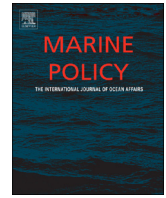




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## How have catch shares been allocated?



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## ABSTRACT

A unique database was created that describes the methods used to allocate shares in nearly every major catch share fishery in the world. Approximately 54% of the major catch share fisheries in the world allocated the Total Allowable Catch (TAC) solely on the basis of historical catch records, 3% used auctions, and 6% used equal sharing rules. The remaining 37% used a combination of methods, including vessel-based rules. These results confirm the widely-held belief that nearly all catch share programs have "grandfathered" private access to fishery resources: 91% of the fisheries in the database allocated some fraction of the TAC on the basis of historical catch. This publicly available database should be a useful reference tool for policymakers, academics, and others interested in catch shares management in Hawai'i and across the globe.

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## 1. Introduction

The debate over catch shares management has intensified recently, in both academic and policy circles [1–3]. Most commentators agree that catch shares improve the *aggregate* economic performance of a fishery, especially in terms of measures such as total profit generated. However, in terms of other (often more fine-scale) metrics, such as total jobs, crew remuneration, number of active vessels or processor profit, there is little agreement over the impact of catch share systems: both in terms of the direction of the impact and its desirability. For example, a study of the introduction of catch shares to the Bering Sea/Aleutian Island crab fisheries [4] finds that the number of individuals employed in the fishery declines but that the total crew-hours dedicated to fishing activities remains roughly constant.

In terms of ecological impacts, the evidence is also conflicting. One study [5] finds that catch share fisheries are less likely to be collapsed compared to all other fisheries grouped together; [6] corroborate the findings in [5] using similar data but a different empirical strategy. In a similar vein, [7] finds that catch shares have largely positive effects on target species, but mixed or unknown effects on non-target fisheries and the overall ecosystem, and [8] finds that biomass increased in 60 per cent of a sample of catch share fisheries but continued to decline in the remaining 40 per cent. In an evaluation of 15 North American catch share fisheries, [9] find that for a variety of ecological indicators, no change in means was observed after switching to catch shares (except for a decline in the discard rate). There was, however, a significant reduction in the variability of all ecological

indicators leading to the conclusion that the primary effect of catch shares was greater consistency over time. Similar results using expanded databases of catch share fisheries are presented in [10,11].

One of the positive elements to emerge from the often acrimonious debate over catch shares is the recognition that the design of a catch share program is critically important in determining outcomes. One of the key design features in any catch share program is deciding how to allocate the shares. Until recently, the role of allocation in cap-and-trade programs generally and catch shares specifically has been largely ignored by economists. The Coase theorem predicts that the aggregate outcome of a cap-and-trade system should be independent of the initial allocation, which may explain why "allocation is generally considered by economists as merely a distributional, political issue" [12, p. 159]. But recent theoretical and empirical research has suggested that the allocation process may play a pivotal role in the actual performance of a cap-and-trade policy [13–15]. Since allocation often determines who are the winners and losers under a new catch share program, perceptions of how catch shares will be allocated may strongly influence which parties support or block the transition [16–18].

The aim of this paper is to simply present some empirical data on how catch shares have been allocated, where and when this has happened and, why a particular approach was adopted. In some cases, attention is drawn to where particular outcomes may have been due to the allocation method chosen. In order to do this, a unique database on catch share allocation mechanisms was created. Section 2 explains how the database was constructed and presents some general summary statistics. The four main methods used to allocate catch shares are discussed in Section 3 and the entire database is presented in an online appendix. The paper concludes with a discussion of how the lessons learnt from

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the global experience with allocation might apply to the two Hawai'i-based fisheries sometimes considered for catch shares management: the longline pelagic fishery and the nearshore deep-water bottomfish fishery.

## 2. Material and methods

The starting point for constructing the database was information on catch share fisheries from around the world used in [5]. Consequently the database is restricted to large fisheries using Individual Transferable Quotas (ITQs) as a form of catch shares management and it only includes catch share programs adopted by 2004 (there are currently 158 fisheries in the database). The allocation method used when each fishery initially switched to catch shares management was determined and linked to each fishery. A variety of sources were used to make this determination but most sources were either academic articles or government reports. The main methods used to allocate catch shares include: (i) auctions, (ii) equal allocation, (iii) historical catch records, and (iv) vessel- or gear-based rules. Due to difficulties with verification, a category for allocations to indigenous peoples was not created but this has been a feature of a number of catch share programs and will be discussed later. Based on estimates obtained using the database, 54% of the major catch share fisheries in the world allocated all or nearly all shares on the basis of historical catch, 37% used a combination of methods, 6% used equal sharing rules and 3% used auctions (see Fig. 1).

Decomposing the combination of methods category reveals that 91% of the fisheries in the database allocated some fraction of the TAC on the basis of historical catch, 30% allocated some fraction using auctions, 9% used vessel- or gear-based rules, and 7% used equal sharing rules (see Fig. 2). Obviously, these percentages do not sum to 100% since many fisheries used a combination of methods to allocate the TAC. This provides support for the contention that “Catch shares—portions of a fixed total allowable catch (TAC)—are given away free (gifted) to members of a specific fishery based on certified catch history over a politically determined time period” [1, p. 281] but there are clearly many exceptions to this rule. Grandfathering is not the only way to allocate shares but, to date, it has been the most popular approach. The database should hopefully prove to be a useful reference tool for policymakers interested in the types of allocation systems used to assign catch shares.

## 3. Results

### 3.1. Auctions

Most economists would advocate that the best method for allocating a publicly held resource to private individuals is through

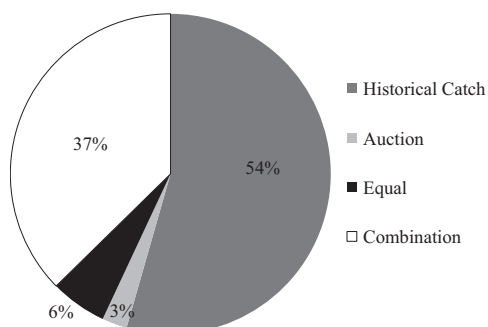


Fig. 1. Proportion of major catch share fisheries in the world by allocation methods: 54% allocated on the basis of historical catch, 37% used a combination of methods, 6% used equal sharing rules, and 3% used auctions.

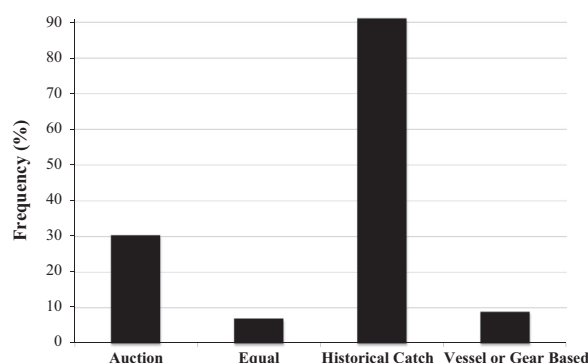


Fig. 2. Catch share allocation methods by frequency: 91% of the fisheries in the database allocated some fraction of the TAC on the basis of historical catch, 30% used auctions, 9% used vessel- or gear-based rules, and 7% used equal sharing rules.

Table 1  
Summary statistics for auction allocation fisheries.

Country	No. of fisheries	Subsequently revised	Earliest adoption	Most recent Adoption
Estonia	9	9	2001	2001
Chile	4	0	1992	1997
New Zealand	25	6	1996	2004
Russian Federation	10	10	2001	2001
Combined	48	25	1992	2004

Notes: summary of fisheries that have used auctions to allocate all or part of the TAC. Column 2 lists the number of fisheries by country, Column 3 lists the number that subsequently revised the initial allocation method, Column 4 lists the year the first fishery in each country adopted auctions to allocate shares and Column 5 lists the most recent use of this mechanism.

an auction. This position has been strongly advocated by professional economists for resources such as air, oil, water and grazing lands [19]. The arguments in favor of auctions in a fisheries context include compensating the general public for allowing private individuals to profit from exclusive access to a public resource; allowing all interested parties the opportunity to enter without favoring incumbents; and encouraging competition and efficiency, especially if the transactions costs associated with trading permits are high or there are tight restrictions on trading permits. Finally, the revenue from catch share auctions can be used for a number of government programs that would be of benefit to all in the fishery and also the general public such as stronger enforcement and record keeping or providing incentives to reduce high-grading, by-catch and habitat damage [20]. This revenue-recycling argument leads [20] to conclude that both the fishery and the environment can be significantly better off with a mixture of auctions and historical catch allocations.

Table 1 summarizes the data on where and when auctions have been used to allocate catch shares. To date, only a handful of catch share fisheries have used auctions to allocate initial shares, mainly in Chile, Estonia and the Russian Federation. In Chile, auctions were used to allocate catch shares in the squat lobster (*Pleuroncodes monodon*) and black cod (*Dissostichus eleginoides*) fisheries in 1992, and the yellow prawn (*Cervimunida johni*) and orange roughy (*Hoplostethus atlanticus*) fisheries in 1997 [21]. The Chilean method of auctioning quota can be loosely summarized as follows. Initially, 90% or 100% of the TAC is allocated through an auction and the remainder is allocated based on historical catch. The corresponding catch shares last ten years but are reduced by 10% each year. Consequently, 10% of the total TAC (which has been made available by reducing every ITQ by 10%) is re-auctioned annually. The decision about whether to auction 90% or 100% of

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