

PESKAS data report

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Contents

1	Aim	2
2	Peskas fleet	3
3	National indicators	4
3.1	Number of trips	4
3.2	Fishing effort	4
3.3	Catch volume	6
3.4	Catch revenue	6
3.5	Market value	8
3.6	Catch usage	9
3.7	Stock composition	11
3.8	Gender composition	13
4	Municipal indicators	14
4.1	Number of trips	14
4.2	Catch volume	15
4.3	Catch revenue	16
4.4	Market value	17
4.5	Catch usage	18
4.6	Stock composition	19
4.7	Interannual fish groups composition	20
5	Boat tracking	21
6	Gear type usage	22
7	Catch diversity	23
8	Other fisheries	24
9	Nutritional properties	25
10	About Peskas	30
	References	31

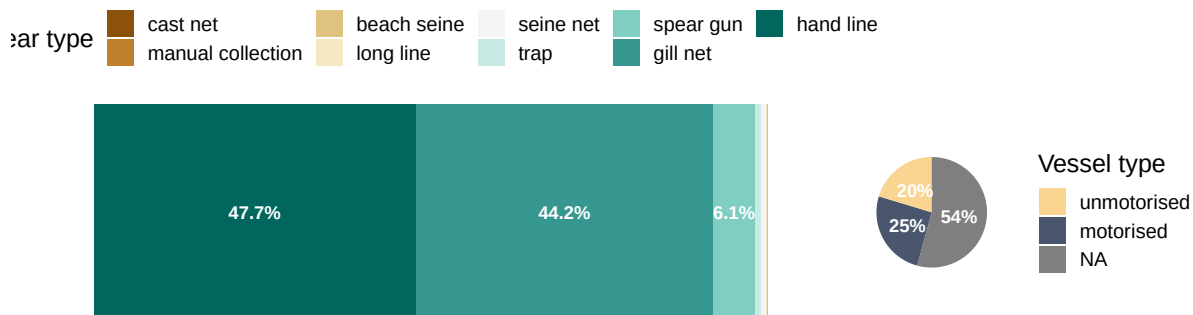
1 Aim

This report is automatically generated in the last step of [Peskas' data pipeline](#) and summarises the main statistics and insights related to small-scale fisheries in Timor during the period Jan 2018 - Mar 2023. The report gives an overview of the Peskas' fleet and provide aggregated statistics and time series of the total revenue and total catch. The report provide also information on the catch composition, highlighting the most important fish groups in terms of overall stock.

2 Peskas fleet

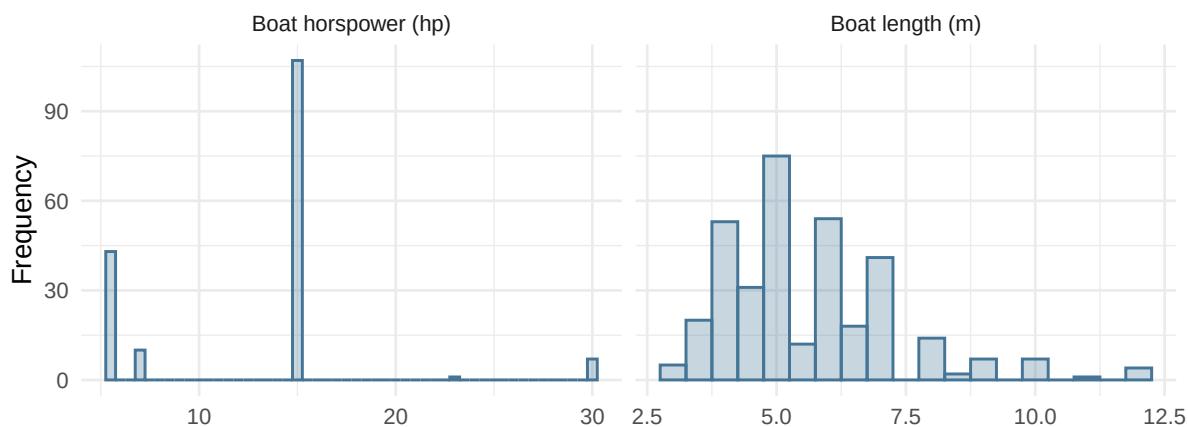
Boats gear type

The Peskas' fleet is composed of a total of 2334 boats, among these 451 are recorded. More than 90.9% are equipped with hand line and gill net. Most of these boats are motorised



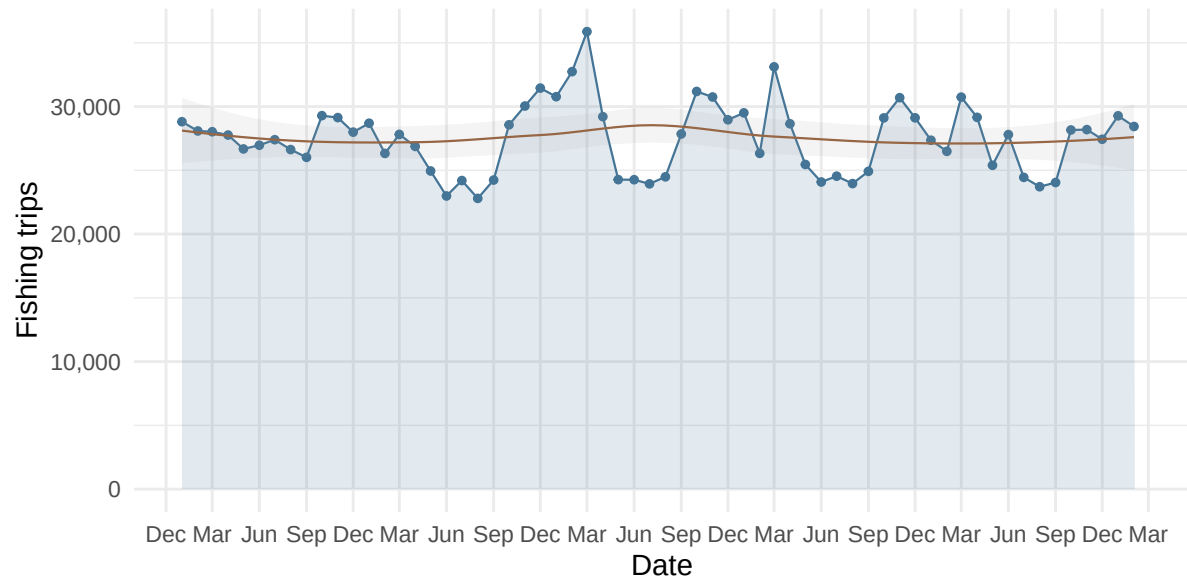
Boat properties

Most of the boats are equipped with a 15-hp motor and measure between 3 and 7 meters. Very few of them are longer than 10 meters.



3 National indicators

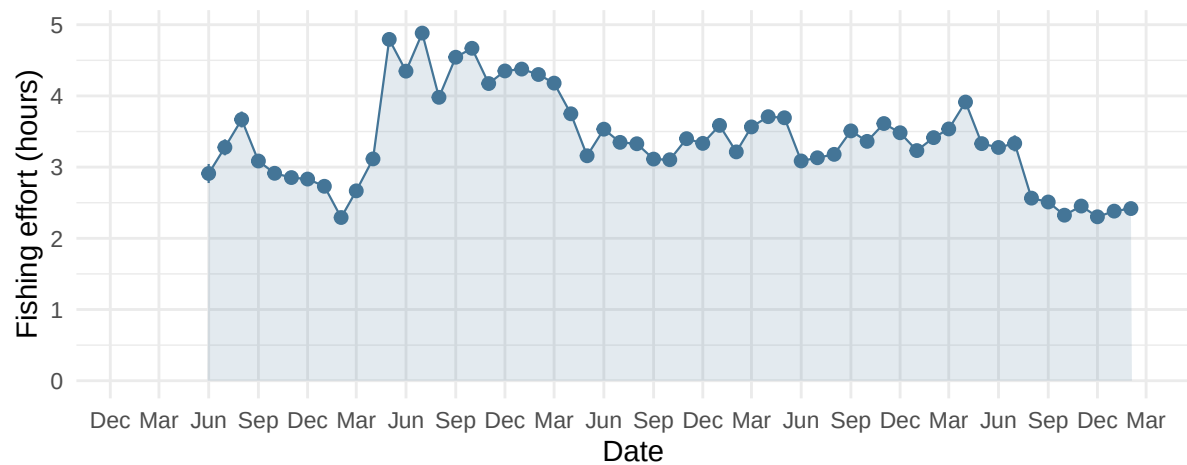
3.1 Number of trips



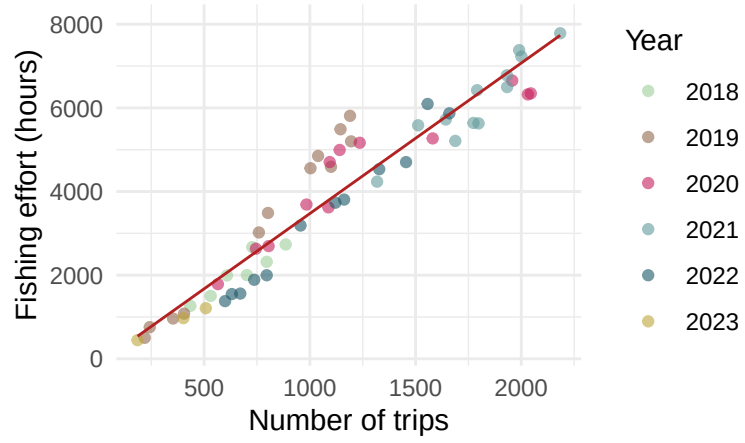
3.2 Fishing effort

Interannual distribution of fishing effort

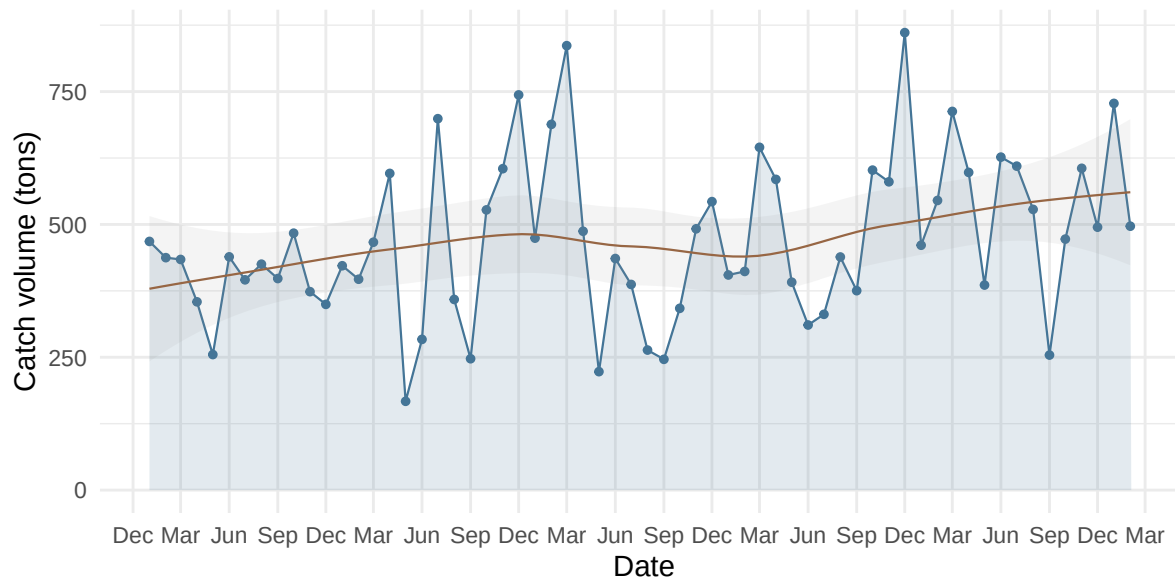
The average trip duration of Peskas' boats is of 3.4 ± 1.8 hours. As there are on average 2273 trips each month, the monthly fishing effort is about of 7728.2 hours.



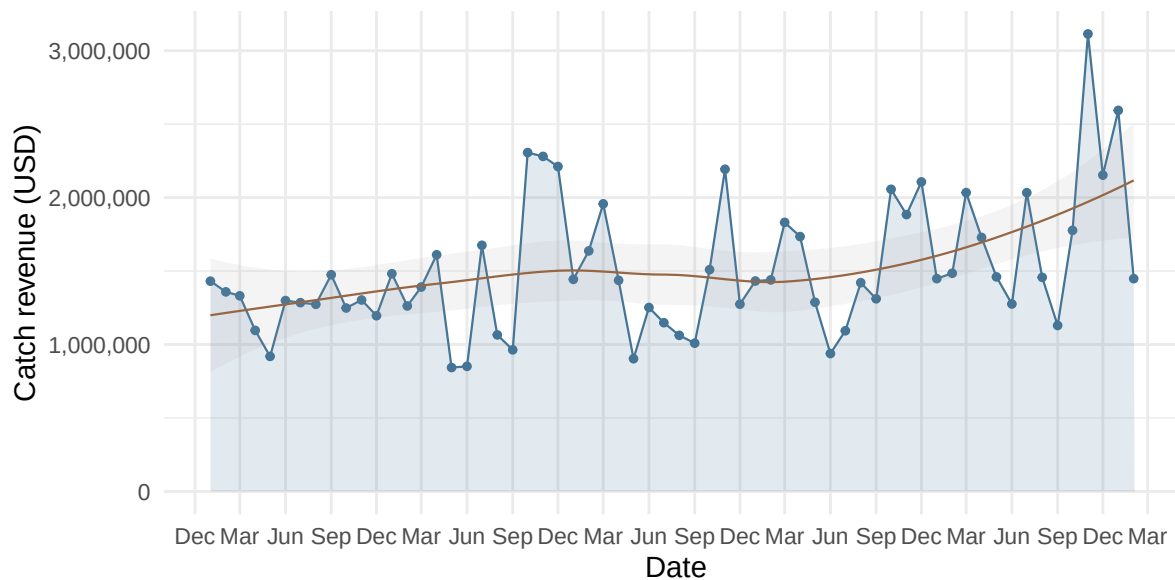
Except for 2019, where there appears to be a greater fishing effort in proportion to the number of fishing trips, the relationship between the two is stable throughout Peskas' period of activity.



3.3 Catch volume

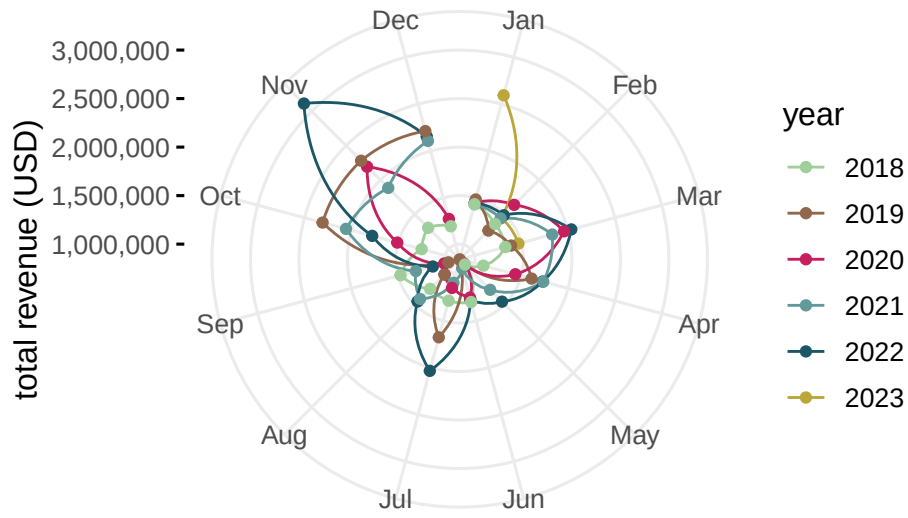


3.4 Catch revenue

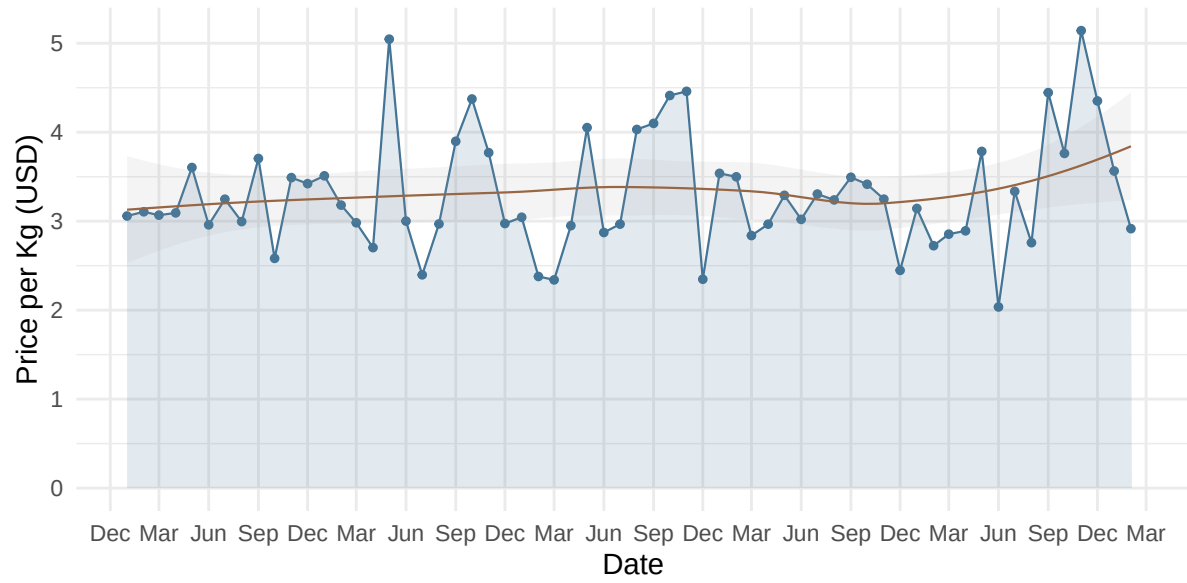


Seasonal total revenue

Except for 2019, the total revenue is seasonal, showing the highest during the dry season.



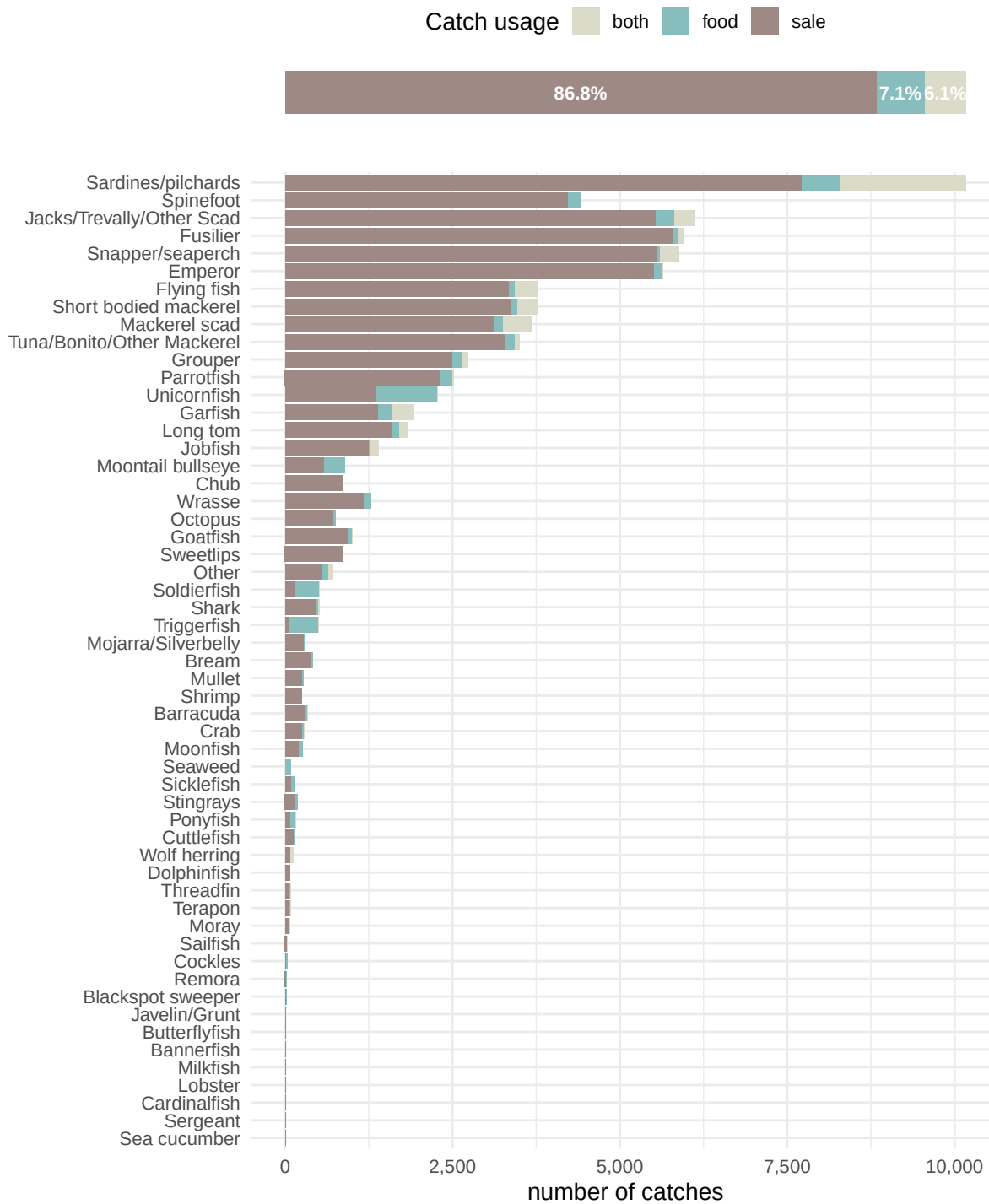
3.5 Market value



3.6 Catch usage

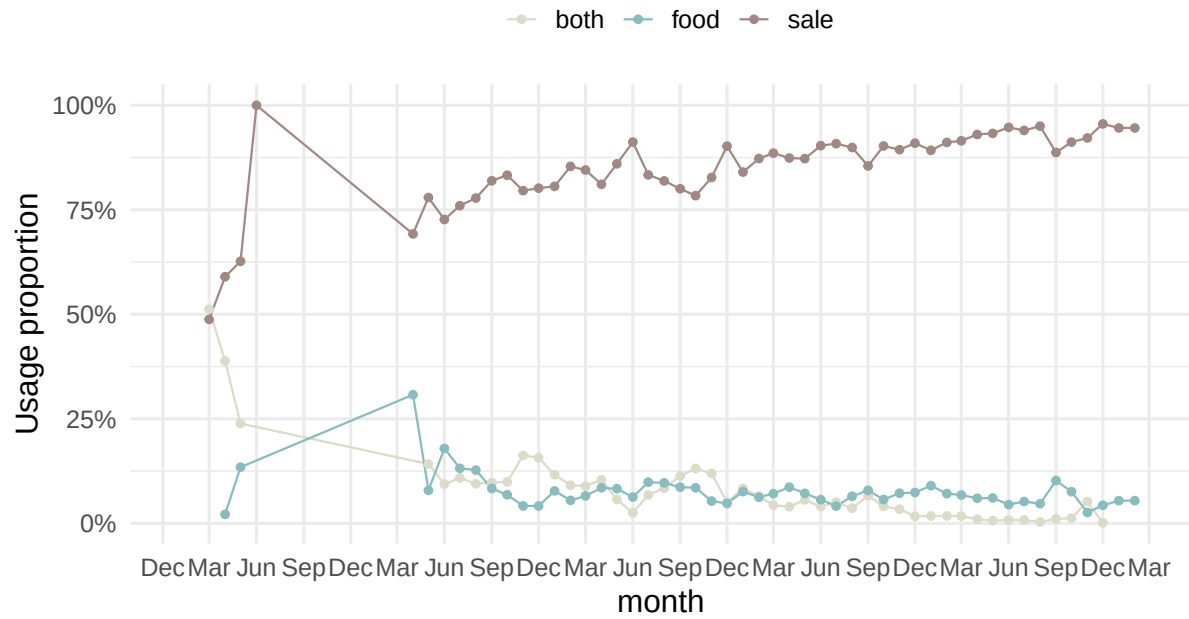
Catches final usage

Sardines and pilchards are by far the most fished species followed by scads and emperor fishes. Overall, more than 70% of the catch is doomed for sale, except for some groups caught for sustenance as unicornfish and soldierfish.

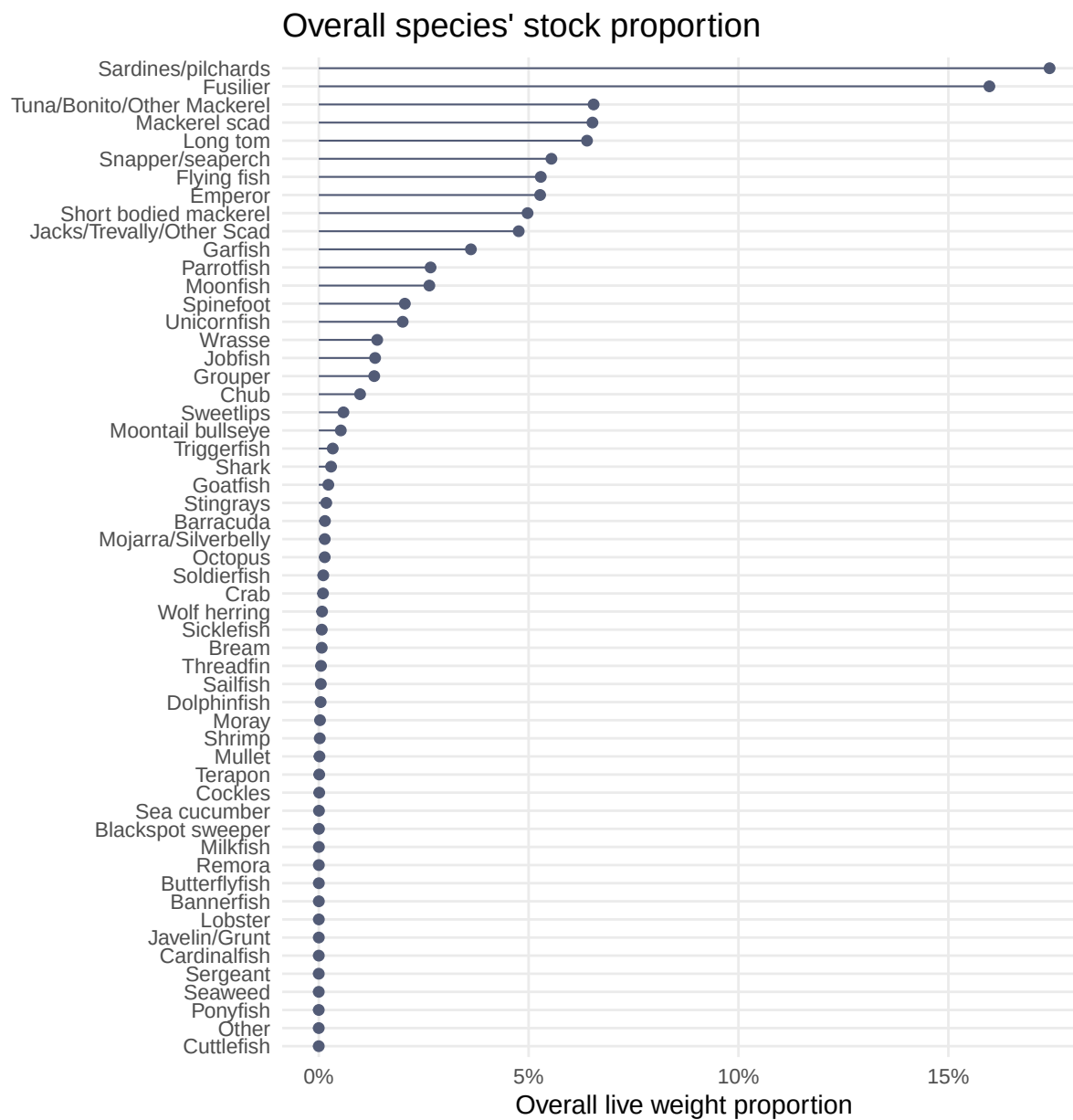


Time series of catches final usage

Since 2019 catches sale is constantly increasing relatively to other usages.

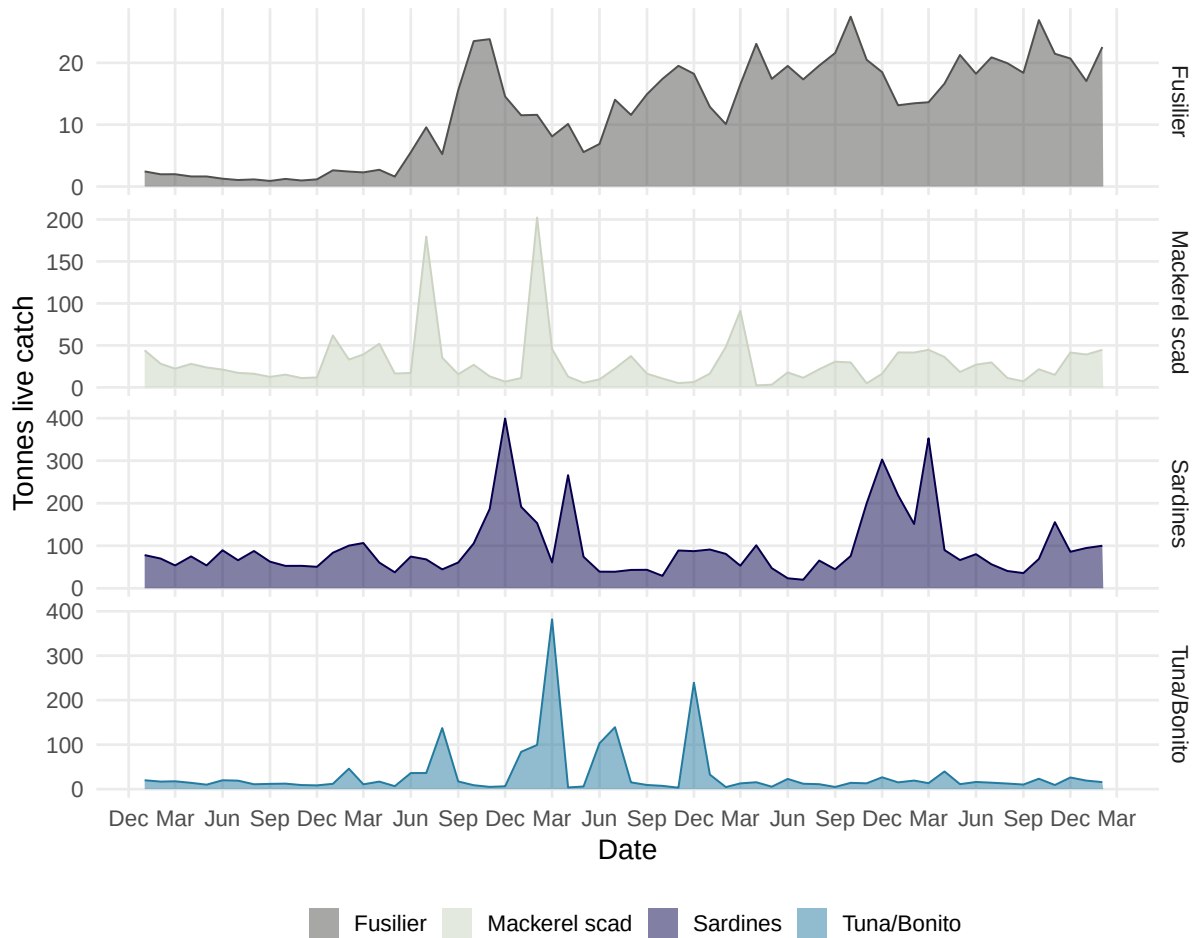


3.7 Stock composition



Interannual species distribution

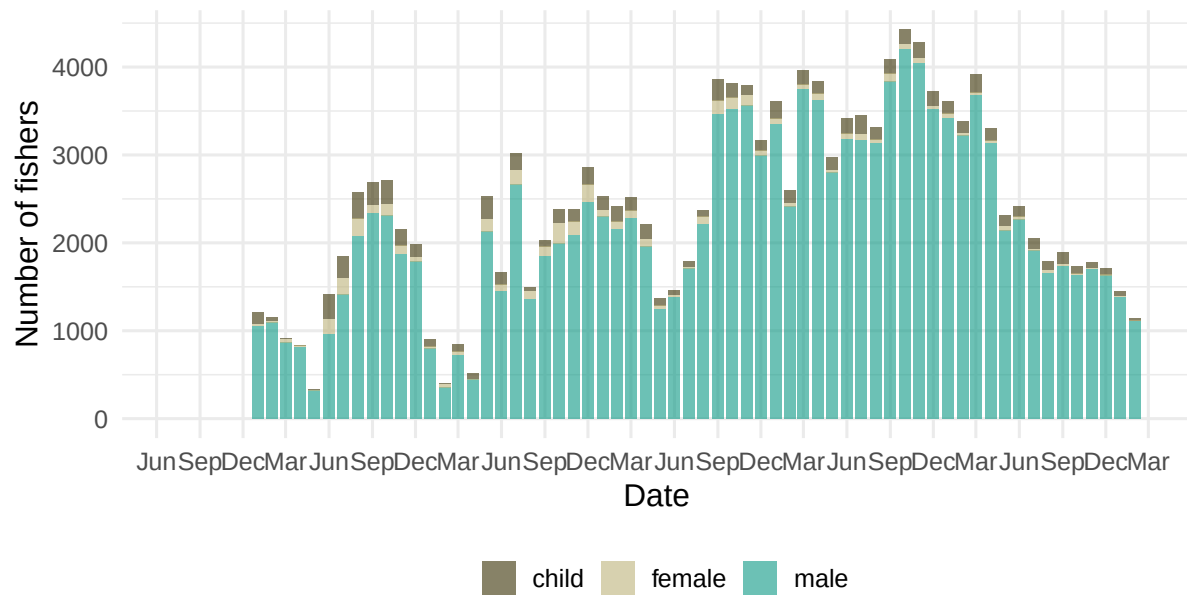
Fishing of the most important species remained mostly stable, except for a considerable increase of fusiliers and to a lesser extent of Tuna-like species.



3.8 Gender composition

Fishers gender

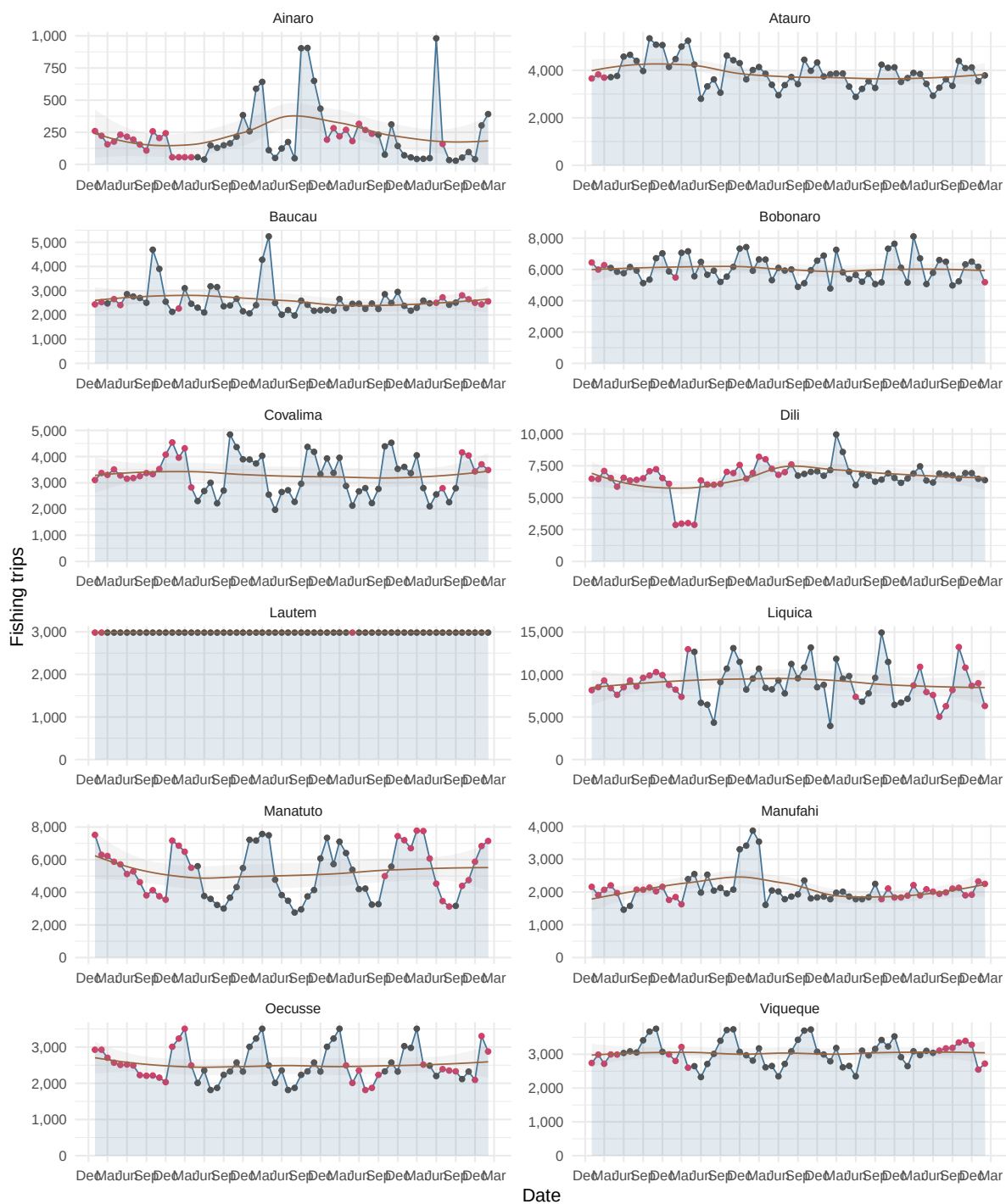
Monthly number of non-unique fishers in Timor, male adult fishers are by far the most representative.



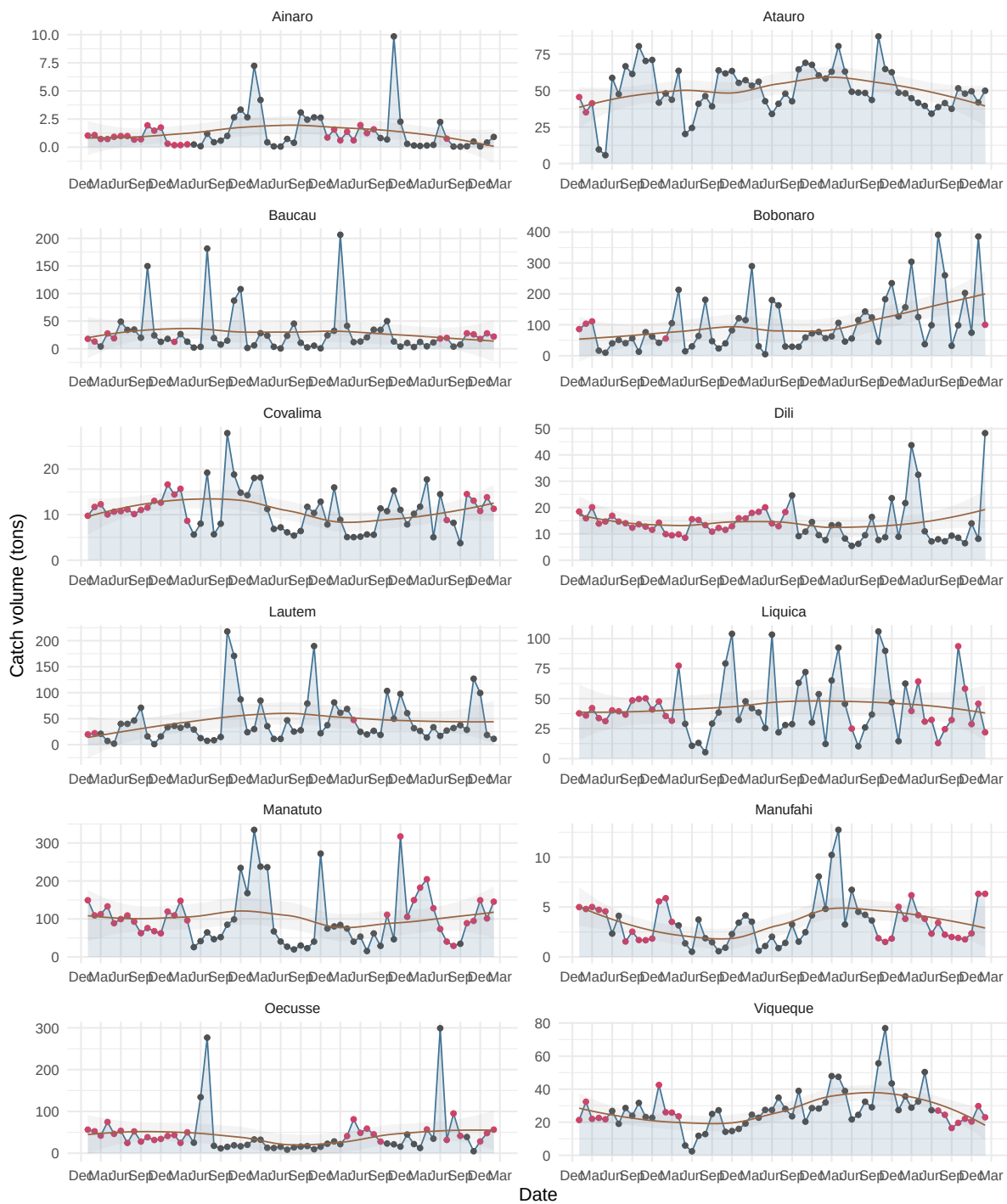
4 Municipal indicators

Estimates of municipal data were interpolated in order to fill data gaps in the time series. Interpolated values in the following plots are represented by red points.

4.1 Number of trips



4.2 Catch volume



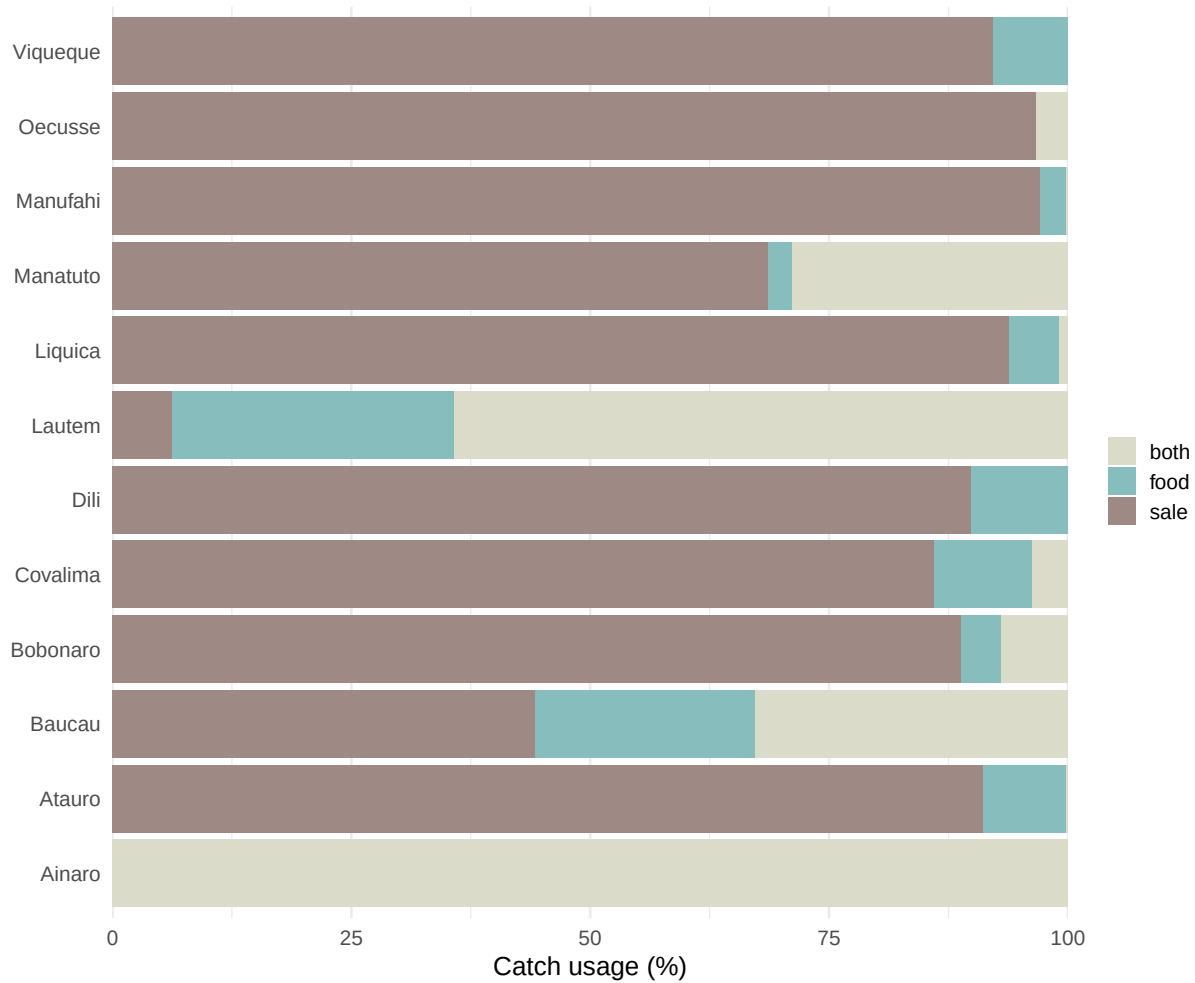
4.3 Catch revenue



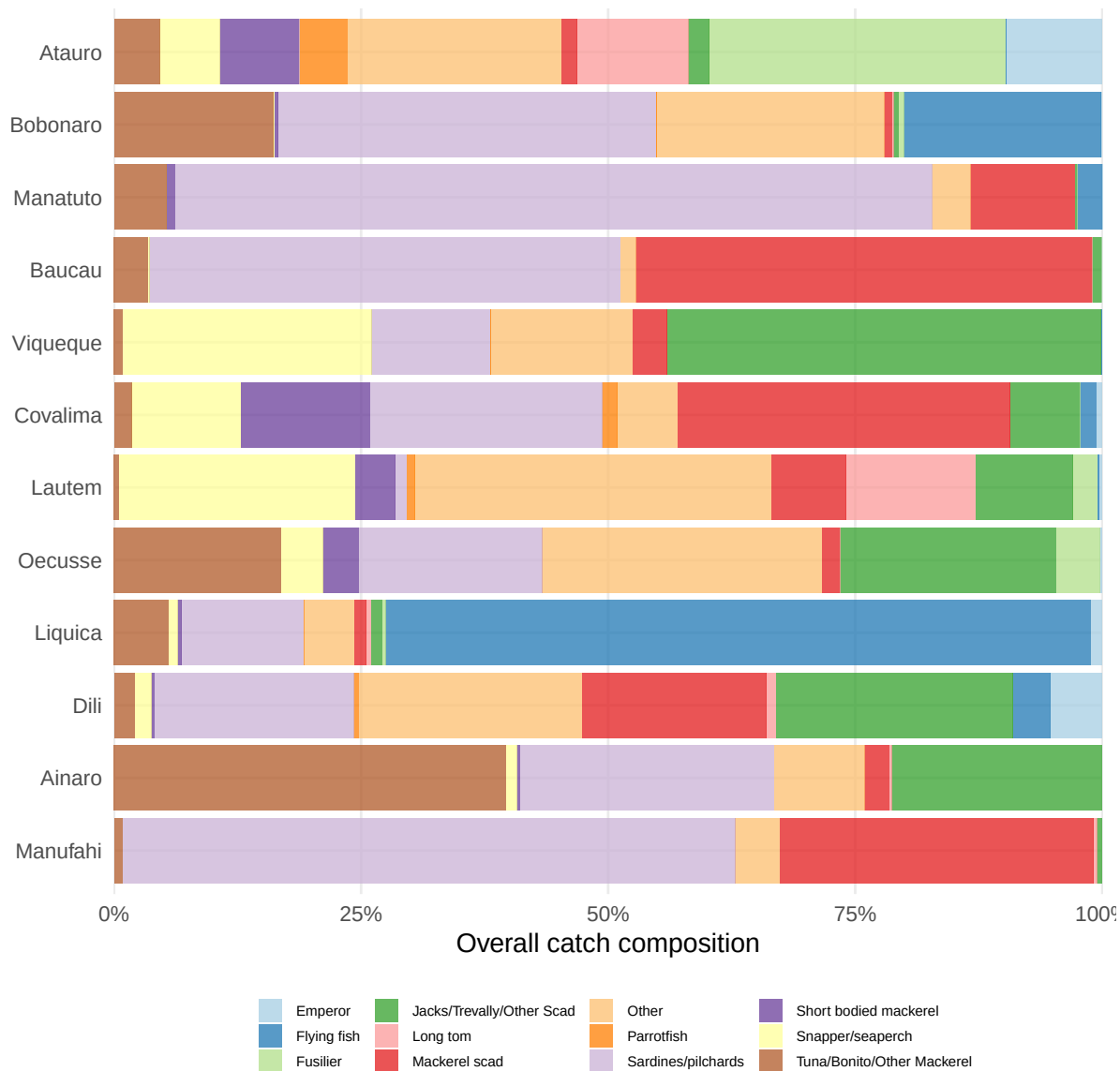
4.4 Market value



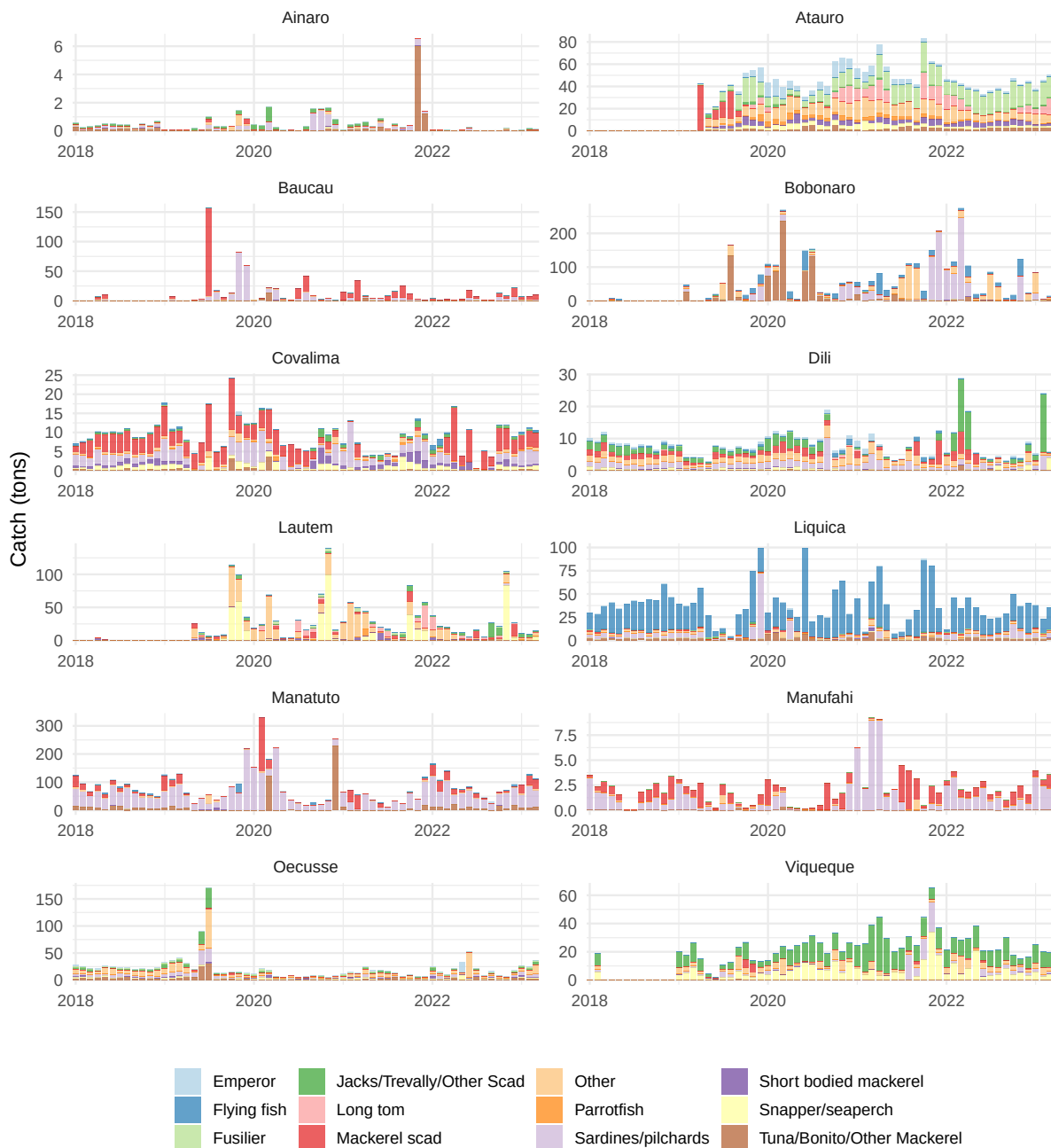
4.5 Catch usage



4.6 Stock composition

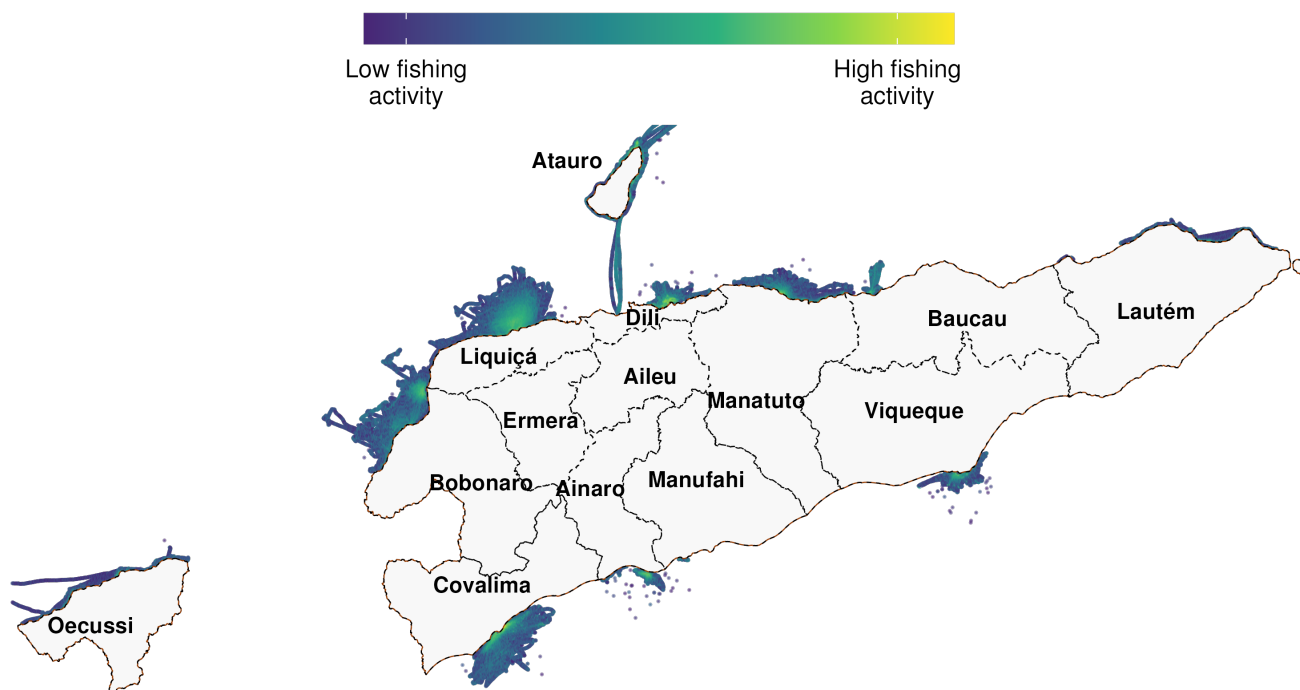


4.7 Interannual fish groups composition



5 Boat tracking

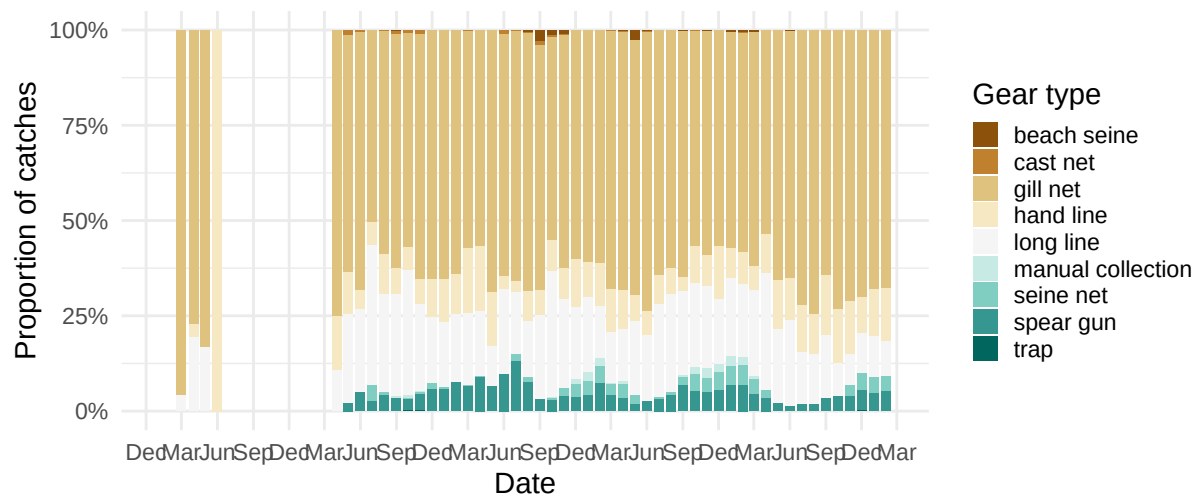
Boat movements are tracked by [Pelagic Data System](#) tracking system, and a proprietary algorithm is used to determine when a trip occurs. Tracks are recorded by GPS devices mounted on the boats. The heatmap refer to the boats' movements tracked along the Timor coast with a grid resolution of 10 x 10 meters. The tracks are filtered for outliers and some potential algorithm errors. Specifically, we do not take into account geo-referenced tracks characterized by large anomalies in the quality of the tracking signal, the speed of the boats, and the distance and time travelled.



6 Gear type usage

Proportion of catches by gear type

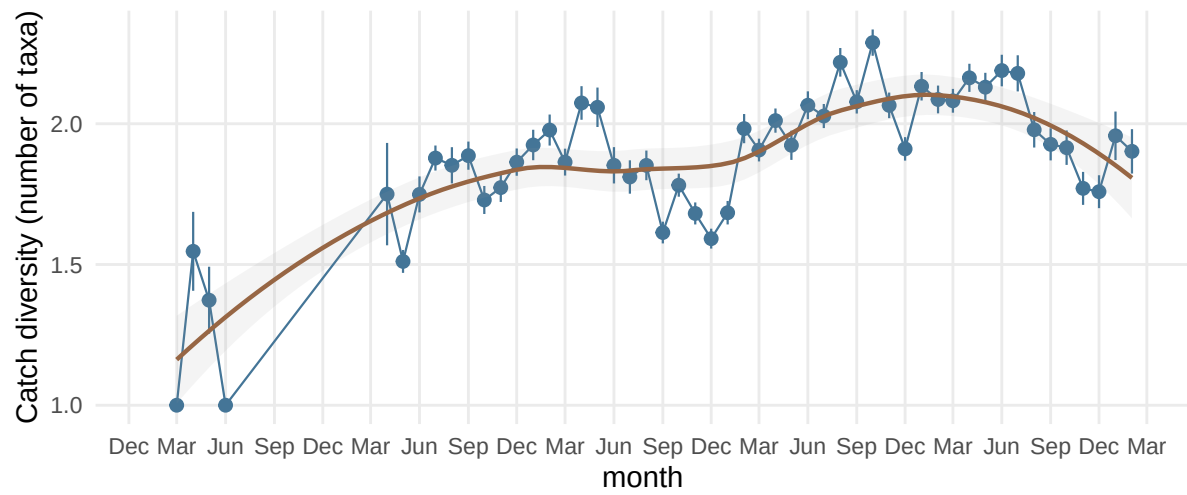
Gill nets constitute more than 50% of the catch on a monthly scale, and with 29950 is by far the most used gear type. Following, long line, hand line, spear gun are the most used with 9712, 4462, 2158 trips respectively. Except before 2020 when the use of long lines was marginal, the relative usage of different gear types was comparable along the time series.



7 Catch diversity

Interannual catches diversity

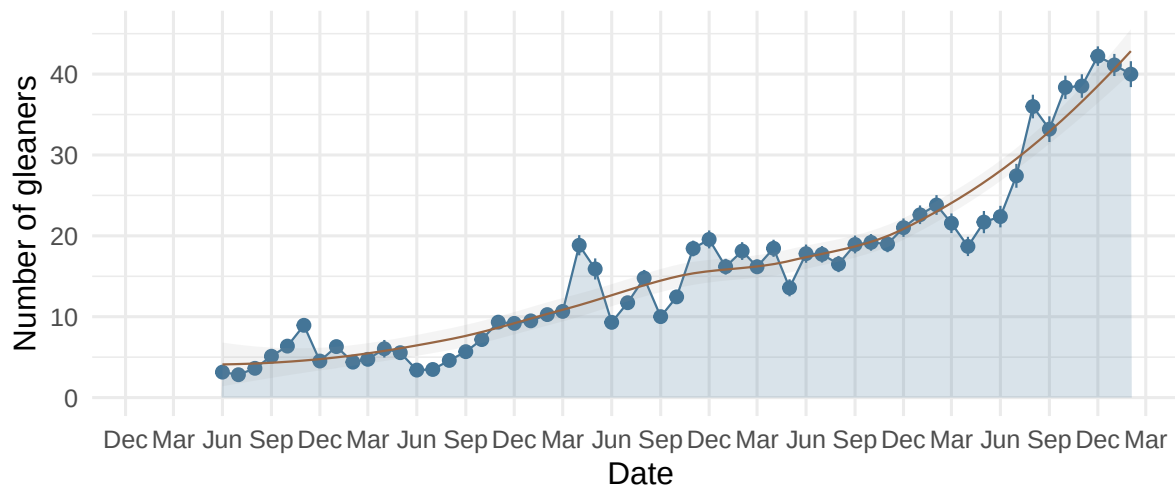
The average diversity associated to catches is constantly increasing over time.



8 Other fisheries

Gleaning fishery

Gleaners increased consistently over time, especially from 2020.

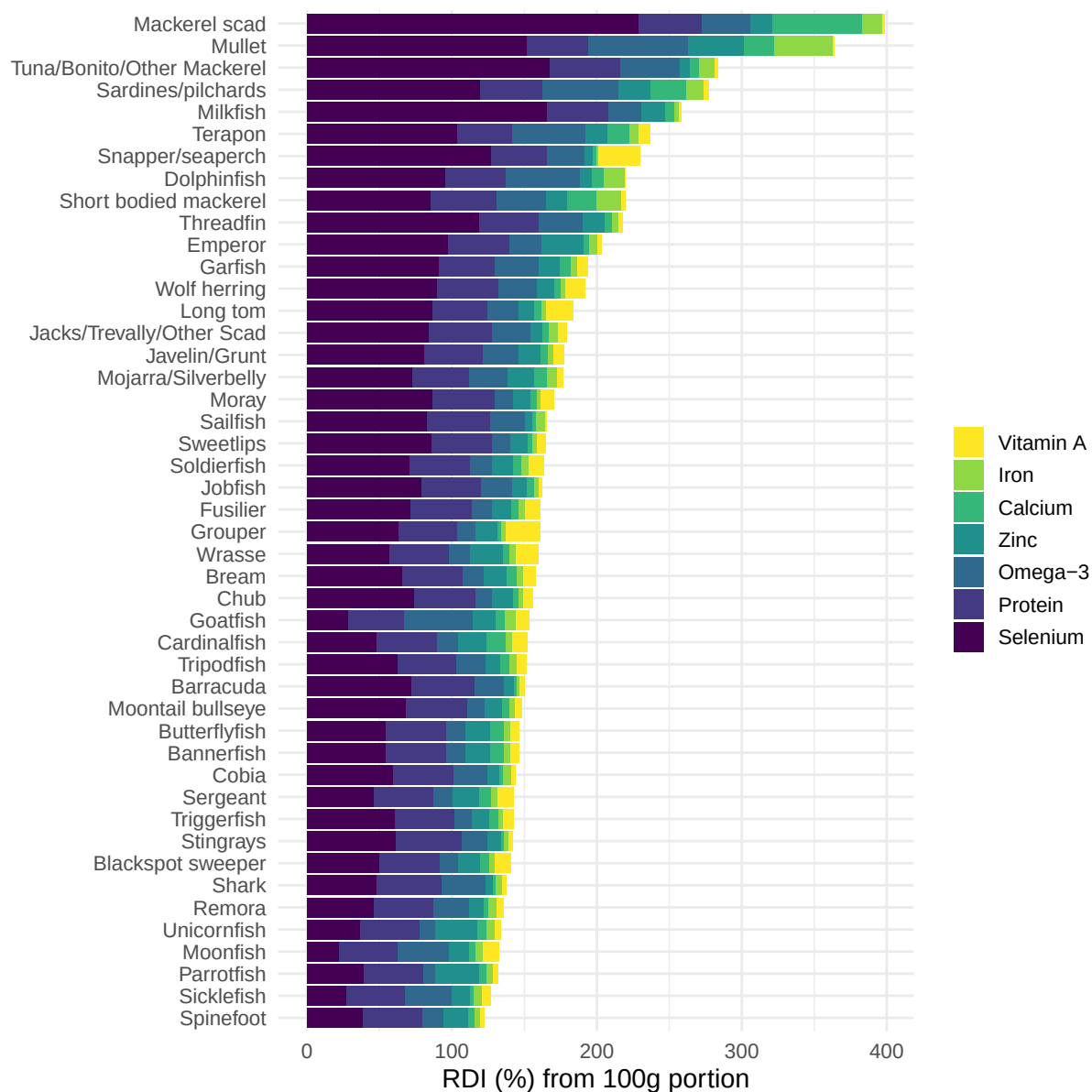


9 Nutritional properties

The nutritional values for each catch were obtained by integrating the weight estimates for each fish-group retrieved from [FishBase](#) with modelled concentrations of seven nutrients (Hicks et al. 2019) foundable in [FishBase Nutrient Research Tool](#) and in the public repository associated to the paper on [GitHub](#). In the plots below we refer to the Recommended Daily Intake of a woman between 31 and 50 years old (Trumbo et al. 2002) to estimate the overall nutritional value.

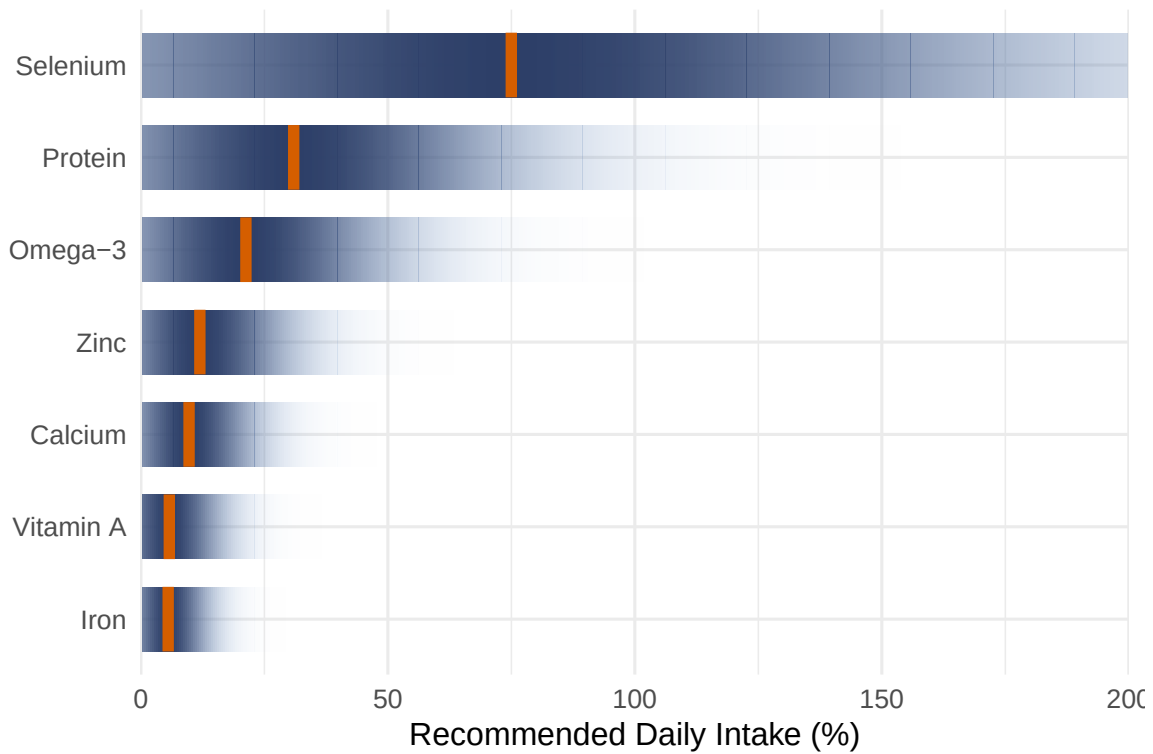
Fish groups nutritional contribution

Median contribution of fish groups to the Recommended Nutrient Intakes (%) for the seven nutrients considered.



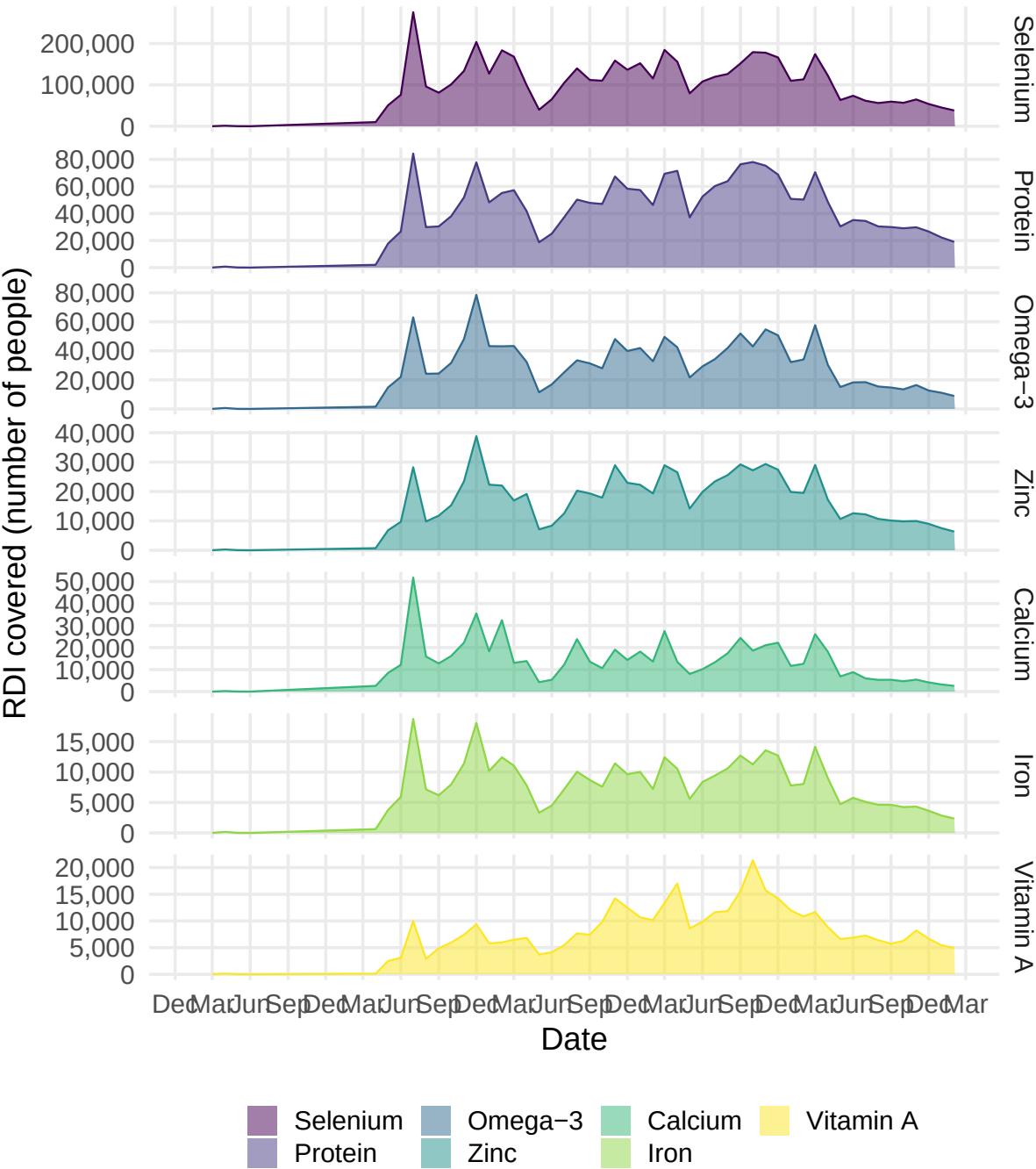
Catches' nutritional properties

Average nutritional properties of Timor catches relative to the Recommended Daily Intake (%). The orange line represent the mean, shaded areas represent the limits of the 95% confidence interval with dark shades indicating high density in the distribution.



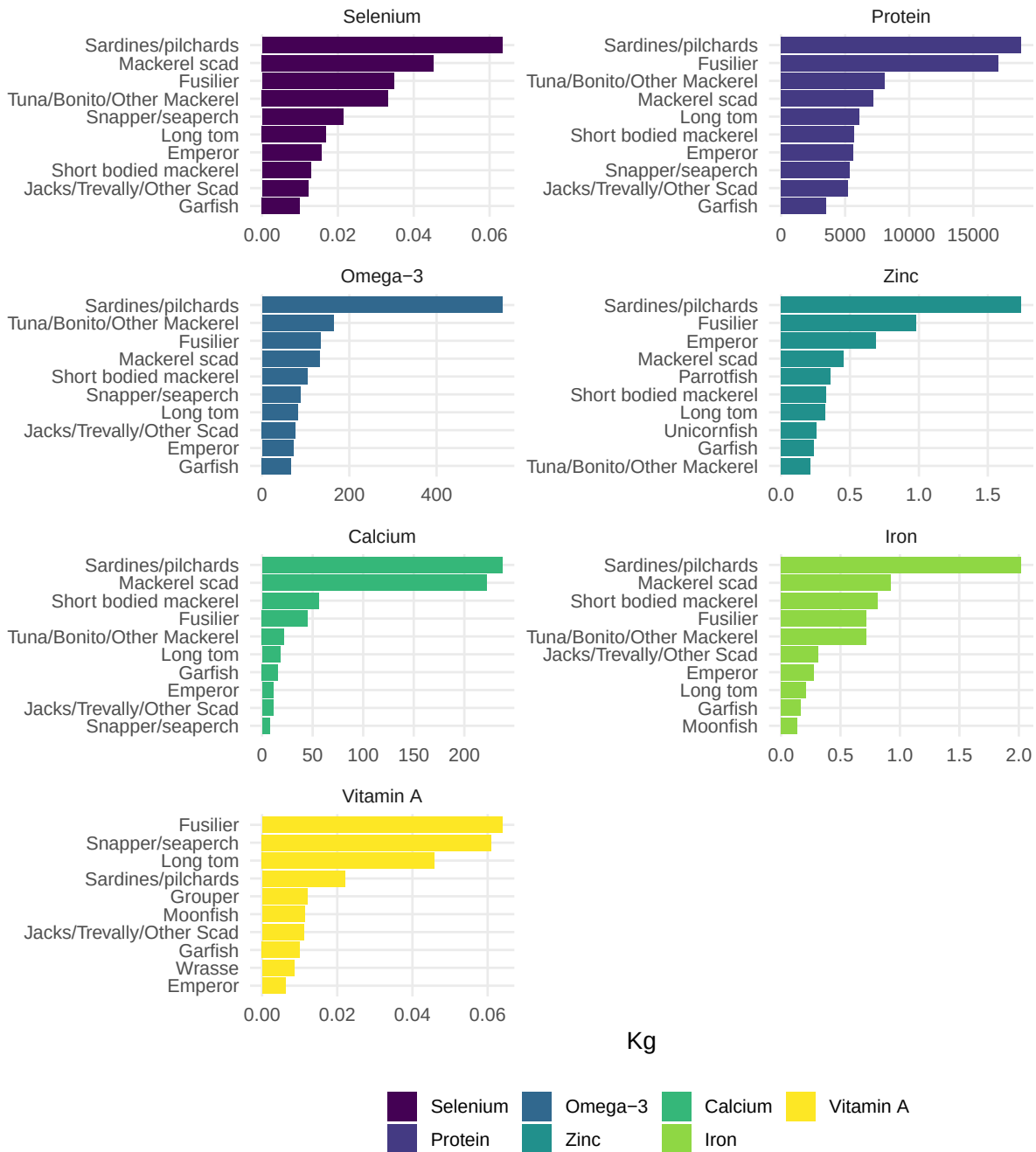
Nutrients coverage

Monthly number of people feed by small-scale fisheries in Timor according to the Recommended Daily Intake for the seven nutrients considered. Note the increase in vitamin A coverage over time.



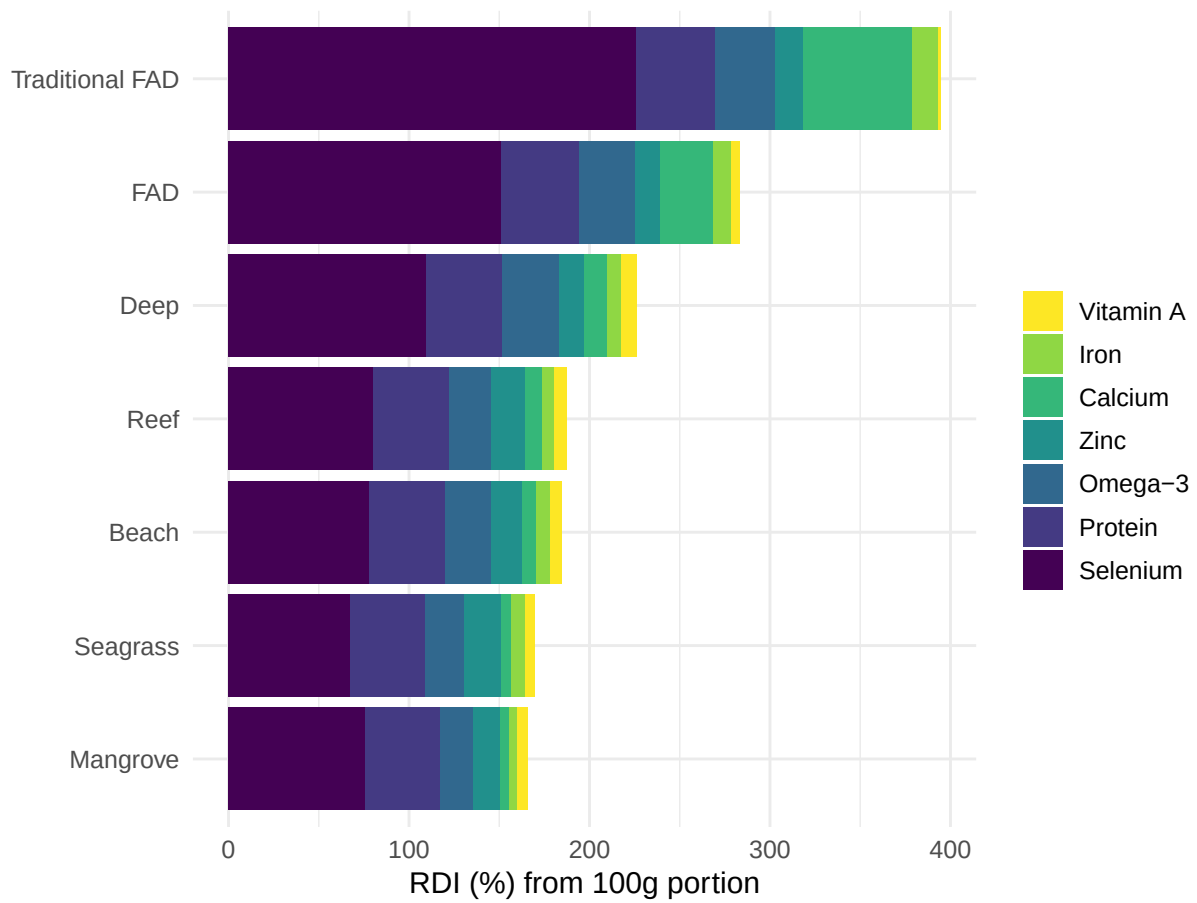
Fish groups nutrients' stock

Contribution of fish groups to nutrients' aggregated stock. Sardines represent the main source of almost all the nutrients except for calcium and vitamin A. These two nutrients are mostly provided by mackerels and by the group formed by snappers, long toms, and fusiliers respectively.



Nutrients distribution by habitat

Distribution of nutrients' concentration relative to the Recommended Daily Intake (%) of 100g of catch in each habitat monitored in Timor.



10 About Peskas

Peskas is the official fisheries national monitoring system of Timor-Leste and represents one of the most sophisticated data collection systems for small-scale fisheries in the world.

Peskas' platform collects real-time information directly from fishermen's activity via a system of digital surveys developed in [KoBo toolbox](#). In addition, Peskas uses the technology provided by [Pelagic Data System](#) to record vessel movements via solar-powered tracking devices).

The data and the information collected is subjected to an elaborate processing and cleaning through an open-source code pipeline on [GitHub](#), and provide important data in the hands of fisheries officers, researchers and local stakeholders and enables them to better understand the contribution of fish and fisheries to local livelihoods and food security.

Information about the process and user-centred design of the Peskas pipeline and initial analytics, and its application in fisheries research & management can be found in the following publications:

- [PeskaAAS: A near real-time monitoring system for small-scale fisheries in Timor-Leste](#). In A. Tilley & M. B. Roscher (Eds.), Information and communication technologies for small-scale fisheries (ICT4SSF) - A handbook for fisheries stakeholders. In support of the implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (pp. 11–18). FAO; WorldFish.
- [PeskaAAS: A near-real-time, open-source monitoring and analytics system for small-scale fisheries](#). PloS One, 15(11), e0234760.
- [Nearshore Fish Aggregating Devices Show Positive Outcomes for Sustainable Fisheries Development in Timor-Leste](#). Frontiers in Marine Science, 6, 487.

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- Hicks, Christina C., Philippa J. Cohen, Nicholas A. J. Graham, Kirsty L. Nash, Edward H. Allison, Coralie D'Lima, David J. Mills, et al. 2019. "Harnessing Global Fisheries to Tackle Micronutrient Deficiencies." *Nature* 574 (7776): 95–98. <https://doi.org/10.1038/s41586-019-1592-6>.
- Tilley, Alexander, Joctan Dos Reis Lopes, and Shaun P Wilkinson. 2020. "PesKAAS: A Near-Real-Time, Open-Source Monitoring and Analytics System for Small-Scale Fisheries." *PloS One* 15 (11): e0234760.
- Tilley, Alexander, Shaun P Wilkinson, Jeppe Kolding, Juliana López-Angarita, Mario Pereira, and David J Mills. 2019. "Nearshore Fish Aggregating Devices Show Positive Outcomes for Sustainable Fisheries Development in Timor-Leste." *Frontiers in Marine Science* 6: 487.
- Tilley, A, and MB Roscher. 2020. "Information and Communication Technologies for Small-Scale Fisheries (ICT4SSF)-a Handbook for Fisheries Stakeholders."
- Trumbo, Paula, Sandra Schlicker, Allison A. Yates, and Mary Poos. 2002. "Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein and Amino Acids." *Journal of the American Dietetic Association* 102 (11): 1621–30. [https://doi.org/10.1016/s0002-8223\(02\)90346-9](https://doi.org/10.1016/s0002-8223(02)90346-9).