

Science, Service, Stewardship



Measuring Fishery Value with Quota Prices?

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**NOAA
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Outline

- What can quota market transactions tell us about fishery value in principle – and why might they not in practice?
- Quota markets studies
 - New Zealand Quota Management System
 - B.C. Groundfish ITQ
 - West Coast Groundfish
 - US Catch Share Quota Markets Metadata Study
- Conclusions

Quota Shares & Quota Pounds

- **Quota Shares:** *An ongoing entitlement to a percentage of the total allowable catch of a specific fish stock*
 - **Quota share price** *should equal the discounted value of future profits from a unit of quota share*
- **Quota Pounds:** *An entitlement to catch a specific quantity of a particular fish stock over a single fishing year or season (analogous to quota lease or annual catch entitlement)*
 - **Quota pound price** *should equal the profit or net revenue from a unit of quota in that year*
- **Relationship** *between Quota Pound and Share Price*

$$P_{QS} = \frac{P_{qp}}{r-g}$$



Question

- Can we use prices data from quota market transactions to determine the incremental value of TAC allocation to/from a fishery managed with catch shares?
- Necessary (but not sufficient) criteria:
 - Efficient quota market – efficient pricing
 - Accurate and representative data on priced arms-length transfers of quota shares (maybe quota pounds but more assumptions required)
 - Small change in allocation only



Problems

- Thin, inefficient markets
- Lack of or miss-reporting of price data
- Market segmentation
- Interdependent species values in multispecies fisheries
- Instability of value

Do Quota Markets in the Real World Operate According to Theory?



New Zealand (Newell, Sanchirico and Kerr 2006)

“We also find evidence of economically rational behaviorOverall, this suggests that these markets are operating reasonably well, implying that ITQs can be effective instruments for efficient fisheries management”



British Columbia Groundfish IFQ (Holland 2013)

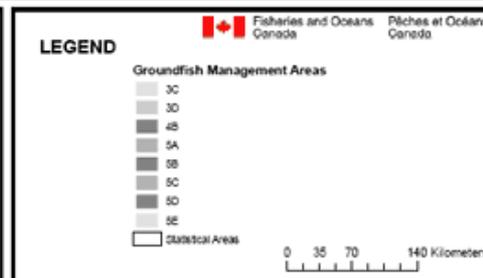
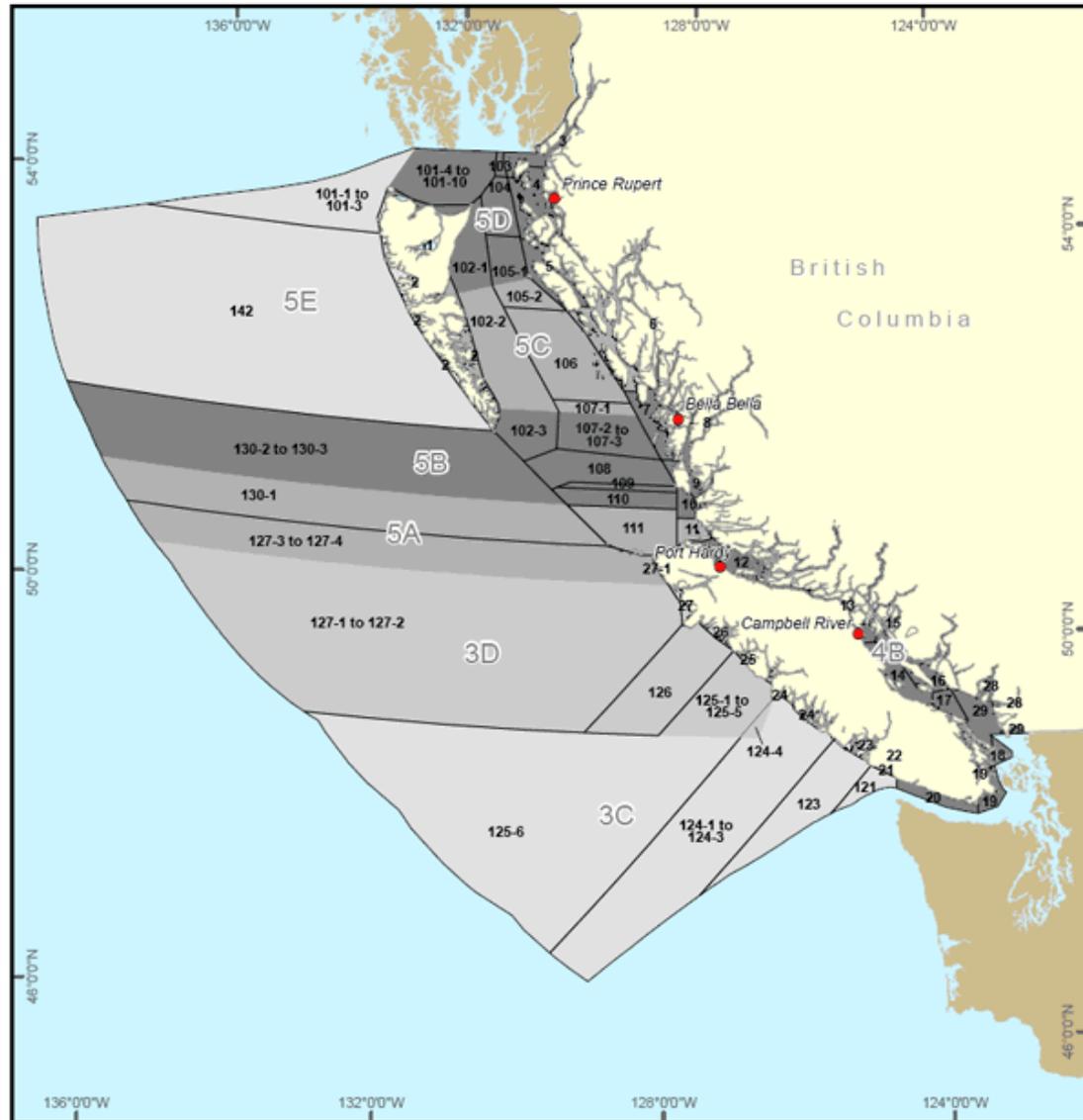
“the QP market in the BC groundfish ITQ system is probably not operating efficiently.... for quota stocks that are constraining catch of other species, QP values do not appear to reflect their shadow value.



US Pacific Groundfish (Holland – in progress)

British Columbia Groundfish IFQ Market

- IFQ implemented in 1997
- Around 40 active vessels mostly fishing to 3 processors
- IFQ includes 33 species divided into over 75 distinct quota stocks



For general information purposes only. Please refer to 'Pacific Fishery Management Area Regulations, 2007' for complete groundfish management area definitions.

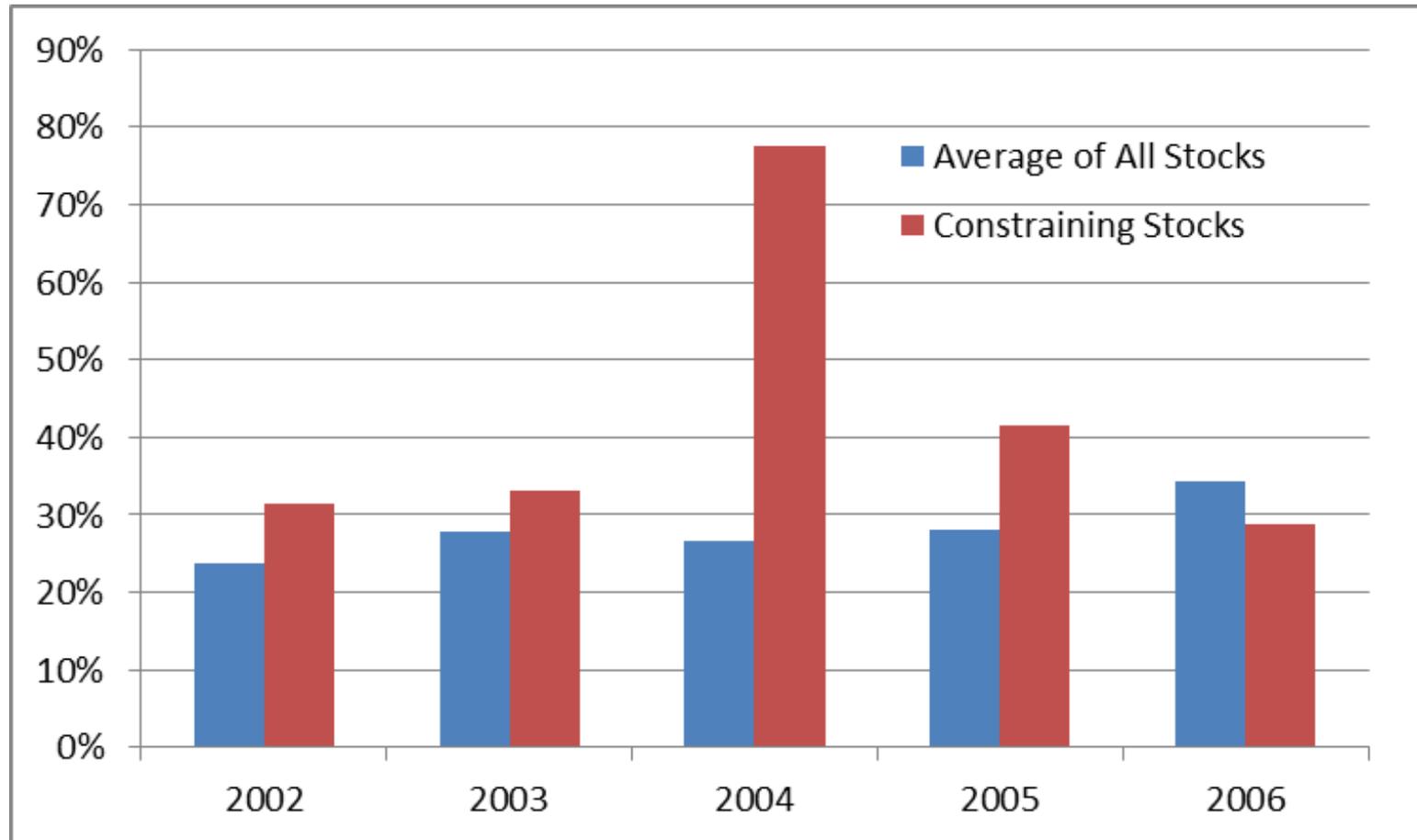
Source Information:
BC basemap provided by BC Ministry of Sustainable Resource Management.
Groundfish Fisheries Management Area and Statistical Area boundaries provided by DFO.

Map projection - BC Albers
Production date - April, 2009
Produced by - OHEB GIS Unit, DFO

What is the fifth set of tires worth?



Average of Implicit Quota Lease Prices as Percent of Ex-vessel Price



Holland, D.S. 2013. Making Cents Out of Barter Data from the British Columbia Groundfish ITQ Market. *Marine Resource Economics* 28(4):311-30

Pacific Groundfish Limited Entry Trawl Fishery

- WA, OR and CA
- 105 active vessels post IFQ
- 29 separate IFQ stocks
- Human observers ensure all catch accounted for

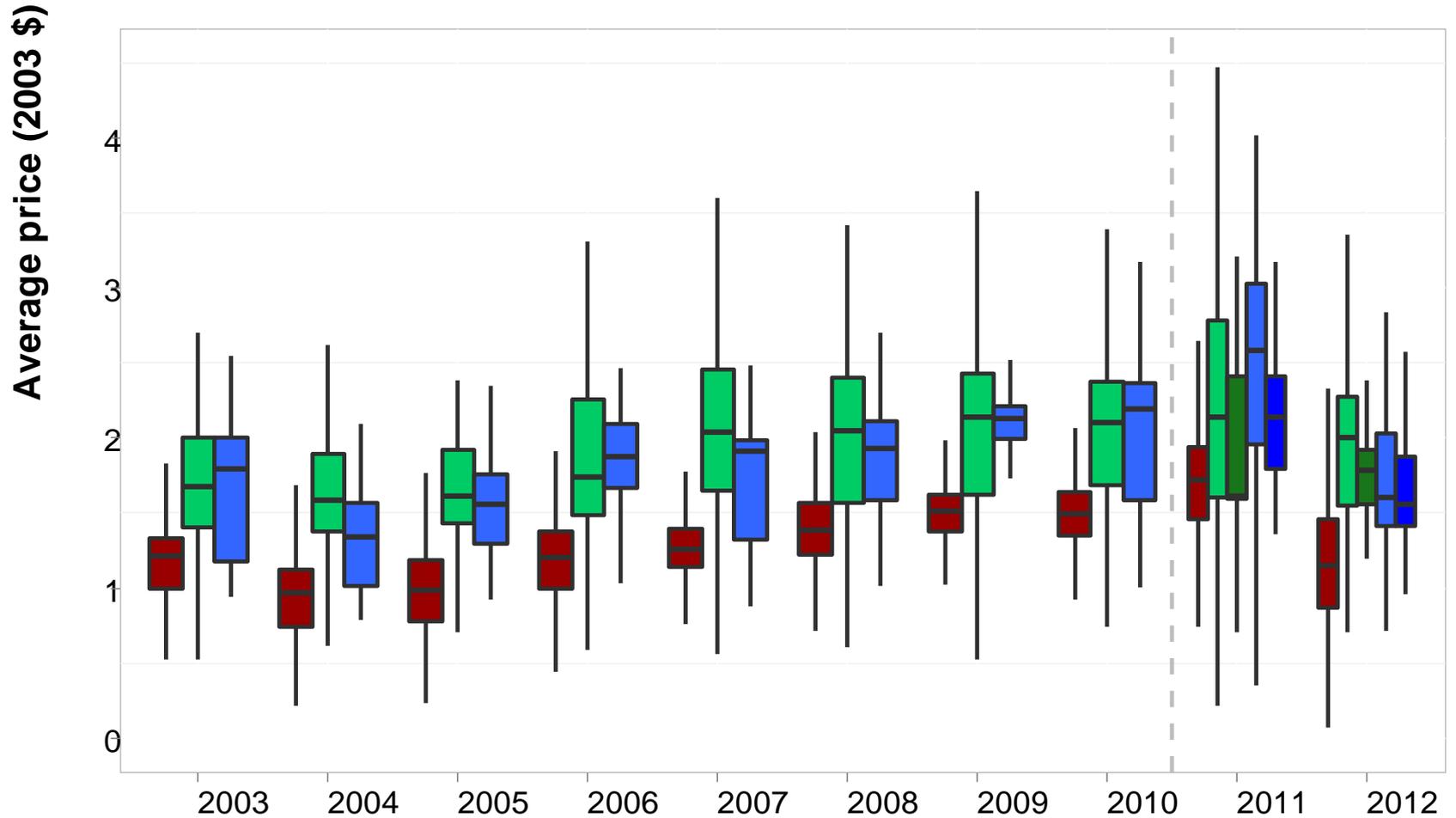


Quota Pounds Prices From Single-Species Cash Sales 2011-2013

OPTIMAL_YIELD_CATEGORY	2011			2012			2013			Average Pounds Transferred	Average % Used
	Price (simple)	Count	C.V.	Price (simple)	Count	C.V.	Price (simple)	Count	C.V.		
Arrowtooth flounder		0			2	85%	\$ 0.01	8	75%	37,825	37%
Bocaccio rockfish South of 40°10' N.		3	42%		1		\$ 0.20	4	17%	1,972	14%
Canary rockfish		4	18%	\$ 1.49	15	57%	\$ 3.09	12	26%	245	22%
Chilipepper rockfish South of 40°10' N.		3	36%	\$ 0.03	7	63%	\$ 0.02	8	62%	31,641	26%
Cowcod South of 40°10' N.		2	10%		2	101%		3	0%	16	9%
Darkblotched rockfish	\$ 0.40	4	119%	\$ 0.22	6	49%	\$ 0.53	10	51%	2,379	39%
Dover sole	\$ 0.05	5	74%		0		\$ 0.00	3	107%	131,136	35%
English sole		0			0			0			2%
Lingcod		2	77%	\$ 0.05	4	37%		1		8,701	19%
Longspine thornyheads North of 34°27' N.	\$ 0.04	5	84%	\$ 0.05	12	55%	\$ 0.05	15	46%	13,929	52%
Minor shelf rockfish North of 40°10' N.		1			2	23%		0		1,412	5%
Minor slope rockfish North of 40°10' N.	\$ 0.43	3	92%	\$ 0.04	4	14%	\$ 0.03	3	55%	9,375	23%
Minor shelf rockfish South of 40°10' N.		0			2	13%	\$ 0.04	5	23%	4,819	14%
Minor slope rockfish South of 40°10' N.	\$ 0.05	7	85%	\$ 0.03	7	35%		7	12%	8,286	26%
Other flatfish			0%		1					27,761	17%
Pacific cod	\$ 0.05	11	28%	\$ 0.02	9	52%		1		48,853	24%
Pacific halibut (IBQ) North of 40°10' N.	\$ 1.31	5	45%	\$ 1.19	10	19%	\$ 1.76	21	51%	1,072	34%
Pacific ocean perch North of 40°10' N.		3	69%		3	56%	\$ 0.75	14	45%	1,478	43%
Pacific whiting	\$ 0.02	29	71%	\$ 0.04	64	31%	\$ 0.04	54	43%	142,373	98%
Petrale sole	\$ 0.34	38	29%	\$ 0.40	20	12%	\$ 0.25	50	32%	9,255	95%
Sablefish North of 36° N.	\$ 1.06	58	41%	\$ 1.04	47	36%	\$ 0.88	66	17%	10,265	95%
Sablefish South of 36° N.	\$ 0.76	62	54%	\$ 1.05	31	9%	\$ 0.26	8	31%	7,479	48%
Shortspine thornyheads North of 34°27' N.		2	70%	\$ 0.05	9	59%	\$ 0.05	10	46%	15,611	53%
Shortspine thornyheads South of 34°27' N.	\$ 0.17	3	58%		1			3		830	8%
Splitnose rockfish South of 40°10' N.		0			1			0		16,500	3%
Starry flounder		0			0			0		-	1%
Widow rockfish	\$ 0.44	6	62%	\$ 0.34	9	57%	\$ 0.53	10	45%	4,117	42%
Yelloweye rockfish		4	105%	\$ 21.76	9	33%	\$ 29.58	11	53%	8	7%
Yellowtail rockfish North of 40°10' N.		1		\$ 0.01	10	41%	\$ 0.03	6	14%	20,380	28%

Average Sablefish Ex-vessel Prices

LE or IFQ Trawl LE longline IFQ longline LE pot IFQ pot

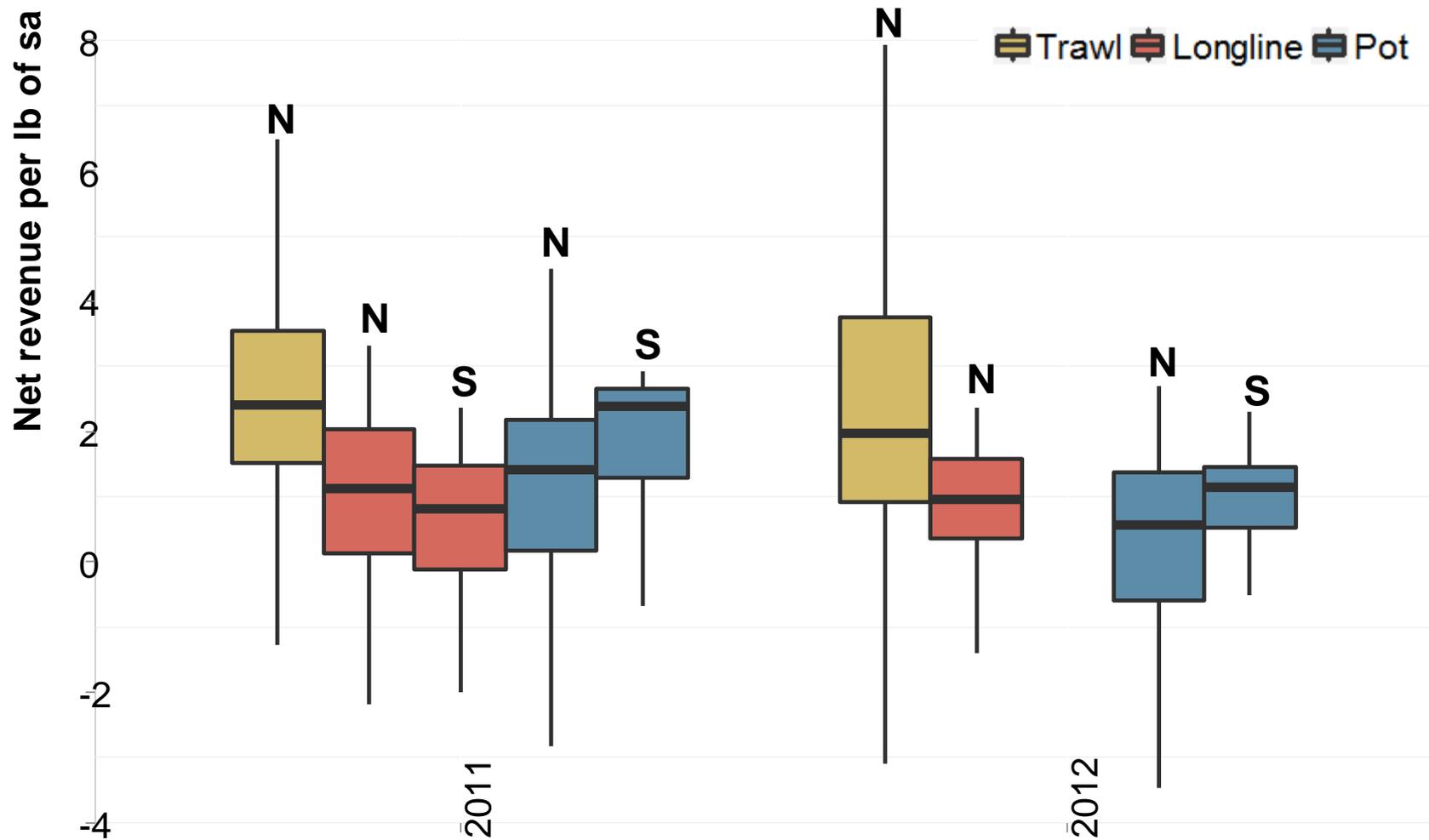




Estimated Median Value of Sablefish (trip data)

Net Revenue Per Pound of Sablefish		2011	2012
Trawl	\$	2.41	\$ 1.96
Pot	\$	1.41	\$ 0.57
Longline	\$	1.11	\$ 0.97
Net Revenue Per Day			
Trawl	\$	3,123	\$ 2,340
Pot	\$	3,146	\$ 1,340
Longline	\$	2,513	\$ 2,352

Net Revenue Per Pound of Sablefish





Conclusions on Pacific Groundfish Quota Market

- The quota pounds market is thin but is still developing
- Most transactions are barter, package sales or other trading mechanisms making price discovery difficult
- High price dispersion and not enough priced trades to look at within-year prices trends
- Evidence that quota pound prices for sablefish are well below true value
- Efficient market? Not yet.

Catch Share Systems in Federally Managed US Fisheries

Region	Fishery	Year Implemented	Type of Catch Share
North Pacific	Western Alaska Community Development Quota	1992	CDQ
	North Pacific Halibut & Sablefish	1995	IFQ
	Bering Sea American Fisheries Act (AFA) Pollock	1999	CO-OP
	BSAI King & Tanner Crab	2005	IFQ-IPQ/CO-OP
	BSAI Non-pollock Groundfish Trawl CP (Amendment 80)	2008	CO-OP
	Freezer Longline Coalition	2010	CO-OP
Pacific	Central Gulf of Alaska Rockfish	2012	CO-OP
	Pacific Coast Fixed Gear Sablefish	2001	IFQ
Gulf of Mexico	Pacific Coast Groundfish Trawl	2011	IFQ/CO-OP
	Gulf of Mexico Red Snapper	2007	IFQ
South Atlantic	Gulf of Mexico Grouper and Tilefish	2010	IFQ
	South Atlantic Wreckfish	1992	IFQ
Mid-Atlantic	Surfclam & Ocean Quahog	1990	IFQ
	Mid Atlantic Golden Tilefish	2009	IFQ
New England	Northeast Multispecies Groundfish	2010	CO-OP (Sector)
	General Category Atlantic Scallops	2010	IFQ

Holland, D., E. Thunberg, J. Agar, S. Crosson, C. Demarest, S. Kasperski, L. Perruso, E. Steiner, J. Stephen, A. Strelcheck, and M. Travis. 2014. U.S. Catch Share Markets: A Review of Characteristics and Data Availability. U.S. Dept. of Commer., NOAA Technical Memorandum NMFS-F/SPO-145, 67 p.

Availability and Quality of Price Information on QS and QP Transfers for US Catch Share Programs

Fishery	QS and QP Price Availability
North Pacific Halibut & Sablefish	Both QS and QP prices
Bering Sea and Aleutian Islands Pollock	No price information collected
Bering Sea and Aleutian Islands King & Tanner Crab	Some prices for QS and QP
Bering Sea and Aleutian Islands Groundfish (non-Pollock)	No price information collected
Central Gulf of Alaska Rockfish	No price information collected
Pacific Coast Fixed Gear Sablefish	Some permit prices
Pacific Coast Groundfish Trawl	QP prices available for some more frequently traded species. No QS transfers allowed until 2014. No prices on permit transfers in at-sea whiting Co-ops.
Gulf of Mexico Red Snapper	Prices for both QS and QP transactions
Gulf of Mexico Grouper and Tilefish	Prices for both QS and QP transactions for more frequently traded species.
South Atlantic Wreckfish	Prices for QS but not for QP
Surfclam & Ocean Quahog	No price information collected
Mid Atlantic Golden Tilefish	Price information collected but priced transfers insufficient to estimate QS or QP values
Northeast Multispecies Groundfish	QS not tradable but QP prices from inter-Sector trades for most species
General Category Atlantic Scallops	Price information collected

Source: NMFS Catch Share Market Working Group



Overall Conclusions

- Efficient quota markets and pricing necessary to enable using quota prices to value marginal TAC allocations (at a minimum)
- Markets are often thin, idiosyncratic, if they exist at all
- Multispecies fishery and segmented markets may complicate valuation in many catch share fisheries
- Little if any price data on most US catch share markets
- **Upshot: Catch share markets do not provide a viable approach to valuing most US catch share fisheries at the present time**

Related Publications

- Holland, D.S. 2013. Making Cents Out of Barter Data from the British Columbia Groundfish ITQ Market. *Marine Resource Economics* 28(4):311-30.
- Holland, D., E. Thunberg, J. Agar, S. Crosson, C. Demarest, S. Kasperski, L. Perruso, E. Steiner, J. Stephen, A. Strelcheck, and M. Travis. 2014. U.S. Catch Share Markets: A Review of Characteristics and Data Availability. U.S. Dept. of Commer., NOAA Technical Memorandum NMFS-F/SPO-145, 67 p.

Would Markets Yield Optimal Allocation?

