

## In Peru, Seafood Is Economically More Valuable Than Fishmeal

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*Peruvian anchovy is the largest single-species fishery in the world, and it supplies one-third of the world's fishmeal. But a new economic study published in the journal *Marine Policy* shows that human consumption of seafood in Peru—including anchovies and all other fish species—generates more than twice the domestic revenue and three times the jobs as the production of fishmeal and fish oil.*

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Anchovies at a Lima market. Peruvian anchovy is the largest single-species fishery in the world, and most of the catch is processed into industrial fishmeal.

Fishing in Peru is often associated with industrial-scale catch of anchovies. This fishery lands 5 million to 7 million metric tons per year, almost all of which is processed into fishmeal and fish oil and exported, primarily for aquaculture and animal feed. But to many Peruvians, seafood—not just anchovies but also species such as bonito and tuna—is also vitally important. Because few studies have addressed this fact, researchers at the University of British Columbia and Cayetano Heredia University set out to compare the economics of human consumption with those of fishmeal and fish oil.

### Studying the fisheries sector

To study the Peruvian fisheries sector, the researchers created an economic model of the relevant domestic

businesses. That “value chain” includes all the producers, processors, wholesalers, and retailers whose primary product is fish caught in Peru. The model depicts the value chain as an ecological food web, but instead of describing the flow of energy and nutrients, it describes the flow of fish products.

To produce economic estimates with the model, the researchers added data on the businesses involved in the sector. Their sources of data included government agencies, published research, interviews with officials and entrepreneurs in the fisheries sector, and direct observation of fishing vessels and other enterprises. This broad data collection effort allowed the researchers to model where fish are caught and processed, what happens to the

resulting products, how much money changes hands, and how many people are employed. The output of the model is a set of estimates for revenue and employment.

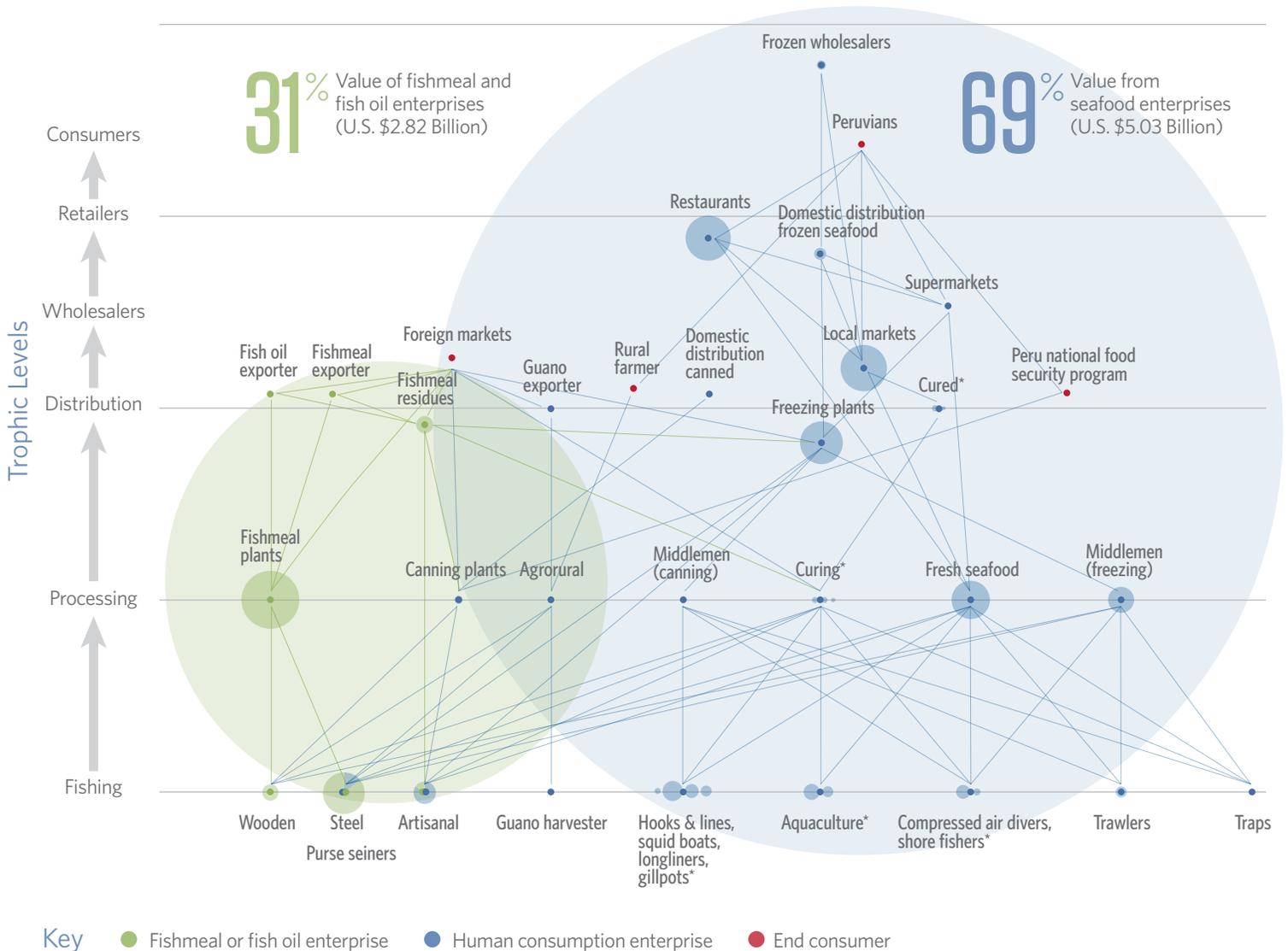
### Results: Seafood is economically more valuable

The diagrams on the following pages show the complete revenue and jobs estimates. A key overall result is that the fishmeal industry, despite its global prominence, generates a minority of the revenue and jobs in the Peruvian fisheries sector.

To arrive at this finding, the researchers added together the data for all enterprises involved in producing seafood for human consumption, including artisanal fishermen, wholesalers, markets, and restaurants.

# Revenue Flow in the Peruvian Fishing Sector

Peruvian anchovy is the largest single-species fishery in the world and supports a sizable fishmeal industry. But a new economic study shows that seafood for human consumption generates most of the revenue in the fisheries sector. This chart shows the economic model from the study. The size of the circles is proportional to the revenue generated.



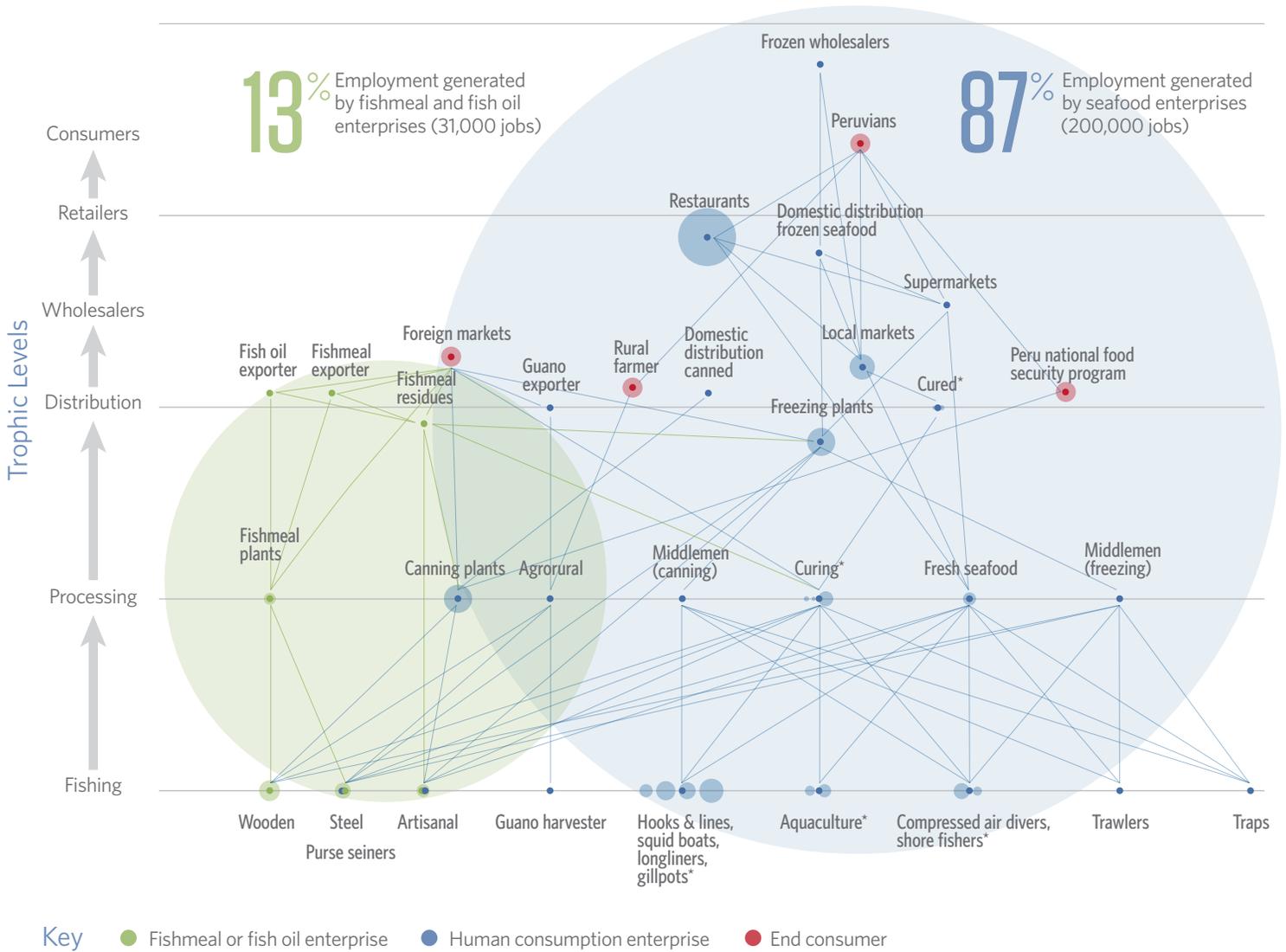
\*Enterprises that were treated separately in the study but combined here for simplicity.

Source: Christensen et al. (2013)

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## Employment in the Peruvian Fishing Sector

The study also shows that seafood for human consumption generates 87 percent of the employment in the fisheries sector, compared with 13 percent for fishmeal and related enterprises. The size of the circles is proportional to the number of jobs generated by each type of enterprise.



\*Enterprises that were treated separately in the study but combined here for simplicity.

Source: Christensen *et al.* (2013)

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They estimated that such enterprises generate about US\$2.4 billion per year, or 69 percent of all fisheries-related revenue. They compared this to enterprises involved in fishmeal and fish oil production, such as industrial fishing vessels, fishmeal plants, and exporters. These enterprises generated about US\$1.1 billion, or 31 percent of total revenue.

For employment, the researchers estimated that human consumption accounted for about 200,000 jobs, 87 percent of the total in the fisheries sector. This figure compares with about 31,000 jobs for fishmeal and fish oil enterprises.

The researchers concluded that there is great potential to increase revenue and employment in the Peruvian fisheries sector by reducing certain disincentives, including the prohibition of industrial purse-seine vessels from landing anchovies for direct human consumption. In their next study, the scientists will investigate how economic output might be increased sustainably, by coupling the economic model with an ecological model of Peru's ocean ecosystem.

### Citation

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Industrial processing of anchovies. Fishing in Peru is often associated with industrial-scale catch of anchovies.



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