

# Catch Shares: A Useful Tool with Limits

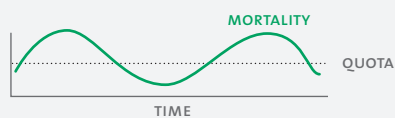
Catch shares are a method of fisheries management in which fishermen get the right to harvest a share of the total allowable catch. They are widely used in some parts of the world, but their impact on the health of fish populations is unclear. According to three recent studies supported by the Lenfest Ocean Program, catch shares reduce year-to-year variation in fishing mortality—likely because they end the harmful “race to fish”—but do not consistently affect other important ecological metrics, such as the biomass of fish remaining in the population. The most recent of these papers confirmed this conclusion with a more robust analysis and found that the “variance-dampening” effect of catch shares is stronger when fishermen can keep their shares from year to year.

Catch shares can benefit fisheries, but ecological benefits are unclear.

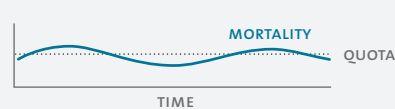
## Main effect:

Less variable fishing mortality

### NON-CATCH SHARES



### CATCH SHARES



Other benefits, observed in fewer cases:  
reduced discards, lower average fishing mortality, slight reduction in major cases of overfishing.



## No effect:

Biomass of fish remaining in the ocean

### NON-CATCH SHARES



### CATCH SHARES



In addition, the effectiveness of catch shares depends on certain design features:  
Notably, fishermen need to have the right to hold on to shares from year to year.

## BACKGROUND

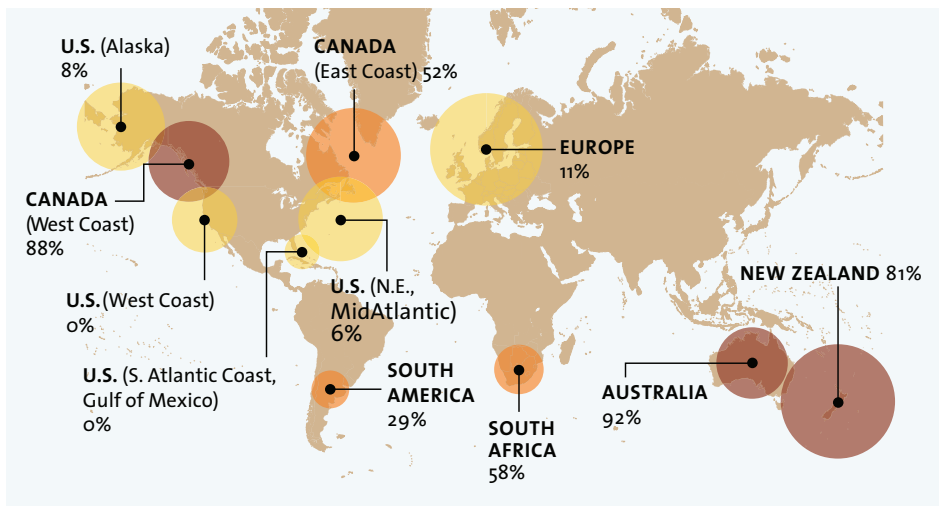
Catch share programs are like cap-and-trade for fish. They set a fleet-wide fishing limit, or quota, and assign “shares” of that quota to individual fishermen or to fishing groups. Holders of catch shares may use them to fish during any part of the season or sell them to others. The concept is that when fishermen have an ownership right to part of the fishery, they will place greater importance on long-term sustainability.

## CITATIONS

Essington, T.E. 2010. Ecological indicators display reduced variation in North American catch share fisheries. *PNAS* 107, 754–759. doi: 10.1073/pnas.0907252107

Melnychuk, M. C., Essington, T. E., Branch, T. A., Heppell, S. S., Jensen, O. P., Link, J. S., Martell, S. J. D., Parma, A. M., Pope, J. G. and Smith, A. D. M. 2012. Can catch share fisheries better track management targets? *Fish and Fisheries*, 13: 267–290. doi: 10.1111/j.1467-2979.2011.00429.x

Essington, T. E., Melnychuk, M. C., Branch, T. A., Heppell, S. S., Jensen, O. P., Link, J. S., Martell, S. J. D., Parma, A. M., Pope, J. G. and Smith, A. D. M. 2012. Catch shares, fisheries, and ecological stewardship: a comparative analysis of resource responses to a rights-based policy instrument. *Conservation Letters*, 5: 186–195. doi: 10.1111/j.1755-263X.2012.00226.x



**Fishery Regions that Use Catch Shares, 2000–2004**  
The map at left shows fishery size and frequency of catch share use. The circles represent the number of stocks in the study, ranging from 6 to 64. Adapted from Melnychuk *et al.* (2012).

- FREQUENT USE OF CATCH SHARES (more than 75% of fisheries)
- SOME USE OF CATCH SHARES (25% to 75% of fisheries)
- INFREQUENT USE OF CATCH SHARES (less than 25% of fisheries)

### THREE STUDIES OF CATCH SHARES

#### 1. Catch shares in North America reduce fluctuations in mortality (Essington, 2010):

Dr. Tim Essington of the University of Washington studied 15 catch share programs in North America. He compared at least five years of data from before and after the start of each program and, in some cases, compared closely matched fisheries that did not have catch shares. The study found that under catch shares:

- Fishing mortality and landings showed fewer large fluctuations.
- Fishermen were more likely to comply with catch limits.
- Rates of fish discards declined.

#### 2. Catch share fisheries are more likely to meet management targets (Melnychuk *et al.*, 2012):

Dr. Michael Melnychuk, Essington, and eight colleagues compared data from 345 fish stocks around the world and found that:

- Fisheries under catch shares met target catches more consistently.
- Overfishing was less common under catch shares, but also under quotas that apply only to the fishing fleet as a whole. (Effort controls had the most overfishing).
- Biomass did not appear to change with management approach.

#### 3. Catch shares generally do not correct overfishing but may provide other benefits (Essington *et al.*, 2012):

The same researchers studied more than 150 fisheries worldwide, including 84 with catch share programs in place. They used a novel method to account for potential confounding factors. This method statistically controlled for trends that were under way in all fisheries and separated them from changes that only occurred in catch share fisheries. This global and more robust study matched what Essington (2010) found in North America: catch shares reduced fluctuations in fishing mortality but did not affect biomass. The newer study also found reductions in average fishing mortality, but only in a subset of fisheries. These trends were the same regardless of whether fisheries were overfished before the catch share program. Other research had suggested that catch shares could correct overfishing, but these papers found no evidence for that.

The authors concluded that catch shares alone cannot overcome other factors that promote overfishing such as pressure to set catch limits that exceed scientific

recommendations. But catch shares may provide other benefits. For example, they may stabilize mortality rates by eliminating the “race to fish,” in which fishermen compete to catch as much as they can before the fishing fleet reaches its overall limit. This can lead to wasteful practices such as discards and bycatch. Catch shares might also stabilize mortality rates by reducing the incidence of major overfishing.

Essington *et al.* (2012) also investigated several attributes of catch share programs that may alter their effectiveness. One crucial attribute was durability, or the right of fishermen to retain their shares from year to year. Durability appeared necessary for the “variance dampening” that is the main effect of catch share programs. The authors also found that catch share fisheries with higher on-board observer coverage that targeted multiple species had somewhat lower mortality rates.



A fishing boat in the Alaskan walleye pollock fishery, one of the first to be managed with catch shares. Photo: Ed Melvin



The Lenfest Ocean Program was established in 2004 by the Lenfest Foundation and is managed by the Pew Charitable Trusts.

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