

All graphics were made in collaboration with Stephanie Lozano. She obtained her associates degree in graphic design from Southwestern Community College. More of her work can be found at her website, stephanielozano.weebly.com.

The numbers and locations for the data on bycatch and discard on global fisheries and marine megafauna were compiled from 11 literature sources that focused specifically at the global level that were the most recent at the time of analysis. Not much research is focused on the global level due to the difficulty of accurately collecting data from all over the globe. The collection of bycatch and discard data requires transparency and economic resources in order to observe and document any incidental capture that occurs out at sea while fishing. Some fishermen might not want to disclose information on incidental capture due the fear of being penalized or shamed. However, documenting what is incidentally captured and discarded is as important as what is being landed. Depletion on non-target species or habitat destruction may be occurring silently through bycatch.

“Estimates of Global Fisheries Discard”

This graph displays the estimations of global fisheries discard. The changes in the tons over the years is due the difficulty in calculating the amount of discard that may be occurring cumulatively world-wide based on limited data and gaps. With time estimation methods have been improving with more data and calculation methods.

“Global Bycatch of Marine Megafauna”

This map shows the distribution of where most of the bycatch of these 4 marine megafauna. The research papers used for this graphic focused on specific taxa and even specific gear type from a global perspective.

“Gear Type and Mortality”

This graphic displays the estimated number of bycatch that occur globally among the 4 marine megafauna with respect to the top 3 fishing gear types that are considered to cause the highest incidental mortality. The values are for estimated individuals per year. Marine mammals, sea turtles, and sea birds estimates were able to calculated by authors. However, for sharks and rays there was no estimation of individuals due to sharks being consumed when accidently captured and the practice of shark finning where only the fins are kept and the rest of the body is discarded.

References:

1. Alverson, Dayton L. “A global assessment of fisheries bycatch and discards”. Vol. 339. Food & Agriculture Org., (1994).
2. Anderson, Orea RJ, et al. "Global seabird bycatch in longline fisheries." *Endangered Species Research* 14.2 (2011): 91-106.

3. Davies, R. W. D., et al. "Defining and estimating global marine fisheries bycatch." *Marine Policy* 33.4 (2009): 661-672.
4. Kelleher, Kieran. *Discards in the world's marine fisheries: an update*. No. 470. Food & Agriculture Org., 2005.
5. Lewison, Rebecca L., et al. "Global patterns of marine mammal, seabird, and sea turtle bycatch reveal taxa-specific and cumulative megafauna hotspots." *Proceedings of the National Academy of Sciences* (2014): 201318960
6. Oliver, Shelby, et al. "Global patterns in the bycatch of sharks and rays." *Marine Policy* 54 (2015): 86-97.
7. Read, Andrew J., Phebe Drinker, and Simon Northridge. "Bycatch of marine mammals in US and global fisheries." *Conservation biology* 20.1 (2006): 163-169.
8. Reeves, Randall R., Kate McClellan, and Timothy B. Werner. "Marine mammal bycatch in gillnet and other entangling net fisheries, 1990 to 2011." *Endangered Species Research* 20.1 (2013): 71-97.
9. Wallace, Bryan P., et al. "Global patterns of marine turtle bycatch." *Conservation letters* 3.3 (2010): 131-142.
10. Zeller, Dirk, et al. "Global marine fisheries discards: a synthesis of reconstructed data." *Fish and Fisheries* 19.1 (2018): 30-39.
11. Žydelis, Ramūnas, Cleo Small, and Gemma French. "The incidental catch of seabirds in gillnet fisheries: A global review." *Biological Conservation* 162 (2013): 76-88.

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