Permit Stacking As An Approach To Implementing Harvest Rights That Can Be Transferred And Accumulated

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Abstract. The current U.S. moratorium on implementation of new Individual Quota (IQ) programs has left fishery managers without an important tool in the quest for successful management systems. Meanwhile, many fisheries, such as the west coast groundfish fishery, are in desperate need of capacity reduction and more flexible management.

The Pacific Fishery Management Council (PFMC) has, since 1994, employed a license limitation program for most of its groundfish fishery. Management objectives identified for this fishery include the provision of year-round supplies of fresh fish to regional markets. To promote this objective the Council has adopted, over the past 15 years, an evolving web of individual-trip and cumulative-time-period landing limits, which slow the pace of the fishery. In recent years, downturns in the perceived health of several stocks, combined with more stringent rebuilding requirements, have resulted in dramatic reductions in the limits for many species. With little hope of implementing a permit buyback initiative, the PFMC is currently considering alternatives for voluntary and mandatory permit stacking to achieve fleet reduction and, in turn, higher limits for vessels on the water. Stacking may prove to be an effective intermediate step towards IQs for fisheries combining limited access with some form of effort/output controls. In relatively small fisheries, particularly those with existing permit programs and output/effort restrictions, permit stacking may represent a cost-effective means of facilitatating fleet consolidation and individual accumulation of harvest rights.

Keywords: fishery management, property rights

1 INTRODUCTION

In 1982, the Pacific Fishery Management Council (PFMC) implemented a Fishery Management Plan (FMP) for groundfish within the U.S. Exclusive Economic Zone off the coastal states of California, Oregon, and Washington. This plan includes 82 species of groundfish, 55 of which belong to the rockfish family. When this FMP was revised in 1990, one of the three stated goals included the desire to "promote year round availability of quality seafood to the consumer." In its attempt to distribute deliveries of fish throughout the entire year, the PFMC has relied upon an evolving structure of landing limits to mediate the effects of downward trends in the allowable catches of many species and the emergence of significant fleet overcapacity. These landing limits initially took the form of "per-trip" restrictions on poundage and occasionally on trip frequency. In an effort to reduce regulatory-induced discards and increase the flexibility afforded fishing operations, most of these limits are now expressed in the form of monthly or bi-monthly cumulative landing limits. Two major exceptions are the fishery for Pacific hake, or whiting , which is managed only with a quota and sector allocations, and the fixed-gear fishery for sablefish, which will be discussed in greater detail in Section 2.

Despite implementation of a license limitation program for most of the groundfish fishery in 1994, the current fleet is highly overcapitalized. A recent white paper on over-capacity, produced by the PFMC's Scientific and Statistical Committee, suggests that capacity utilization in the trawl fleet is probably less than 40%, and less than 20% in the fixed-gear fleet. Several factors have contributed to the extent of this imbalance. First, there was insufficient support for using qualifying criteria to achieve a tangible reduction in the fleet during implementation of license limitation. Second, subsequent efforts to develop a permit buyback program, with either government or industry funding, were unsuccessful. Third, estimated biomasses for many species continued to decline throughout the 1990s. Concurrently, a growing consensus among fisheries scientists that many west coast stocks have experienced rather low productivity over the past twenty years, has led to reductions in the exploitation rates used to calculate allowable catches for these species. And finally, the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA, 1996), and the associated guidelines developed by the National Marine Fisheries Service (NMFS) for its implementation, have mandated strict timelines for the rebuilding of stocks classified as "overfished", as well as a more precautionary approach to addressing uncertainty. In 1999, the PFMC defined overfished stocks as those below 25% of the equilibrium biomass in an unfished state. Currently, five species have been identified as overfished, four of which are rockfish. The rebuilding plans for some of these long-lived, slow-growing species anticipate that rebuilding their biomasses to target levels may take 30-40 years, or longer.

In conjunction with the PFMC's goal of sustaining year-round deliveries of fish, these circumstances have led to dramatic reductions in many cumulative limits. Since this fishery lacks

an ongoing observer program, these reductions have heightened concerns about regulatory-induced discards. And as a consequence, PFMC actions have also included implementation of further gear and limit restrictions intended to reduce the opportunities for targeting species commonly associated with overfished stocks. The cumulative effect of this array of changes has been to place an increasing segment of the fishery on the brink of financial collapse. Furthermore, the degree to which total mortality of many species can be effectively constrained to the identified targets is highly dependent on the skill of fishers in matching their fishing strategies and locations to the mix of poundage that is available. There is considerable fear that unless corrective actions are taken soon, many of those who have accumulated decades of experience in this fishery will exit, taking their knowledge with them and leaving behind permits, vessels, and gear sold to newcomers at discount prices.

It is highly unlikely that the financial viability of the fishery can be improved without significantly reducing overcapacity. As acknowledged in a draft version of a Groundfish Fishery Strategic Plan being developed by the PFMC, "The current problems associated with low landings limits, short seasons and complex regulations will not go away unless latent capacity is permanently removed from the fishery." However, the lack of a funding source for effective permit buyback and the current MSFCMA moratorium on new Individual Quota (IQ) programs have severely restricted the availability of tools with which the PFMC can respond to this situation. The remainder of this paper explores one possible approach for fleet consolidation: permit stacking. Within this paper, permit stacking will refer to a program in which more than one permit can be attached to a vessel, along with all, or part, of the landing limits of each permit. The potential for implementing this approach will be discussed in the context of two segments of the groundfish fishery: the fixed gear fishery for sablefish, and the mixed-species groundfish trawl fishery.

2 THE FIXED-GEAR SABLEFISH FISHERY

2.1 History of the Fishery and Management

Sablefish is one of the cornerstones of the groundfish fishery, for both trawl and non-trawl gear groups. From 1984-99, it accounted for 21% of all ex-vessel groundfish revenue generated by onshore landings. During this period its contribution ranged from 14% in 1984 to 32% in 1997. It is responsible for 58% of the ex-vessel groundfish revenue earned by those fishing fixed-gears--longlines or fish pots--from 1984-99. A very high percentage of the fish are exported frozen, in headed-and-gutted form, to Japan.

Between 1984 and 1986, real sablefish price increased by 61% for fixed-gear fishers, promoting an increase in the number of participants from 105 to 243. As a result, the season length for all gears fell from the entire year in 1984 to 295 days in 1986. This led to an allocation of sablefish between trawl and non-trawl users which has been in effect

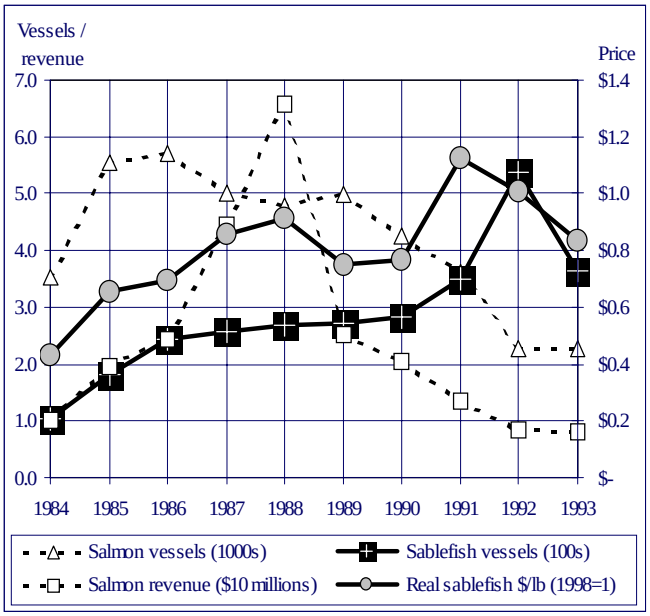

Figure 1.--Factors influencing fixed-gear sablefish participation, 1984-93

since the 1987 season. By 1991, real sablefish price for fixed-gear had increased by 161%, relative to 1984. Compounding the effect that this had on participation was a drop in west coast salmon revenue from $66 million in 1988 to $8 million in 1992, which was accompanied by a reduction in the number of vessels landing salmon, from 4,800 to 2,300 (Fig. 1).

With the allure of rising prices and a ready pool of motivated entrants, the number of fixed-gear sablefish participants climbed to 540 by 1992. In order to constrain catches to the allocated poundage, the season length, which had been nearly 5 months in 1990, was reduced to just two weeks by 1992 (Fig. 2). As an indication of the mounting intensity of the fishery, the average landed poundage of the top-30 vessels in 1992 was roughly half the average in 1990, despite having a season of one-tenth the duration.

Serious PFMC consideration of IQs for this fishery began during this timeframe, following their approval of the license limitation plan. Soon after limited entry was implemented in 1994, it was clear that the license program would afford minimal and short-lived improvements for this fishery. Although the number of participants was reduced to less than

150 in 1994, roughly 240 fixed-gear permits had been issued,

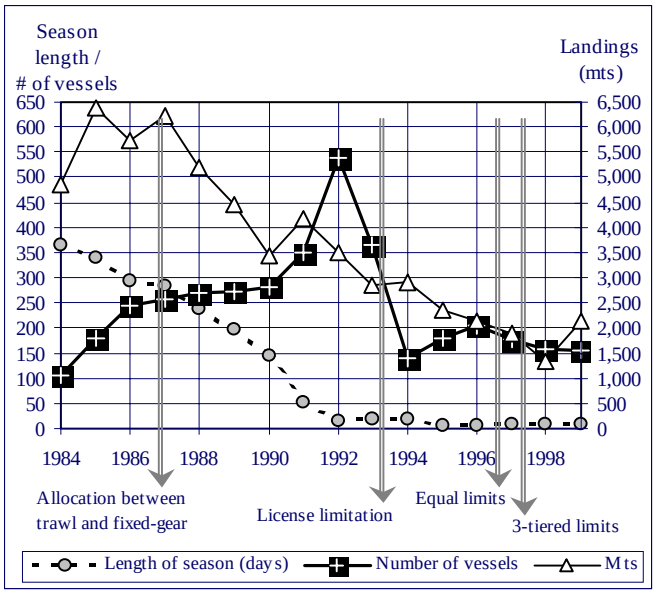

Figure 2.--Changes in fixed-gear sablefish opportunities, participation, and landings, 1984-99

providing the opportunity for the number of participants to return to 200 by 1996. Despite reducing the number of participants by more than half from 1992, the season shrank to just 5 days by 1996.

In spite of the evident deterioration in the fishery by 1995 and the increasing difficulty in managing it, the fixed-gear industry and the PFMC were unable to resolve divergent beliefs on the manner in which IQs should be initially allocated. By that time, Congress had begun discussing a possible moratorium on new IQ programs, and the PFMC was advised not to implement any such program until the MSFCMA had been approved. And, when finally amended in October, 1996, the MSFCMA did, in fact, retroactively repeal all IQ programs that had been approved by the Secretary of Commerce after January 3, 1995.

Desperate for an alternative to the derby fishery, the PFMC began consideration of whether a cumulative limit structure might be used stabilize the fishery. Initially, it was hoped that limits could be assigned to each permitted vessel, for between one and three fishing periods. However, concern soon arose regarding whether such a system would constitute a *de facto* IQ. Resolution of this issue was not straightforward, since Congress did not define what it meant by the term. Legal advisors to the PFMC concluded that any new program in which all qualified fishers would have a reasonable expectation of harvesting a specified poundage or percentage of the annual quota would likely be determined to be under the umbrella of the IQ moratorium.

This interpretation provided the opportunity for development of a cumulative limit framework in which a sufficient number of eligible fishers would not have a reasonable expectation of taking their entire limits. The term "overhead" was used to reflect the difference between possible and actual landings, as defined in (1), and this value became the focus for determining whether or not an approach would be precluded by the IQ moratorium.

$$\text{"Overhead"} = (\text{Possible landings} - \text{Actual landings}) / \text{Actual landings} \quad (1)$$

The PFMC was advised that a program with overhead values of less than 20% would be very susceptible to successful challenge, while values greater than 25% would not. The PFMC then considered whether a cumulative limit fishery with a specified season length could be designed to meet a 25% criterion and still provide some relief from the accelerating pace of the fishery.

Faced with the expectation of a 3-day derby fishery in 1997, the PFMC implemented a sablefish endorsement, qualifying 164 permits to continue participating in this fishery, and provided each qualifier with an equal cumulative limit that had to be fished within a 9-day season. Allocated poundage not landed in this time period would be divided equally within a mop-up fishery, as had been the practice since the 1995 season. This equal limit fishery was viewed as a transition to a program based more on historical participation. However, it was approved for only one year, so that the threat of returning to an even shorter derby could be used to motivate a swift resolution to the specifics of an alternative.

The overhead realized during the first year was roughly 40%, which permitted the approach to be continued, and expanded into a 3-tiered structure of limits that continues to the present. Permits were assigned to a tier based on historical landings over an 11-year period. The ratio of cumulative limits between tiers is fixed at 1 : 1.74 : 3.85. In the 2000 fishery, limit poundages range from 21,000-81,000 lb. As the ability to project fleet participation has improved, the PFMC has been able to achieve levels of overhead closer to its target of 25%; never falling below it, and never exceeding the allocation to the fishery. Season length has remained in the range of 9-10 days since 1997.

2.2 Potential for Using Permit Stacking

The PFMC's Draft Strategic Plan identifies the development of voluntary permit stacking for this fishery as a high priority. The potential benefits from allowing vessels to gain access to multiple limits through permit stacking remain heavily dependent upon the continuation of the IQ moratorium. While it remains in effect, the need to constrain season length to achieve the requisite overhead will limit the potential returns from stacking for most of the fleet. A recent analysis of the effects of voluntary stacking in this fishery suggests that no more than 30 currently permitted vessels would likely be able to land a full additional limit, given the current duration of the season. And the season length with 30 stacked permits would be expected to decrease in length, as underutilized permits are shifted to vessels that can harvest the associated limits more completely. Another factor that could tend to reduce the willingness to stack is that the permits convey limits to species other than sablefish. Since these other species are currently not allocated between trawl and fixed-gears, the future value of limits for them under stacking is highly uncertain, at present.

Beyond the point where full additional limits can be easily harvested with the current season length, higher numbers of stacked permits would tend to lengthen the season. However, significant increases in duration could only be achieved through stacking in excess of 50% of the permits. The PFMC's Draft Strategic Plan identifies "mandatory" stacking as an available alternative for achieving significant fleet reduction. This approach would require that **two** permits be attached to a vessel for it to remain eligible to participate in the fishery. Results from modeling such a scenario suggest that removing half of the 164 endorsed vessels from this fishery would allow an increase of only one day in season length, in order to achieve the overhead target.

Despite the limited gains that appear to be available from stacking with the IQ moratorium in force, there may be good reasons to implement the ability to stack permit limits, even if the moratorium is not allowed to sunset this fall. Assuming that the moratorium is allowed to lapse at some point during the next few years, the time allowed for harvesting limits could be swiftly extended to 2-3 months, without the delays associated with regulatory or FMP amendments. Because overhead would not be included in calculating limits, the poundage assigned to permits in each tier would be reduced. For example, with the current allocation, the Tier-1 limit would fall from 81,000 pounds (lb) to 67,000 lb. However, even with a 2-month opening, at least 60 permitted vessels would have the capability to harvest 200,000 lb or more. This is roughly the poundage that would be assigned to a vessel stacking three Tier-1 permits, which has been discussed by industry as a possible accumulation cap. Taken together, these 60 vessels would be capable of harvesting more than 12 million lb--or 180 Tier-1 limits--in two months, and the allocation to the fishery is less than 5 million lb, with just 27 Tier-1 permits.

Although permit stacking may not fully resolve over-capacity issues within this fishery, it would provide a mechanism to allow adjustment to begin immediately following the removal of the IQ moratorium. The PFMC has expressed an interest in considering IQs for the entire groundfish fishery once implementation becomes feasible. However, history suggests that it will take several years to develop and secure approval for such a program. With stacking already in place, the fixed-gear sablefish fishery could begin consolidation while a more comprehensive IQ program is being developed.

If, in the longer term, the PFMC did not adopt an IQ approach to managing the entire groundfish fishery, it is not clear that converting only the fixed-gear sablefish fishery to IQs would be preferable to retaining permit stacking. Although IQs would afford greater flexibility to fishery participants, the start-up and administration costs of an IQ program for a single, relatively small fishery might well exceed the marginal economic benefits of that increased flexibility. From a more general viewpoint, stacking of permit-based landing limits should be viewed as a potential alternative to IQs in any circumstances where the scale and scope of the target fisheries are insufficient to yield benefits from IQs that will clearly outweigh costs.

3 THE MULTI-SPECIES TRAWL FISHERY

3.1 History of the Fishery and Management

As noted in Section 1, the desire to maintain year-round supplies of many species into regional fresh-fish markets has been an important guiding force in the evolution of west coast groundfish management, in general, and the use of landing limits, in particular. Limits on the amount of poundage that can be landed on a single trip were first implemented for two species in October 1982, in order to slow the rates of catch and allow continued retention through the end of the year.

From 1983 onward, landing limits for an increasing number of species, or species groups, were established at the beginning of the year, and adjusted inseason as necessary to attain but not exceed greatly the harvest targets. Since then, the duration of landing limit periods has gradually increased, in order to provide greater flexibility to fishers and to address concerns regarding regulatory induced discards.

By 1985, the PFMC began to incorporate weekly cumulative limits into this framework. In some cases, these limits were restricted to one landing per week up to the specified poundage. For some species, this structure also included options to land half of the poundage twice per week, or twice the poundage once every two weeks. By 1993, this structure had evolved into a mixture of 4-week, 2-week, and individual-trip limits, varying by species.

In 1994, the duration of cumulative limits was standardized to one month for all species managed with limits, except Pacific Ocean perch. This framework was modified slightly beginning in 1996, when limits were specified for a 2-month period, but with the stipulation that no more than 60% of the limit could by landed in either individual month. The use of 2-month cumulative limits became the standard for most of the year in 1999. Since 1997, the duration of limit periods towards the end of the year has reverted back to one month, in order to provide the management flexibility needed to adjust limits or close fisheries. Due to difficulties in predicting vessel participation and limit attainment, as well as delays in processing landings information and the discrete opportunities for PFMC action, partial fishery closures within the last three months of the year have been necessary in some years.

Although the available poundage per fixed unit of time declined steadily for most species prior to 1997, the changes since then--attributable largely to mandated rebuilding plans, more precautionary management, and changes in the scientific view of stock productivity--have been dramatic, as illustrated in Table 1.

Table 1.--Changes in selected trawl cumulative limits from 1997 to 2000.

	1997	2000
Overfished species		
Pacific Ocean perch	8,000 lb / 2 mo.	1,300 lb / mo.
Canary rockfish	14,000 lb / 2 mo.	200 lb / mo.
Bocaccio rockfish-Southern area	11,000 lb / 2 mo.	300 lb / mo.
Lingcod	35,000 lb / 2 mo.	200 lb / mo.
Total *Sebastes* (with bottom gear)		
North	95,000 lb / 2 mo.	5,500 lb / 2 mo.
South	215,000 lb / 2 mo.	13,000 lb / 2 mo.

Opportunities in the very important DTS assemblage--comprised of Dover sole, two species of thornyhead rockfish, and sablefish--have also been significantly reduced. From 1989 to 1997, combined limits for all four species fell from 40,000 lb per week (or, over 300,000 lb per 2-months) to 56,000 lb per 2-months. Since then, although the total poundage per 2-months has fallen by only 4,000 lb, limits for the three most valuable species have fallen by 27% (sablefish) and 50% (both thornyhead species).

3.2 Potential for Using Permit Stacking

With the lack of an apparent funding source to underwrite the cost of buying back permits and the current inability to implement an IQ form of management, the PFMC is anxious to identify some mechanism by which fleet capacity can be reduced and fishing opportunities consolidated into financially viable amounts. If the IQ moratorium does not sunset in 2000, they are likely to begin consideration of permit stacking as a means of accomplishing these objectives.

As in the fixed-gear sablefish case, a potential roadblock to implementation of trawl stacking would be a determination that overhead, as defined above, under such a plan would be insufficient to distinguish the program from an IQ. As a first step in assessing this possibility, an analysis was conducted of the degree to which the entire permitted trawl fleet attained the limits that were available for DTS species during the 1999 season.

The importance and desirability of these species is illustrated by three measures. Trawl ex-vessel prices for sablefish and both thornyhead species ranged from $0.74-0.97 per pound in 1999, compared to a range of $0.30-0.50 per pound for most other species, excluding whiting. From 1997-99, revenue from the four DTS species accounted for 45% of all groundfish revenue generated by onshore landings of groundfish. Finally, of the 259 permits with some onshore landings of groundfish between 1997-99, nearly one-fifth received more than 75% of their onshore groundfish revenue from DTS species. Roughly half of the 259 earned more than 50% of their groundfish revenue from DTS species.

For each trawl permit, landings of the four DTS species during 1999 were compared to the amount that could have been landed if the limit during each period were attained. Figure 3 shows the distribution of permits among categories reflecting the percentage of possible poundage that was actually landed, for each of the species. It reveals that the percentage of permits landing as much as 90% of the allowed poundage was very small--less than 15% in the highest case, and less than 5% in two cases. At the other end of the spectrum, those with no landings of these species represented between 15% and 30% of trawl permits, with a minimum of another 20% of the fleet landing less than 30% of the allowable poundage.

It is unlikely that less than 15% of the current fleet is capable of landing the current DTS limits. Examination of 1989data, for example, reveals that 75 vessels had annual landings at least as large as the sum of the 1999 limits--324,000 lb. This represents just over 25% of the current number of trawl permits. Still, the number of vessels landing at least this amount in either year is more similar than might be inferred from the change in limits. What changed even more than the number of vessels participating at this level was the truncation of the 1989 landings distribution, which extended to more than 5 times the amount available in 1999. Thirty-eight vessels landed amounts that were at least twice that available in 1999, with the top-10 averaging about four times the 1999 limits.

Table 2 provides an overview of DTS overhead in these two years. Since only about 230 permits had DTS landings in 1999, total fleet values are contrasted with that participating fleet and the top-50 vessels. Since there were not individual DTS species limits in 1989, results for that year are aggregated over the enitre assemblage. Also, since the fishery was open-access in 1989, there is not a meaningful comparison value for the overheads reported for the entire permitted fleet in 1999.

Table 2.--Differences between possible and actual trawl landings, as a percentage of actual landings ("overhead"), for individual DTS species in 1999, and combined species in 1989.

		Vessel groupings based on total DTS tonnage		
		top-50	top-230	Fleet
1999 DTS fishery				
	Sablefish	18%	111%	154%
	Dover sole	21%	133%	180%
	Longspine	40%	177%	233%
	Shortspine	5%	85%	123%
	All DTS	22%	131%	179%
1989	All DTS	145%	575%	undefined

Given the degree of landing limit reductions throughout the 1990s, overhead remains surprisingly high in the 1999 DTS fishery. However, it has fallen dramatically over this decade, from 575% to 131%, measured over the top-230 DTS vessels in each year. Even though the top-75 vessels in 1989 landed amounts that averaged twice the current opportunity, that average represented only about one-third of what they could have landed during that year.

A variety of factors have contributed to the continued presence such high levels of overhead in this segment of the fishery. First, not all trawl vessels are well-equipped to access these species in the deep regions of the continental slope, where they are, at least seasonally, most abundant. Second, as a result of a decade of limit reductions, many highline operations of the past have either become more diversified, or have left the fishery entirely. This diversification often involves seasonal fisheries for species such as whiting, crab, tuna, or other pelagic or migratory species, where landings of DTS, as well as many other groundfish species, are likely to be foregone for months at a time.

The onshore whiting fishery, for example, has generally operated for 4-5 months beginning in May. In 1999, 26 vessels in this fishery were among the top-100 trawlers in total groundfish volume. They averaged no more than 36% of the available poundage for any of the DTS species, while the remaining 74 vessels in the top-100 averaged more than 70% of the available poundage for 3 of the 4 species. Finally, there are now 10-20 permits associated with vessels whose only participation is in the offshore whiting fishery, where other groundfish species are not targeted or retained.

As a result, then, of fleet diversification into fisheries where most groundfish species are not caught, as well as economic, geographic, or experience barriers to full participation in all aspects of the multi-species groundfish fishery, it would appear that permit stacking within the trawl fishery could provide an opportunity for fleet consolidation and individual accumulation of harvest opportunities, without serious risk of failing to achieve the overhead threshold identified for differentiating fixed-gear sablefish management from an IQ program.

It is expected that, as little-used permits are transferred to vessels capable of landing higher poundage, the baseline cumulative limits per-permit will fall, accelerating the rate at which overhead is initially reduced. However, as long as 35-45 permits remain seasonally or exclusively engaged in the whiting fishery, and those permits retain full access to the groundfish fishery, sufficient overhead should be achievable. The PFMC, and its advisory bodies, have discussed the possible development of endorsements for the non-whiting groundfish species, which would effectively preclude many of these permits from future participation for species other than whiting. Although such endorsements might serve a valuable purpose in constraining future effort shifts towards these species, they would also eliminate the overhead contribution that permits not receiving endorsements could make within a stacking program.

4 CONCLUSIONS

The presence of substantial excess fishing capacity in many

U.S. fisheries has spawned an array of problems, ranging from resource over-exploitation to erosion of economic benefits to creation of highly complicated schemes for micro-managing fishery participation. Commonly, the application of qualifying criteria to remove excess capacity without compensation is not viewed by managers or the industry as a politically viable option. The existing moratorium on implementing new IQ programs, and its uncertain duration, has left managers with few options for developing structures that can facilitate consolidation of fishery access rights while compensating those who exit the fishery.

For fisheries utilizing limited-access permits and some form of landing limits, or those capable of conversion to such a structure, permit stacking may afford an opportunity to initiate industry-funded fleet consolidation within the constraints of the IQ moratorium. Not all fisheries will be well suited to this approach. The west coast fixed-gear sablefish fishery provides an example, where permits--or associated species endorsements--convey access to a small number of species, and where only a limited number of opportunities for participation can be provided, due to the extent of excess capacity. In such circumstances, the structure required to differentiate a stacking program from an IQ may require considerable management effort, and yield relatively little fleet consolidation. However, even in such cases, the existence of a stacking structure, at whatever future time the IQ moratorium is lifted, would allow for rapid adjustment of fishery parameters to facilitate further consolidation. Permit stacking might then serve as a long-term alternative to IQs, or as a mechanism of transition while an IQ program is being developed.

The multi-species trawl fishery on the west coast represents a much different situation, and one that may be better suited to achieving more significant improvements with permit stacking, even if the IQ moratorium continues indefinitely. This fishery has a lesser degree of excess capacity, with the current fleet representing 2-3 times the number of vessels needed, as opposed to 5-10 times the needed number in the fixed-gear fleet. The fishery provides many species to regional fresh fish markets that would not be well served by a short, derby opening, which might be easier and cheaper to administer. Landing limits are defined for each of 6-12 periods throughout the entire year. And coupled with the fact that many permitted vessels participate in alternative seasonal fisheries--for whiting and non-groundfish species--where most groundfish species are not caught, the fleet as a whole is likely to land far less annually than the amount allowed by the limits, even with stacking.

In order to assure that harvest targets can be utilized without being exceeded, this approach requires a significant commitment to the timely tracking of landings throughout the year, and the ability to adjust landing limits, as necessary. Not all fisheries possess the data systems, staffing, or management flexibility to successfully implement this kind of approach. However, in cases like the west coast trawl fishery, where existing management must already contend with these demands, the marginal cost associated with implementing permit stacking is probably minimal.

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6 APPENDIX - SCIENTIFIC NAMES OF REFERENCED SPECIES

Common name	Scientific Name
Sablefish	*Anoplopoma fimbria*
Pacific hake (whiting)	*Merluccius productus*
Lingcod	*Ophiodon elongatus*
Dover sole	*Microstomus pcificus*
Longspine thornyhead	*Sebastolobus altivelis*
Shortspine thornyhead	*Sebastolobus alascanus*
Bocaccio rockfish	*Sebastes paucispinis*
Canary rockfish	*Sebastes pinniger*
Pacific Ocean perch	*Sebastes alutus*