,328,741	20,668,558
Lingcod	4,107,873	4,383,685	—	—	—	—	—	—	—
Lingcod N of lat 40°10′N	—	—	2,956,936	2,546,670	2,498,543	2,388,422	2,997,625	2,776,325	4,554,487
Lingcod S of lat 40°10′N	—	—	1,189,342	1,045,653	987,032	929,491	1,232,164	1,126,011	1,106,865
Longspine thornyheads N of lat 34°27′N	4,334,839	4,592,199	4,455,804	4,366,201	6,915,233	6,762,723	5,952,040	5,644,275	5,335,187
Minor shelf rockfish N of lat 40°10′N	1,150,813	1,265,542	1,232,985	1,233,843	2,406,787	2,419,568	2,531,127	2,530,415	2,546,780
Minor shelf rockfish S of lat 40°10′N	189,598	208,525	196,891	195,750	425,924	426,149	425,889	426,330	415,792
Minor slope rockfish N of lat 40°10′N	1,828,779	2,007,235	1,885,048	1,910,266	2,688,339	2,711,554	2,797,225	2,795,461	2,753,133
Minor slope rockfish S of lat 40°10′N	831,958	914,717	910,203	834,736	961,191	959,534	978,149	978,571	2,312,870
Other flatfish	9,253,683	10,146,797	10,138,583	10,135,553	16,910,558	13,922,412	16,436,343	13,997,810	12,354,044
Pacific cod	2,502,247	2,731,543	2,684,251	2,739,452	2,497,446	2,455,857	2,480,283	2,471,118	2,490,025
Pacific halibut (IBQ) N of lat 40°10′N	257,524	255,517	253,791	257,156	205,708	213,706	191,806	188,277	167,675
Pacific ocean perch N of lat 40°10′N	263,148	287,161	260,719	268,621	285,059	297,771	461,624	475,135	8,151,151
Pacific whiting	204,628,442	151,373,798	216,707,790	263,309,103	274,712,403	310,867,464	373,787,151	372,861,210	372,859,069
Petrale sole	1,920,226	2,387,217	5,110,315	5,242,593	5,598,419	5,805,653	6,052,350	5,794,851	5,407,939
Sablefish N of lat 36°N	5,613,719	5,438,797	4,286,888	4,524,680	5,047,506	5,458,154	5,638,143	5,667,169	5,941,324
Sablefish S of lat 36°N	1,170,390	1,133,352	1,425,731	1,567,543	1,724,074	1,890,464	1,856,459	1,902,271	1,927,557
Shortspine thornyheads N of lat 34°27′N	3,156,138	3,412,327	3,340,864	3,288,161	3,782,893	3,448,202	3,420,031	3,388,505	3,321,925
Shortspine thornyheads S of lat 34°27′N	110,231	120,500	121,002	120,561	120,475	110,955	110,231	110,231	110,231
Splitnose rockfish S of lat 40°10′N	3,045,245	3,508,291	3,658,947	3,472,501	3,569,901	3,634,827	3,663,642	3,665,846	3,630,352
Starry flounder	1,471,586	1,627,429	1,796,274	1,665,592	1,668,569	1,674,080	1,390,896	1,390,896	466,498
Widow rockfish	755,348	825,545	2,259,898	2,392,901	3,299,285	3,413,786	25,116,604	23,504,584	21,889,257
Yelloweye rockfish	1,323	1,422	2,303	2,388	2,377	2,553	2,627	2,624	7,688
Yellowtail rockfish N of lat 40°10′N	6,821,455	7,518,231	6,404,238	6,479,055	10,126,162	9,648,906	9,361,048	8,984,719	9,492,664

Characteristics of QP Transfers

Because all QP transfers must be done through an online system operated by NOAA Fisheries, the full population of QP transfers is analysed here. When making QP transfers through this system, the account holder making the transfer must indicate, along with the quantities of QP to be transferred, whether the transfer is a “Self-Trade” (meant to indicate a transfer within a company), “Cash Sale,” “Barter,” “Cash and Barter,” or “Other.”

The most frequent type of QP transfer is the internal transfer, or Self-Trade (Table 3). At the beginning of the year, individual QS account holders are allocated QP and must transfer them into vessel accounts so they can be used to balance catch; therefore, many of these Self-Trade transfers are QS permit owners transferring QP to their own vessel accounts, while others are between vessel accounts owned by the same company. Depending on the year, 29–35% of single-species transfers and 37–52% of multispecies transfers are self-trades.

For the external (non-Self-Trade) transfers, a variety of trading mechanisms are used. The most frequent type of external transfer is Other. Although transferors are asked to describe any nonmonetary compensation for transfers designated as Other, this is not required and the field is usually left blank. Descriptions that are provided suggest that Other includes transfers made to and from risk pools, trusts and cooperatives, contractual arrangements where payment is a share of revenue when fish is landed, and various miscellaneous reasons (e.g., gifts, corrections to prior transfers, and bycatch QP to go along with a separate sale of target species QP). Depending on the year, trades designated as Other make up 35–48% of all external single-species and 36–78% of external multispecies transfers (Table 3). The share of transfers designated as Other has declined in recent years, while cash transfers have increased.

A substantial number of transfers are described as Barter QP. This category is meant to designate swaps of QP. In 2013, the transfer website clarified that Barter was meant to refer to QP or QS swaps, but it is not possible to verify that this is always the case, and attempts to systematically match up both sides of Barter trades have not be successful. There is a separate category for trades that include Cash and Barter. Barter transfers accounted for 16–24% of external single-species transfers. Another 2–4% of external transfers each year are classified as Cash and Barter. For multispecies transfers, Barter accounted for 7–37% of external transfers, with higher percentages of Barter trades in recent years.

Transfers classified as Cash Sales have made up 22–42% of the external single-species and 12–27% of external multispecies transfers. The overall value of the sale must be indicated (though a value of zero can be entered and there is no validation), which provides a way to calculate price per pound for single-species transfers. Although the transferor is asked to provide a price per pound for each individual species in the multispecies trade, this is not required and rarely filled out. The quantity of “priced” trades is insufficient to use values for these multispecies Cash Sales to estimate prices at the species level. The number of single-species Cash Sales increased each year during the first five years of the program, from 281 in 2011 to 473 in 2015. The number peaked at 501 in 2017, but was down to 420 in 2019 (Table 3).

Table 3. Count of transfers by type, year, and single- vs. multispecies transfer (with multispecies transfer counted as one transfer), 2011–19.

Quota Year:	2011	2012	2013	2014	2015	2016	2017	2018	2019
Single-species									
Cash Sale	281	340	384	411	473	435	501	427	420
Barter	221	275	262	191	206	188	243	272	264
Cash and Barter	22	37	48	31	39	19	44	40	43
Other	395	606	663	596	419	398	422	468	488
Self-Trade	410	512	641	528	599	513	518	601	565
Multispecies									
Cash Sale	96	67	63	62	87	82	89	136	66
Barter	64	48	35	37	53	76	110	128	115
Cash and Barter	11	11	12	9	11	2	12	14	18
Other	196	260	400	360	341	253	235	234	112
Self-Trade	394	308	327	326	467	351	387	303	289

There is a substantial amount of transfer activity for most quota species, but the level and types of transfer activity differ substantially for different species (Table 4a,b). In most cases the total number of pounds transferred is well above the total QP allocation for the species since QP are often transferred first from a QS account into a QP account owned by the same firm and then may be transferred again between vessel accounts. Even excluding internal transfers, the total QP pounds transferred during the year amount to a large fraction of the total QP allocation and for some species above 100%.

The choice between barter and cash sales appears to be somewhat dependent on whether the parties have pre-existing relationships. If we consider only "market" transfers (those identified as either barter, cash, or cash and barter), during the early years of the IFQ there was a preference for using barter over cash sales as the mechanism of trade when both parties own vessels that land fish to the same processor (Figure 1). In contrast, cash sales were and have remained the preferred trade mechanism for parties that do not share a processor (Figure 1). It is not clear why this is the case, but it may be that processors tend to broker barter trades between vessels that land fish to them, and they may favor barter arrangements over cash when they themselves make transfers to vessels that sell fish to them. Fishers may also be uncomfortable setting prices that could be seen as unfair when trading with people they know and thus opt for barter arrangements. There had been a fairly steady decrease in the percentage of barter to cash sales for both groups until the share of barter jumped up in 2016 for transfers between parties that landed fish to the same processor. Barter may have some advantages over cash sales (e.g. not requiring cash up front and there may be tax implications) but cash sales may have lower transactions costs than barter when parties do not know each other. Barter may also be a means of creating an informal risk pool where fishers help others with needed QP for unexpected catch in expectation of reciprocal help should they have an unexpected catch to balance. Holland (2013) found evidence of this behavior in the British Columbia groundfish IFQ. Transfers between parties that own vessels that fish to the same processor make up on about 20% of the total external transfers. Thus cash transfers are much more common that barter transfers overall as was shown in Table 3.

Table 4a. Percentage of total sector QP transfers by transfer type for selected species (can exceed 100%, since QP can be transferred more than once in a year), 2011–19.

Year	Barter	Cash and Barter	Cash Sale	Other	Total external	Self-Trade	All transfers
Sablefish north of lat 36°N							
2011	12%	4%	28%	35%	79%	85%	164%
2012	11%	1%	26%	35%	74%	91%	165%
2013	15%	4%	25%	31%	76%	88%	164%
2014	14%	3%	27%	40%	84%	80%	164%
2015	10%	6%	28%	30%	74%	97%	171%
2016	23%	1%	42%	30%	96%	83%	180%
2017	14%	6%	37%	25%	82%	85%	167%
2018	18%	4%	47%	31%	100%	86%	186%
2019	19%	5%	31%	36%	91%	87%	178%
Petrale sole							
2011	19%	2%	30%	40%	91%	82%	172%
2012	21%	2%	26%	29%	79%	76%	155%
2013	19%	2%	26%	33%	80%	82%	161%
2014	18%	1%	29%	46%	94%	78%	172%
2015	19%	2%	39%	28%	87%	92%	179%
2016	18%	2%	47%	27%	94%	79%	173%
2017	25%	5%	51%	20%	102%	89%	191%
2018	24%	4%	48%	28%	103%	83%	187%
2019	26%	5%	38%	25%	94%	88%	182%
Pacific whiting							
2011	23%	1%	5%	41%	70%	72%	142%
2012	16%	3%	11%	47%	76%	70%	147%
2013	6%	1%	5%	50%	63%	73%	135%
2014	4%	1%	5%	44%	55%	72%	127%
2015	3%	0%	3%	38%	45%	65%	110%
2016	7%	0%	8%	44%	58%	68%	126%
2017	1%	3%	16%	31%	50%	77%	127%
2018	8%	0%	10%	33%	52%	70%	122%
2019	3%	2%	12%	36%	53%	71%	124%

Table 4b. Percentage of total sector QP transfers by transfer type for selected species (can exceed 100%, since QP can be transferred more than once in a year), 2011–19.

Year	Barter	Cash and Barter	Cash Sale	Other	Total external	Self-Trade	All transfers
Canary rockfish							
2011	7%	1%	13%	39%	60%	84%	144%
2012	9%	0%	20%	51%	81%	78%	159%
2013	8%	1%	18%	53%	81%	69%	150%
2014	5%	1%	19%	69%	95%	62%	157%
2015	6%	6%	29%	57%	98%	73%	171%
2016	13%	5%	33%	62%	112%	70%	182%
2017	5%	0%	34%	38%	77%	78%	155%
2018	10%	1%	42%	25%	78%	78%	156%
2019	9%	3%	25%	30%	67%	80%	146%
Pacific ocean perch							
2011	5%	1%	10%	45%	60%	96%	156%
2012	7%	0%	12%	49%	68%	86%	155%
2013	7%	0%	18%	43%	69%	74%	143%
2014	6%	0%	19%	44%	69%	69%	138%
2015	5%	1%	24%	41%	70%	71%	142%
2016	7%	0%	20%	49%	76%	71%	147%
2017	5%	1%	30%	36%	72%	80%	153%
2018	11%	4%	26%	38%	79%	76%	155%
2019	9%	1%	13%	35%	58%	73%	131%
Yelloweye rockfish							
2011	4%	1%	20%	35%	59%	81%	141%
2012	3%	0%	27%	35%	66%	71%	136%
2013	7%	0%	25%	50%	83%	57%	140%
2014	3%	0%	21%	65%	90%	52%	142%
2015	0%	1%	25%	42%	69%	60%	129%
2016	3%	0%	22%	39%	65%	57%	122%
2017	2%	2%	32%	54%	90%	53%	143%
2018	6%	1%	28%	39%	73%	47%	120%
2019	5%	8%	23%	37%	73%	52%	125%
Widow rockfish							
2011	26%	0%	11%	44%	82%	84%	166%
2012	22%	1%	13%	57%	93%	82%	175%
2013	6%	7%	10%	66%	89%	80%	170%
2014	7%	6%	22%	77%	113%	67%	181%
2015	5%	7%	28%	63%	103%	75%	178%
2016	7%	1%	28%	56%	92%	71%	163%
2017	11%	0%	37%	58%	106%	74%	180%
2018	23%	8%	46%	29%	107%	84%	190%
2019	23%	4%	31%	31%	89%	93%	182%

The movement of QP between states may be of some interest to stakeholders and managers to assess some of the distributional implications of the IFQ system. Geographic shifts in QP may also help differentiate whether spatial shifts in fishing activity are the result of vessels moving or of QP moving to vessels. This information can also reveal how the market is organized and the extent to which proximity (e.g., being from the same state) makes trading relationships more likely. Of all external transfers, 53–61% are between account owners with addresses in the same state (depending on the year). For Cash Sales, within-state transfers make up a smaller proportion of the total, ranging from 40–53% depending on the year. The ratio of trades to and from different states differs substantially. The ratio of transfers to California from other states relative to transfers from California to other states has ranged between 0.18 and 0.48 for Cash Sales, and between 0.26 and 0.48 for all external transfers, indicating a much higher likelihood of transfers moving QP out of California than into it (Figure 2). The opposite is true for Oregon, which has a substantially higher ratio of incoming transfers to outgoing than either California or Washington when considering all external transfers, and particularly when considering Cash Sales. Washington had a fairly even ratio of incoming and outgoing transfers and more incoming Cash Sales then outgoing for the first few years of the IFQ. Since 2014, however, the ratio of incoming to outgoing transfers has declined (i.e., fewer incoming and more outgoing transfers in more-recent years), particularly for Cash Sales, suggesting a general exodus of QP from Washington-based owners to Oregon-based ones.

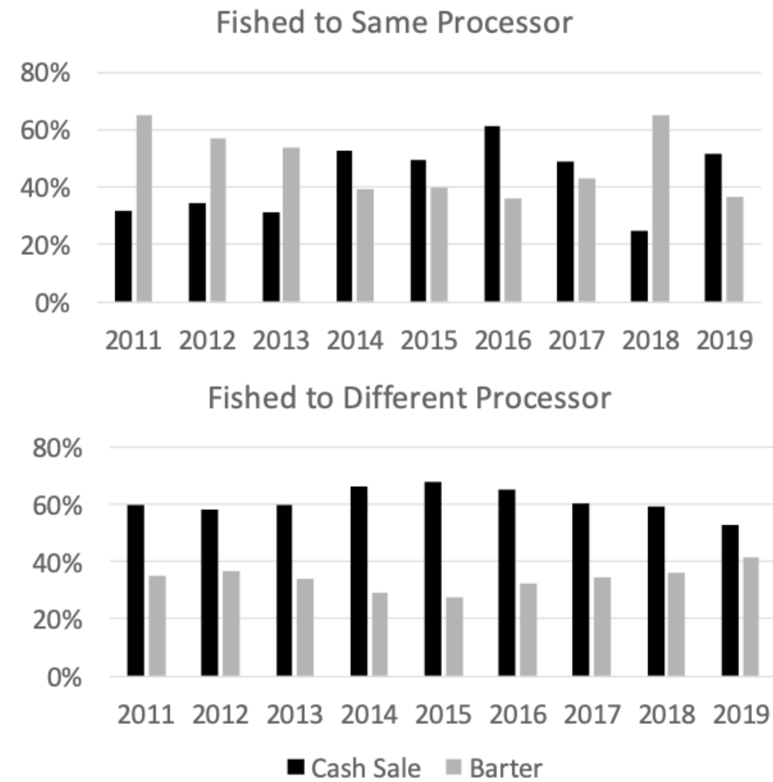

Figure 1. Percent of annual cash and/or barter transfers that were Cash Sales vs. Barter, depending on whether the parties involved landed fish to the same processor.

If we consider some of the key target species in the groundfish trawl fishery (sablefish, petrale sole, and widow rockfish), we see similar patterns in terms of the net total QP transferred between states. Oregon has been a net recipient of QP pounds in all years of the IFQ; the total net incoming QP has risen substantially over time, in 2016 exceeding 1.1M lb of petrale sole (almost 20% of total QP) and nearly 0.8M lb of sablefish (almost 15% of total QP). Net transfers of sablefish QP into Washington were positive in the first two years of the IFQ but became increasingly negative. Net transfers of petrale sole into Washington have been negative in all years of the IFQ, but the quantity of net transfers out of state has increased over time. California has had negative net transfers of both petrale sole and sablefish in all years of the IFQ. Quantities have varied over time, but net transfers out of California were the highest in 2016 out of all years. Both catch and transfers for widow rockfish were small until the fishery was declared rebuilt and total QP allocations increased dramatically. Since then, large amounts of QP have been transferred from California owners to Oregon-based ones. Net QP transfers to Oregon exceeded 4M lb in 2017.

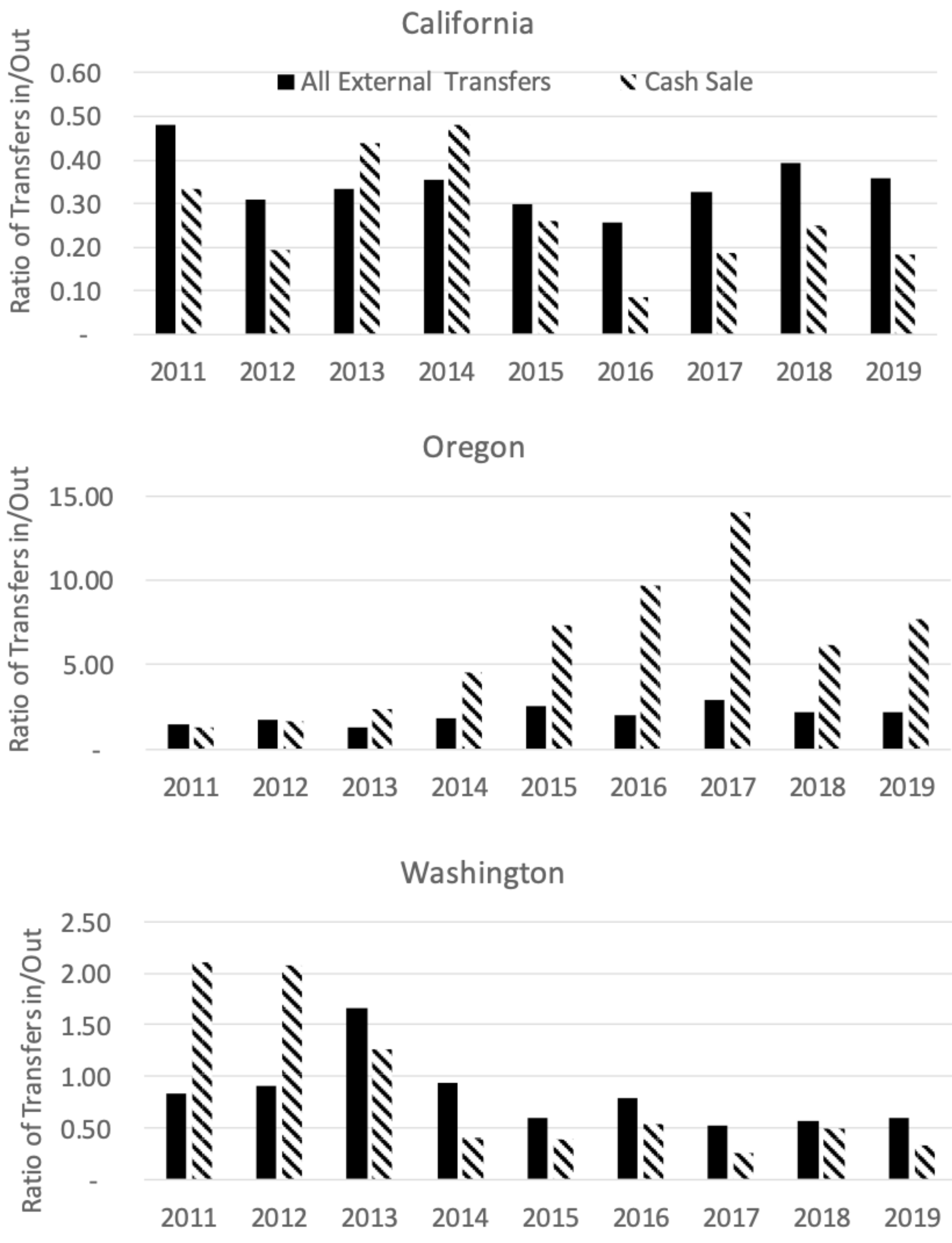

Figure 2. Ratio of transfers to a state from another state to transfers from a state to another state for Cash Sales and for all external transfers, 2011–19.

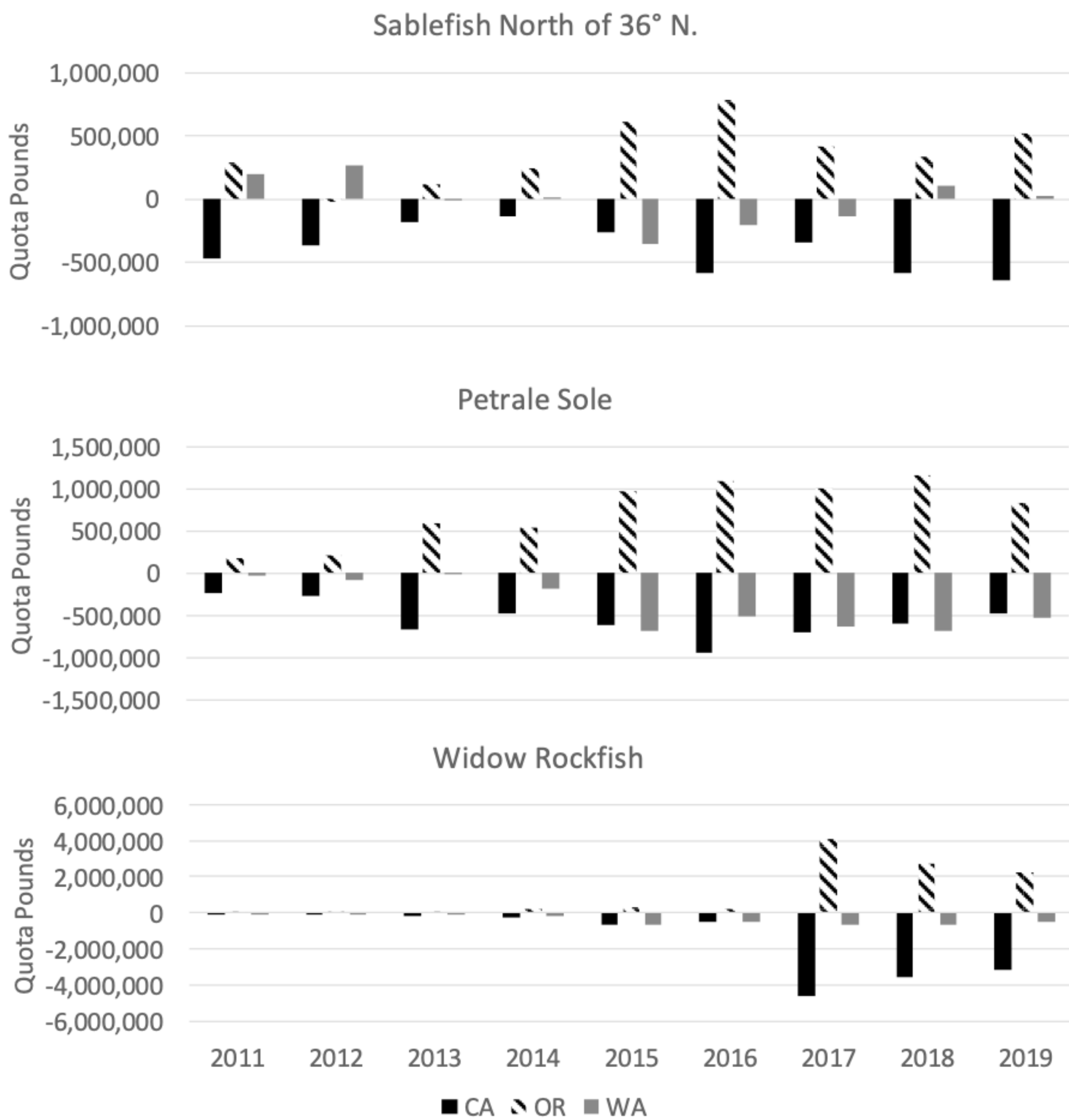

Figure 3. Net quota pounds of petrale sole and sablefish north of lat 36°N transferred in and out of each state (excluding Self-Trades), 2011–19.

QP Prices

Although Cash Sales that include only a single species make up only a fraction of all QP transfers, they are the only means by which QP prices can be estimated given the amount of market activity to date. In principle, species-specific implicit QP prices might be estimated from multispecies QP Cash Sales using a hedonic framework (Holland 2013). However, there do not appear to be enough multispecies Cash Sales or enough variation in their makeup to estimate a hedonic model with reliable prices. Holland (2013) found that hedonic models estimated with combined single-species and multispecies Cash Sale data yield prices nearly identical to the averages from single-species trades when the appropriate weighted least squares estimation model is used, and that price estimates are not statistically significant (and many appear unrealistic) for species that did not have single-species Cash Sales.

For Cash Sales that only included a single species, we calculate annual weighted average prices (Table 5). These prices are also reported on the IFQ website.[3] To maintain confidentiality, prices are shown only when they represent transfers from at least two unique buyer–seller combinations. Thus, for some of the more rarely traded species, it is not possible to present prices. Prices less than half of the minimum prices observed in prior years and more than twice maximum prices are dropped when calculating averages, to eliminate transfers where value information appears to have been entered in error. There are signs that the activity in the cash market for QP has increased since the early years of the program, which should increase the availability and reliability of price information. However, the market is still quite thin for most species. About two-thirds of quota stocks have had enough single-species Cash Sales to report prices in any given year (Table 6). The number of stocks with at least 10 priced cash transfers increased from just five stocks in 2011 to 13 by 2014, and has ranged from nine to 11 stocks since then. However, single-species Cash Sales remain rare for most species.

One thing that is, or at least was, seemingly in conflict with efficient market pricing is that QP prices are a significant fraction of ex-vessel price for some species for which there is substantial unused QP available (Table 7). In fact, for some species (e.g., canary and yelloweye rockfish), QP prices were well above ex-vessel price even though only a small fraction of total QP was used in any year. If there is substantial excess supply of QP, we might expect prices for those species' QP to fall, particularly after surpluses persist for a few years. In the case of yelloweye rockfish, the high prices may really reflect transaction costs. Individual transfers are very small and total transfer values are not large, so the high cost/lb may reflect distribution of the transaction costs over a small number of pounds (averaging only 8 lb). This explanation is somewhat less likely for canary, for which transfers averaged more than 245 lb/transfer. For Pacific halibut, which has a zero ex-vessel value (since it cannot be retained), average QP prices ranging from $0.56 to $1.76 over the 2011–19 period are quite surprising given that utilization of QP in aggregate has not exceeded 42% (Table 1). Theoretically, the price should be close to zero. Prices have been lower in recent years than earlier in the program. Average QP trades of Pacific halibut are more than 1,000 lb, decreasing the likelihood that prices can be ascribed primarily to

[3] https://www.webapps.nwfsc.noaa.gov/ifq/

transaction costs. Regardless of whether these high prices can be ascribed to transaction costs, they suggest inefficiency in the QP market, because some individuals are paying substantial amounts for QP while others are simply leaving QP unused. In 2019, only two species, cowcod and yelloweye rockfish, still had a ratio of QP prices to ex-vessel price exceeding 1.0. Both were still rebuilding and had very low total quotas, though cowcod is now rebuilt. All of the other rockfish stocks that had been overfished have now been rebuilt and have seen large increases in allocated QP. Catches for these two species still remained well below total QP, but they still presented a bycatch risk for some individuals.

Table 5. Annual weighted average prices from QP Cash Sales reported to NMFS, with prices, 2011–19.

IFQ Species	2011	2012	2013	2014	2015	2016	2017	2018	2019
Arrowtooth flounder	—	$0.02	$0.01	—	$0.01	$0.01	—	—	—
Bocaccio rockfish S of lat 40°10′N	$0.50	—	$0.20	$0.30	$0.27	$0.29	$0.23	$0.15	$0.12
Canary rockfish	$1.21	$1.49	$3.09	$2.12	$1.14	$1.35	—	$0.67	$0.30
Chilipepper rockfish S of lat 40°10′N	$0.05	$0.03	$0.02	$0.03	$0.02	—	—	—	$0.01
Cowcod S of lat 40°10′N	—	—	—	—	—	$2.06	$2.37	$2.06	$2.09
Darkblotched rockfish	$0.40	$0.22	$0.53	$1.08	$0.52	$0.55	$0.35	$0.40	$0.32
Dover sole	$0.06	—	—	—	—	—	—	—	—
English sole	—	—	—	—	—	—	—	—	—
Lingcod	$0.07	$0.05	—	—	—	—	—	—	—
Lingcod N of lat 40°10′N	—	—	—	—	—	$0.01	$0.01	$0.03	$0.01
Lingcod S of lat 40°10′N	—	—	—	—	$0.01	—	—	—	—
Longspine thornyheads N of lat 34°27′N	$0.04	$0.05	$0.05	$0.06	$0.03	$0.02	$0.02	—	—
Minor shelf rockfish N of lat 40°10′N	—	—	—	—	—	—	$0.01	$0.01	$0.02
Minor shelf rockfish S of lat 40°10′N	—	—	$0.04	$0.03	—	—	—	—	—
Minor slope rockfish N of lat 40°10′N	—	$0.04	$0.03	$0.03	$0.02	$0.01	$0.02	$0.01	$0.01
Minor slope rockfish S of lat 40°10′N	$0.05	$0.03	$0.05	—	$0.02	—	$0.02	$0.01	—
Other flatfish	—	—	—	—	—	—	—	—	—
Pacific cod	$0.05	$0.02	—	$0.02	$0.01	—	—	—	—
Pacific halibut (IBQ) N of lat 40°10′N	$1.31	$1.19	$1.76	$0.58	$0.58	$0.72	$0.72	$0.95	$0.56
Pacific ocean perch N of lat 40°10′N	$0.14	—	$0.75	$0.99	$0.56	$0.51	$0.51	$0.67	—
Pacific whiting	$0.02	$0.04	$0.04	$0.03	—	$0.01	$0.01	$0.01	$0.01
Petrale sole	$0.35	$0.40	$0.25	$0.28	$0.35	$0.33	$0.37	$0.36	$0.43
Sablefish N of lat 36°N	$1.07	$1.04	$0.88	$1.00	$1.11	$1.10	$1.21	$1.06	$0.61
Sablefish S of lat 36°N	$0.75	$1.05	$0.26	$0.16	$0.18	$0.17	$0.07	—	—
Shortspine thornyheads N of lat 34°27′N	$0.07	$0.05	$0.05	$0.06	$0.04	$0.03	$0.02	$0.01	—
Shortspine thornyheads S of lat 34°27′N	$0.17	—	—	—	—	—	—	—	—
Splitnose rockfish S of lat 40°10′N	—	—	—	—	—	—	—	—	—
Starry flounder	—	—	—	—	—	—	—	—	—
Widow rockfish	$0.44	$0.34	$0.53	$0.23	$0.15	$0.15	$0.03	$0.03	$0.04
Yelloweye rockfish	$32.28	$21.76	$29.58	$27.07	$19.86	—	$13.30	—	$13.60
Yellowtail rockfish N of lat 40°10′N	—	$0.01	$0.03	$0.02	$0.01	$0.01	$0.02	$0.03	$0.05

Table 6. Count of single-species Cash Sales, 2011–19.

IFQ Species	2011	2012	2013	2014	2015	2016	2017	2018	2019
Arrowtooth flounder	<2	2	5	7	19	12	<2	<2	<2
Bocaccio rockfish S of lat 40°10′N	3	<2	4	7	10	8	8	12	2
Canary rockfish	4	15	12	17	29	17	<2	14	12
Chilipepper rockfish S of lat 40°10′N	3	6	5	12	4	<2	<2	<2	6
Cowcod S of lat 40°10′N	<2	<2	<2	<2	<2	6	4	4	4
Darkblotched rockfish	4	6	10	10	22	19	9	15	24
Dover sole	4	<2	2	<2	<2	<2	<2	<2	<2
English sole	<2	<2	<2	<2	<2	<2	<2	<2	<2
Lingcod	2	4	<2	<2	<2	<2	<2	<2	<2
Lingcod N of lat 40°10′N	<2	<2	<2	<2	<2	4	27	16	6
Lingcod S of lat 40°10′N	<2	<2	<2	<2	3	<2	<2	<2	<2
Longspine thornyheads N of lat 34°27′N	5	12	14	18	7	4	3	<2	<2
Minor shelf rockfish N of lat 40°10′N	<2	<2	<2	<2	<2	<2	8	11	16
Minor shelf rockfish S of lat 40°10′N	<2	<2	5	2	<2	<2	<2	<2	<2
Minor slope rockfish N of lat 40°10′N	<2	4	3	2	4	7	2	5	9
Minor slope rockfish S of lat 40°10′N	6	7	7	<2	7	<2	5	6	<2
Other flatfish	<2	<2	<2	<2	<2	<2	<2	<2	<2
Pacific cod	11	9	<2	3	5	14	<2	<2	<2
Pacific halibut (IBQ) N of lat 40°10′N	5	10	21	15	13	28	24	18	14
Pacific ocean perch N of lat 40°10′N	3	<2	14	14	24	15	34	19	<2
Pacific whiting	26	64	53	26	<2	16	20	5	9
Petrale sole	36	20	50	58	65	62	81	54	76
Sablefish N of lat 36°N	54	47	66	62	57	83	86	58	62
Sablefish S of lat 36°N	58	31	8	22	51	3	3	<2	<2
Shortspine thornyheads N of lat 34°27′N	2	9	10	9	7	17	12	5	<2
Shortspine thornyheads S of lat 34°27′N	3	<2	<2	<2	<2	<2	<2	<2	<2
Splitnose rockfish S of lat 40°10′N	<2	<2	<2	<2	<2	<2	<2	<2	<2
Starry flounder	<2	<2	<2	<2	<2	<2	<2	<2	<2
Widow rockfish	6	9	10	34	52	26	3	43	44
Yelloweye rockfish	4	9	11	12	4	<2	11	<2	12
Yellowtail rockfish N of lat 40°10′N	<2	8	6	21	16	9	23	24	43

Table 7. Ratio of quota pound prices to ex-vessel prices, 2011–19. Ratios greater than 1.0 are marked in red.

IFQ Species	2011	2012	2013	2014	2015	2016	2017	2018	2019
Arrowtooth flounder	—	0.16	0.09	—	0.10	0.10	—	—	—
Bocaccio rockfish S of lat 40°10′N	0.75	—	0.25	0.41	0.37	0.38	0.42	0.30	0.26
Canary rockfish	2.21	2.83	5.89	3.77	2.03	2.70	—	1.96	0.64
Chilipepper rockfish S of lat 40°10′N	0.08	0.04	0.03	0.04	0.03	—	—	—	0.02
Cowcod S of lat 40°10′N	—	—	—	—	—	2.34	4.68	3.76	6.23
Darkblotched rockfish	0.83	0.44	1.09	2.33	1.10	1.17	0.79	1.03	0.88
Dover sole	0.14	—	—	—	—	—	—	—	—
English sole	—	—	—	—	—	—	—	—	—
Lingcod	0.09	0.07	—	—	—	—	—	—	—
Lingcod N of lat 40°10′N	—	—	—	—	—	0.01	0.01	0.03	0.01
Lingcod S of lat 40°10′N	—	—	—	—	0.01	—	—	—	—
Longspine thornyheads N of lat 34°27′N	0.09	0.11	0.11	0.13	0.06	0.04	0.04	—	—
Minor shelf rockfish N of lat 40°10′N	—	—	—	—	—	—	0.02	0.03	0.05
Minor shelf rockfish S of lat 40°10′N	—	—	0.02	0.02	—	—	—	—	—
Minor slope rockfish N of lat 40°10′N	—	0.07	0.06	0.08	0.05	0.03	0.06	0.02	0.03
Minor slope rockfish S of lat 40°10′N	0.05	0.03	0.06	—	0.03	—	0.03	0.02	—
Other flatfish	—	—	—	—	—	—	—	—	—
Pacific cod	0.09	0.03	—	0.04	0.02	—	—	—	—
Pacific halibut (IBQ) N of lat 40°10′N	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pacific ocean perch N of lat 40°10′N	0.28	—	1.50	1.98	1.07	1.12	1.44	2.15	—
Pacific whiting	0.17	0.27	0.31	0.27	—	0.13	0.13	0.13	0.11
Petrale sole	0.24	0.27	0.20	0.25	0.29	0.28	0.32	0.31	0.35
Sablefish N of lat 36°N	0.38	0.52	0.50	0.45	0.49	0.45	0.52	0.64	0.47
Sablefish S of lat 36°N	0.33	0.51	0.13	0.06	0.06	0.08	0.03	—	—
Shortspine thornyheads N of lat 34°27′N	0.10	0.06	0.06	0.06	0.05	0.04	0.03	0.02	—
Shortspine thornyheads S of lat 34°27′N	0.04	—	—	—	—	—	—	—	—
Splitnose rockfish S of lat 40°10′N	—	—	—	—	—	—	—	—	—
Starry flounder	—	—	—	—	—	—	—	—	—
Widow rockfish	1.00	0.79	1.15	0.51	0.36	0.36	0.10	0.12	0.15
Yelloweye rockfish	60.43	43.68	51.34	47.08	34.90	—	20.08	—	30.17
Yellowtail rockfish N of lat 40°10′N	—	0.02	0.06	0.04	0.02	0.02	0.07	0.11	0.16

Conclusion

The role of an efficient QP market is at least threefold (Holland 2016). It allocates QP to its highest value use. It influences behavior, e.g., incentivizing individuals to avoid constraining species. Finally, it provides information to fishing businesses, fishery managers, and other stakeholders to support business planning and policy decisions. The prices generated by QP markets also provide information to QP market participants on how to set prices in subsequent transactions. This not only lowers negotiation costs, but helps buyers and sellers to decide whether and how much QP to offer to buy or sell on the market. Market participants and other stakeholders now have publicly available and regularly updated information about QP prices from Cash Sales published on the NMFS website, as well as information available from brokers and auction sites.

An effective and efficient QP market will not necessarily emerge when an IFQ system is created, even if a tool for implementing transfers is in place. The analysis in this report suggests that the QP market for Pacific groundfish IFQ may not have been operating efficiently, particularly for species that are caught incidentally and are potentially constraining for some individuals, though there are fewer of these species since most overfished stocks have rebuilt. Price dispersion has been high. The market is thin, with very few cash trades, particularly for species that are not primary targets or are underutilized. High prices for QP of some species with substantial unused QP in aggregate indicate high transaction costs or a failure to match up those with unused QP to those who could use them. Anecdotal evidence suggests this was occurring with rebuilding rockfish species as a result of "hoarding," driven by the combination of uncertainty about individual QP needs and a lack of confidence that one could acquire QP on the market at a foreseeable price should it be needed unexpectedly. There are fewer clear indications of inefficiency in the market (e.g., as stocks with QP prices above ex-vessel price). However, most of the overfished rockfish species have been rebuilt and QP prices for those species dropped below ex-vessel prices once QP allocations were increased. Most of the species in the IFQ system are underutilized, but this is likely due to lack of demand rather than a failure of the QP market.

As this analysis shows, the forms of compensation used in interfirm QP transactions are quite diverse, and transfers are not dominated by Cash Sales with individual species prices. Rather, Barter and contractual arrangements, including risk pools, are common, and multispecies trades are also common. Given that QP of a given species is a straightforward, nondifferentiable commodity, we might expect to see a higher prevalence of Cash Sales. However, these alternative transaction methods may be largely a product of uncertainty about the value of QP to the users that would purchase it. That value depends on whether the QP will actually be needed to balance catch or can be carried forward to the next year, and on the cost of harvesting the fish and the price received for it. A contractual arrangement (e.g., for a percentage of the value of the landed fish) shares the risk between the buyer and seller and, if the seller of the QP is the buyer of the fish, they may be in a better position to bear some of that risk. Barter enables individuals to trade less-valued QP for more-valued QP without having to put cash up front, which may be difficult and risky financially for an individual fisherman. Multispecies Cash Sales or Barter, while they may result in less-efficient pricing of particular species, enable fishers to acquire a balanced portfolio of QP and reduce the risk they will be left holding QP for species they can't catch without more QP of jointly caught species. There does appear to be a trend toward more Cash Sales and fewer transactions designated as Other, but both Barter and Other are still common nine years into the program.

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Species Mentioned

arrowtooth flounder	*Atheresthes stomias*
bocaccio rockfish	*Sebastes paucispinis*
canary rockfish	*Sebastes pinniger*
chilipepper rockfish	*Sebastes goodei*
cowcod rockfish	*Sebastes levis*
darkblotched rockfish	*Sebastes crameri*
Dover sole	*Microstomus pacificus*
English sole	*Parophrys vetulus*
flatfish	Pleuronectiformes
lingcod	*Ophiodon elongatus*
nearshore rockfish	Scorpaenidae
Pacific cod	*Gadus macrocephalus*
Pacific hake	*Merluccius productus*
Pacific halibut	*Hippoglossus stenolepis*
Pacific ocean perch	*Sebastes alutus*
petrale sole	*Eopsetta jordani*
sablefish	*Anoplopoma fimbria*
shelf rockfish	Scorpaenidae
shortspine thornyhead	*Sebastolobus alascanus*
slope rockfish	Scorpaenidae
splitnose rockfish	*Sebastes diploproa*
starry flounder	*Platichthys stellatus*
widow rockfish	Sebastes entomelas
yelloweye rockfish	*Sebastes ruberrimus*
yellowtail rockfish	*Sebastes flavidus*

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