US West Coast Shoreside Pacific Whiting Fishery (non-tribal)

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Abstract
The US West Coast shoreside Pacific whiting fishery takes place off the coasts of Washington, Oregon, and California. Harvesters target Pacific whiting, a migratory pelagic species sometimes marketed as Pacific hake, and deliver catch to land-based processing facilities. Harvester participation is constrained by a limited entry permit program. Harvests are constrained by a total allowable catch, which is set annually through a bilateral management agreement between the US and Canada known as the Pacific Whiting Treaty. Through 2010, Pacific whiting catch was monitored within seasons, and the derby fishery closed when the sector allocation or a bycatch limit was reached. In 2011, individual tradeable fishing quota was introduced into the fishery through the implementation of the West Coast Groundfish Trawl Catch Share Program. The complex program is comprised of a number of provisions, including a mandatory annual cost-earnings survey of all participants and 100 percent observer coverage. The program also included an allocation of 20 percent of Pacific whiting harvesting quota to eligible shoreside processors. Initial quota allocations for all quota shareholders, including processors, were based on historical participation during qualifying years. Allocation of harvesting quota to shoreside processors was intended to compensate for projected adverse impacts of catch shares on the sector, including stranded capital and shifts in bargaining power in the ex-vessel market due to season lengthening. Some observed changes under catch shares include season lengthening, consolidation in both the harvesting and processing sectors, higher ex-vessel prices, and increases in operating profit for the average vessel and processor. These changes are influenced by a variety of factors including large increases in the TAC occurring under catch shares but exogenous to the program.

1. INTRODUCTION

This case study provides an overview of the US shoreside Pacific whiting fishery and the introduction of individual fishing quotas (IFQs) in 2011. For a more detailed description and analysis, please see the five-year review of the West Coast Groundfish Trawl Catch Share Program (PFMC and NMFS, 2017). The results reported in this case study are obtained by comparing summary statistics before and after IFQ implementation, and should not be interpreted as causal. Data utilized include cost-earnings data from the Economic Data Collection (EDC) Program,[1] fish ticket data from the Pacific Fisheries Information Network (PacFIN),[2] and qualitative data from the Pacific Coast Groundfish Fishery Social Study.[3]
All errors and opinions are our own and do not reflect the beliefs of the University of Washington or NOAA Fisheries.

1.1 Description of the fishery

Pacific whiting (*Merluccius productus*), also called Pacific hake, migrates north up the West coasts of the US and Canada in the spring and summer months (Grandin et al., 2016), and is a round fish with an average size of 40 cm (2011-2016 average). This migratory species is harvested in Canada as well as in several fisheries in the US: the shoreside fishery, the at-sea fishery, and the tribal fishery. This case study focuses

[1] For more details, see: https://www.nwfsc.noaa.gov/research/divisions/fram/economic/overview.cfm
[2] For more details, see: https://pacfin.psmfc.org/
[3] For more details, see: https://www.nwfsc.noaa.gov/research/divisions/cb/ecosystem/humandim/groundfish-study.cfm

on the US shoreside fishery, in which catcher vessels target Pacific whiting and deliver to land-based fish processors. The primary shoreside fishing season begins on 15 June each year and continues until the end of the calendar year or until the whiting allocation, or a bycatch limit is met. In recent years, most fishing has occurred off the coasts of Washington and Oregon (42-48 degrees N, 124-126 degrees W), generally between 15 and 60 nautical miles off the coast (Somers et al., 2017), on fishing trips lasting an average of several days.

The Pacific whiting fisheries are higher volume than other fisheries on the West Coast, with an average annual catch of over 80 000 metric tons in the shoreside fishery from 2011-2016. Pacific whiting is the single target species in the fishery, and rockfish species comprise much of the bycatch, with an annual average bycatch rate of 1.7 percent from 2014-2015 (Steiner et al., 2017). The stock is assessed annually and, in most years, the fishery is close to full utilization of the total allowable catch (TAC). Natural variability in the Pacific whiting stock biomass has led to large fluctuations in TAC over the years with particularly high levels in recent years, coinciding with, but likely unrelated to, the introduction of catch shares into the fishery. Pacific whiting was declared overfished in 2002 and was rebuilt by 2004, due to reductions in commercial harvests coupled with strong recruitment ("Rebuilding plans," 2016). The West Coast Pacific whiting fisheries earned Marine Stewardship Council (MSC) certification in 2009, prior to the implementation of IFQs in 2011, and the fishery was recertified in 2014.

An average of 24 vessels participated in the fishery each season from 2011-2016, and tend to be fairly large and mechanized compared to vessels in other non-whiting fisheries on the US West Coast. Vessels that use midwater trawl gear to target whiting were an average length of 29 meters with inboard engines of 1126 horsepower on average, and generally have holds below deck where fish is kept cold using refrigerated seawater. Vessel crews included 2-3 paid crewmembers on average from 2011-2016 (Steiner et al., 2017). Most vessels have home ports in the major whiting ports of Astoria and Newport, Oregon; although, some vessels have home ports in communities outside the fishing grounds and must travel to access the fishery. There are a variety of vessel and gear owners in the fishery including fishers and non-fishers from both local communities and outside the fishing grounds, as well as fish processors. Vessel ownership by foreign entities in the fishery is limited by 46 U.S.C. 12113, which states that a vessel owned by an entity is eligible for a fishery endorsement only if at least 75 percent of the interest in the entity, at each tier of ownership and in the aggregate, is owned and controlled by citizens of the United States.[4]

1.2 Economic contribution and social implications of the fishing activity

An average of 8 fish processors participated in the fishery in 2011-2016 (Guldin et al., 2017), with vessels delivering Pacific whiting to 3 major port areas. An annual average of around 3 000 individuals worked at Pacific whiting processors as processing workers or other employees from 2013-2016, although, it is likely not all were involved in Pacific whiting processing specifically. These large multi-species processors produce several whiting products including headed-and-gutted, frozen whole, filleted, and others. An annual average of 94 percent of overall whiting landings was designated as destined for human consumption in the fish ticket database from 2011-2016. Low-quality whiting and scraps/byproduct can be generated into products like bait and fishmeal. The average product recovery rate was 58 percent from 2011-2016 but varies considerably depending on final product form.

The shoreside Pacific whiting processing sector earned a total of USD 42 million dollars in revenue per year on average from 2011-2016. Pacific whiting degrades quickly, so most products are frozen and exported abroad to be sold globally. In 2014, total national exports of Pacific whiting were more than 60 000 metric tons worth USD 100 million, with the majority going to Russia and Ukraine as well as other

[4] https://www.law.cornell.edu/uscode/text/46/12113

European countries (Guldin et al., 2017). Some processors have indicated domestic markets for Pacific whiting as well (Pacific Seafood, 2017).

An average of around 90 total individuals (captain and crew) participated in the Pacific whiting harvesting sector each year from 2011-2016. Vessels spent an annual average of 52 days at sea targeting Pacific whiting in the shoreside fishery. Some vessels that participate in the US shoreside whiting fishery also participate in the US at-sea whiting fishery (spending an annual average of 47 days at sea), in Alaskan fisheries, like Pollock, (spending an annual average of 94 days at sea), and in other fisheries (spending an annual average of 21 days at sea). Vessels generally earn between 26-50 percent of their total fishing income from participation in the shoreside Pacific whiting fishery (Steiner et al., 2017). Much of the above information is vessel-specific and not fisher-specific, due to the nature of the data collection. The Pacific Coast Groundfish Fishery Social Study asked West Coast groundfish fishers (not necessarily Pacific whiting fishers) about what jobs they hold outside the fishery and they indicated the following industries: fishery services, mechanic or building maintenance, real estate, agriculture/farming, processing, construction, city services, as well as some other industries.

2. MANAGEMENT OF THE FISHERY AND RIGHTS-BASED APPROACH

2.1 Management of the fishery

The Pacific whiting stock is assessed annually, and a TAC is set each year through a bilateral management agreement between the US and Canada known as the Pacific Whiting Treaty. After a portion of the US Pacific whiting TAC is set aside for the tribal sector, the remainder is allocated between the shoreside sector (42%) and the at-sea sectors (58%). The tribal allocation may be reapportioned to the shoreside and at-sea sectors throughout the season (generally after 15 September) if it is determined that it will not be utilized by the tribal sector.

The US Pacific whiting fisheries are managed by the Pacific Fisheries Management Council (PFMC), a regional management body with jurisdiction over the exclusive economic zone off Washington, Oregon, and California. The management process is bottom-up and inclusive of Council staff, the federal government, regional government, stakeholders, non-governmental organizations, and the public.[5] The Council develops management measures, which are implemented by the federal government via regional offices of the National Marine Fisheries Service (NMFS). Management measures are enforced by NOAA's Office of Law Enforcement (OLE).

The Pacific whiting fishery falls under the purview of the Pacific Groundfish Fishery Management Plan (FMP), which was approved in 1982 and established economic and biological goals to promote sustainable fisheries management (Warlick et al., 2018). In 1994, the Pacific whiting fishery was one of several on the US West Coast where a license limitation program was put into place to address issues of overcapacity and to better meet FMP goals, with the understanding that it was a stopgap measure (Warlick et al., 2018). The program required vessels to obtain federal permits with different gear-type endorsements to participate in the fishery. Permits were based on vessel length to discourage capital stuffing (Warlick et al., 2018). In 1997, several management measures were introduced into the Pacific whiting fisheries, including season start dates, fishery-specific harvest allocations, and provisions for reapportioning unused quota between fisheries towards the end of the season. These measures eliminated existing derby fishing conditions between the shoreside fishery and the at-sea fisheries but the race to fish within the shoreside fishery remained (Warlick et al., 2018). Discussion and consideration of an individual fishing quota (IFQ) program began in the 1990s but was stalled by the nationwide moratorium on new IFQ programs in 1996,

[5] https://www.pcouncil.org/

which lasted until 2002 (Warlick et al., 2018). To deal with persistent overcapacity in the interim, a federal buyback program removed a number of permits from the Pacific whiting fishery as well as other fisheries on the West Coast in 2003. A five percent fee on landings of groundfish, crab, and shrimp was implemented to repay the USD 10 million public funding appropriation and the USD 36 million loan (Warlick et al., 2018). In 2002, Rockfish Conservation Areas were established, which closed certain areas and depths to fishing in order to minimize bycatch of rebuilding rockfish species. There are several additional management measures that affected certain aspects of the fishery that are not mentioned specifically here. For more details, see Warlick et al. (2018) and the groundfish regulations (50 CFR part 660, subparts C – G, 2017).

There are several monitoring, control, and surveillance systems in place in the fishery. OLE uses patrol boats and collaborates with a number of organizations including the US Coast Guard to enforce fishery regulations.[6] Before a vessel leaves port, a declaration report must be submitted declaring the gear type to be used on the trip. All vessels are required to have a vessel monitoring system (VMS) on board to transmit the vessel's location to OLE. Electronic software assists in recordkeeping for logbooks and fish tickets. Observers and catch monitors are also used to track discards and catch of bycatch species. In the event of noncompliance, economic sanctions may be applied as well as criminal charges. For more details, see the groundfish regulations (50 CFR part 660, subparts C – G, 2017).

2.2 Brief history of the former rights-based approaches used in the fishery

As noted above, the fishery has been operating under a license limitation program since 1994.

2.3 Rights-based approach: allocation and characteristics

In 2011, an IFQ program was introduced into the shoreside Pacific whiting fishery, as well as the shoreside non-whiting groundfish trawl fishery through the West Coast Groundfish Trawl Catch Share Program. The catch share program also included cooperative programs for the at-sea Pacific whiting fisheries. Some of the main goals of the program were to resolve issues with overcapacity and high amounts of discards in these fisheries (PFMC and NMFS, 2017). The Council considered a number of different alternatives prior to the implementation of the program taking into account stock sustainability, economic outcomes of harvesters and processors, community outcomes, tribal fishing rights, and new entrants, amongst other considerations (PFMC and NMFS, 2010). The complex program is comprised of a number of provisions, including a mandatory annual cost-earnings survey of all participants and 100 percent observer coverage.

With the introduction of the catch share program, the US tribal fishery maintained the right to 17.5 percent of the total US TAC of Pacific whiting. In the shoreside non-tribal fishery, 80 percent of the fishing quota was allocated to vessel permit owners (which include a variety of entities) based on catch histories between 1994 and 2003. The remaining 20 percent of the fishing quota was allocated to eligible processors based on historical purchases between 1998 and 2004. Eligibility required the purchase of at least one metric ton of Pacific whiting in at least two years from 1998 to 2004 (PFMC and NMFS, 2010). Allocating harvesting quota to processors was motivated by concerns of stranded capital in the processing sector as well as potential shifts in bargaining power towards vessels in the ex-vessel market that could arise with season lengthening under IFQs (PFMC and NMFS, 2010).

Fishing quota allocations have no sunset clause, but may be revoked, limited, or modified at any time per 16 U.S.C. 1853a SEC. 303A.[7] In order to own a fishing quota, one must be a US citizen, a permanent resident alien, or corporation, partnership, or other entity that is eligible to own a US fishing vessel with

[6] https://www.fisheries.noaa.gov/about/office-law-enforcement
[7] https://www.law.cornell.edu/uscode/text/16/1853a

a fishery endorsement under 46 U.S.C. 12113 (50 CFR part 660, subparts C – G, 2017). Fishing quota can be leased and, starting in 2014, permanently bought/sold in units smaller than the original allocation if desired.

Fishing quota can also be inherited. Quota accumulation limits restrict the amount of quota any one entity can hold. Initial allocations over the limit were given an initial grace period and then required to divest any amount in excess of the limit (Warlick et al., 2018). All catch of IFQ species (retained or discarded) must be covered by quotas, or the vessel must stop participating in the fishery until any deficit is resolved.

The West Coast Groundfish Trawl Catch Share Program included some explicit costs for industry participants. Cost recovery fees, federally-mandated to recover government costs associated with private use of a public resource (not to exceed three percent of ex-vessel revenue in a given year), were implemented in 2014 (Warlick et al., 2018). Costs of observers increased under IFQs with 100 percent coverage. During the transition, NMFS provided a subsidy that gradually decreased from USD 330 per day to USD 0 from 2011 to 2016 (Warlick et al., 2018).

3. CONTRIBUTION OF THE RIGHTS-BASED APPROACH TO ACHIEVING SUSTAINABILITY

3.1 Sustainable use of the resources

The transition to IFQs in the shoreside Pacific whiting fishery ended the race to fish that existed prior. Under derby conditions, seasons were an average of 20 weeks from 2005-2010 and extended to an average of 27 weeks under IFQs, with the average processor purchasing whiting almost twice as many days (72 days under IFQs compared to 38) (Guldin and Anderson, 2018).

The IFQ program was also intended to reduce discards and bycatch. Individual accountability can make bycatch more constraining if fishers engage in very risk-averse behaviour to avoid disaster tows, particularly for species where individuals were allocated very small amounts of quota. Bycatch in the shoreside Pacific whiting fishery has been more constraining in recent years because of the rebuilding of overfished species (PFMC and NMFS, 2017). An informal risk pool was created in the shoreside sector to share information and quota in the event of a “lightning strike” (Holland and Jannot, 2012). Since 2011, there has been one incident in the shoreside whiting fishery where a vessel had a disaster tow and exceeded their individual quota limit (PFMC and NMFS, 2017).

3.2 Economic viability of the fishery

Consolidation was projected to occur under the IFQ program in both the harvesting and processing sectors, as less capital would be required to harvest and process fish over a longer season (Errend et al., under review; Guldin et al., under review; PFMC and NMFS, 2010). The shoreside Pacific whiting fleet consolidated 29 percent from 2009-2010 to 2011-2015, from an average of 34 vessels to 24 vessels (PFMC and NMFS, 2017). The average length of vessels in the fishery has increased by 7ft and engine horsepower has increased by almost 150. The number of land-based Pacific whiting processors dropped from 12 in 2009 to eight in 2015 (Guldin et al., under review). This decrease in participating processors had little effect on the Herfindahl-Hirschman index (HHI) of pounds purchased, as exiting processors had comparatively small market shares that were then distributed across remaining processors (Guldin and Anderson, 2018). In terms of regional purchasing behavior, most port areas experienced decreases in the number of Pacific whiting buyers from 2006-2010 to 2011-2015. The most notable declines occurred in southern Oregon and northern California, with no purchases of Pacific whiting in California under catch shares where some smaller operations existed previously (Guldin et al., under review).

Potential increases in Pacific whiting prices, both first-wholesale and ex-vessel, were anticipated under catch shares. Longer seasons could provide opportunities to increase value in the fishery, thus leading to higher first-wholesale prices, and potentially higher ex-vessel prices (PFMC and NMFS, 2010). In addition, season lengthening could induce shifts in bargaining power in the ex-vessel market towards harvesters, potentially mitigated by the allocation of quota to processors (PFMC and NMFS, 2010). Processors paid higher ex-vessel prices under IFQs with an average of USD 0.12/lb. compared to UDSD 0.09/lb. in 2009-2010 (Guldin et al., under review). However, no corresponding increase in first-wholesale prices was observed, possibly indicative of a shift in bargaining power (Guldin and Anderson, 2018; Guldin et al., under review). The industry average markup (total fish production value divided by total fish purchase cost) for Pacific whiting decreased from an average of 3.7 in 2009-2010 to 2.9 in 2011-2015 (Guldin et al., 2017).

Variable cost net revenue (revenue minus variable costs) is a measure of operating profit. Variable cost net revenue per metric ton is examined to compare across years with widely-varying TAC. Variable cost net revenue per metric ton from shoreside Pacific whiting harvesting increased substantially for the average vessel, from USD 32 in 2009-2010 to USD 126 in 2011-2014 (PFMC and NMFS, 2017). Fleet-wide expenses as a percentage of revenue decreased over this period as well (PFMC and NMFS, 2017). Variable cost net revenue per metric ton from shoreside Pacific whiting processing operations decreased for the average processor, from USD 415 in 2009-2010 to USD 294 in 2011-2014. The longer seasons were anticipated to lower costs of production for processors, allowing them to utilize their labour and utilities more efficiently. Guldin and Anderson (2018) explore changes in production worker and utility expenses per processed pound for all operations at Pacific whiting facilities, finding weak evidence of efficiency gains. Whiting harvesters and processors are heterogeneous and there is a large variation in many of these metrics, particularly net revenue. More information and other metrics can be found on NOAA Fisheries' FISHeries Economics Explorer (FISHEyE).[8]

Individual crewmember compensation (for all operations) increased on vessels participating in the Pacific whiting fishery, with average daily wages 83 percent higher and average annual wages 118 percent higher in 2011-2015 compared to 2009-2010 (PFMC and NMFS, 2017). Respondents of the Pacific Coast Groundfish Fishery Social Study indicated that they felt there were fewer jobs connected to the groundfish fishery than prior to catch shares (PFMC and NMFS, 2017). However, it should be noted that this information includes the perspectives of those fishing in the at-sea whiting fishery and the non-whiting groundfish fishery.

Discussions of concentration of ownership of vessels, gear, and quota are limited by available information and challenges associated with linking affiliates.

3.3 Social equality

The IFQ program created a new type of fishery participant, quota shareowners, that don't necessarily have to directly participate in harvesting and processing. Quota shareowners can lease their quota in entirety (or in smaller units) and earn income from the fishery via indirect participation. Data suggest that vessels that have chosen to remain in the whiting fishery are spending a larger portion of revenue on quota purchases and leases from those that have exited or have decreased participation (PFMC and NMFS, 2017). The quota also increases the cost of participation for new entrants into the harvesting and processing sectors.

[8] https://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/

Of the processors originally allocated whiting quota, whiting quota share ownership has increased from 20 percent to 23 percent (PFMC and NMFS, 2017). These processors currently own quota shares for non-whiting species as well; although, they own no more than 2.114 percent of any one quota species aside from Pacific whiting (PFMC and NMFS, 2017). It is important to note that these values exclude any other processors (those that were not originally allocated whiting quota) and any accounts linked to processors that may have acquired quota. Regarding processor use of harvesting quota, there is little evidence that processors are directly capturing the value of their quota by leasing in the quota market. Only three percent of transfers of processor-affiliated quota to independent vessels involve an explicit cash value, although it is possible that the price was not known at the time of the transfer or that the price was not recorded (PFMC and NMFS, 2017). Processors seem to be using quota to support bargaining relationships with vessels to secure deliveries, by offering quota as a percentage of landings to delivering vessels (PFMC and NMFS, 2017). There is mixed evidence that processors extract value from quota through ex-vessel price adjustments. The following are quotes from the Pacific Coast Groundfish Fishery Social Study from processors describing how they are utilizing the processor quota allocation within the catch share program:

> "I entice boats to come in with fish, not money. Fish equals money, right? … I tell them you bring your fish to me and I will match your deliveries by 20%...I am paying you to catch my fish" —Oregon Processor

> "We're not leasing it out, we have to give it to them… You can't even charge a lease fee for it. If we want their 5 million pounds of whiting, we have to give them 1.5 million of our own" —Washington Processor

4. MAIN CHALLENGES AND WAY FORWARD

4.1 Challenges for the fishery

Challenges and competing interests between fishers arose during the development of the West Coast Groundfish Trawl Catch Share Program given that it covered multiple fisheries and multiple species. Some fishers in the Pacific Coast Groundfish Fishery Social Study believed that the Pacific whiting fisheries had more influence on management, and both whiting and non-whiting fishers believed the program would benefit the Pacific whiting fisheries more than the non-whiting groundfish fishery (PFMC and NMFS, 2017). Some of these conflicts have persisted through catch shares, as it is generally perceived that Pacific whiting outcomes have been better under IFQs than outcomes in the non-whiting groundfish fishery.

Conflicts between fishers and managers have arisen as well. In the Pacific Coast Groundfish Fishery Social Study, some fishers expressed that the program favored the interests of fish over those of fishers, perceiving the program's emphasis on 100 percent accountability as an indication of distrust in the industry (PFMC and NMFS, 2017). In addition, some expressed that the management process would discount fisher experience in favor of science (PFMC and NMFS, 2017).

Regarding conflicts over allocation of the resource, there was mixed support for allocating fishing rights to processors in the shoreside Pacific whiting fishery during program development. Some believed that processors would be disadvantaged without an initial allocation of quota, while others believed it would give processors too much power in the ex-vessel market (PFMC and NMFS, 2010). The provision was also debated by researchers, some in support (Matulich, 2010) and others expressing concern (Wilen, 2009). In addition, lawsuits arose after program implementation where vessels and processors challenged the control dates used for developing initial quota share allocations, however the original allocations were upheld after a review (Pacific Dawn, LLC, et al. v. John Bryson, et al., 2011; Pacific Dawn, LLC, et al. v. Penny

Pritzer, et al. and Midwater Trawlers, et al., 2013). There have also been some conflicts over access to bycatch between fishers targeting Pacific whiting in the shoreside and at-sea fisheries as well as with fishers participating in other fisheries including recreational fisheries.

Conflicts also exist between fishers and processors, and within the processing sector. Several lawsuits have been filed in recent years citing anticompetitive behavior, including *Whaley v. Pacific Seafood Group* (2010), *Boardman v. Pacific Seafood Group* (2016) and *Seawater Seafoods Co. v. Dulcich* (2016). The first of which reached a settlement agreement, the second of which was dismissed, and third of which was dropped.

4.2 Improving fishery sustainability in the future

This case study highlights some of the benefits and challenges associated with rights-based management. In general, it is perceived that IFQs have improved conditions in the Pacific whiting fisheries (although partially influenced by increasing TACs), particularly regarding the elimination of the race to fish. Regarding the allocation of harvesting quotas to processors, discussions with industry members appear to indicate that a mutually beneficial situation has arisen with regards to the use of quotas. However, more research is required to understand the full effects.

The complexity of the catch share program and sometimes-competing interests of participants within fisheries as well as across fisheries illustrate the challenges associated with multispecies fisheries management. As the program continues to mature and develop, careful consideration must continue to be given to interactions between fisheries, communities, and stocks.

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