**Key Assumptions & Limitations**

A complete discussion of the assumptions made to overcome data limitations during the course of this analysis--as well as their inherent limitations--are included in the methodology document that can be downloaded above. However, brief summaries of some of the key assumptions and limitations are summarized in the subsequent sections.

**Defining Distant Water Fishing**

Definitions of “distant water fishing” vary, but for the purposes of this tool, we assume it to encompass any fishing activity by a vessel that a) occurs in areas beyond the jurisdiction of any nation or state (“on the high seas”) or b) occurs in the EEZ of a coastal state that is different from the flag state of the vessel. We therefore only represent fishing activity meeting either of those criteria in this tool. These determinations are not intended to imply any judgements about the legality of distant water fishing—most distant water fishing activity is completely legal and governed by bilateral or multi-lateral access agreements between nations.

The identification of high seas fishing is fairly straightforward, but extracting fishing activity meeting the second criteria required us to make a number of assumptions. For simplicity, we use the same assumptions made by [Cabral et al. (2018)](https://www.nature.com/articles/s41559-018-0499-1) to identify distant water fishing. If any of the following conditions are met, the corresponding fishing activity is NOT considered to be distant water fishing, and is not included in this tool:

* The vessel’s flag-state is the same as the administering state of the EEZ in which it is fishing (or one of the administering states in the case of joint regime and disputed areas);
* The sovereign of the vessel’s flag-state is the same as the administering state of the EEZ in which it is fishing (or one of the administering states in the case of joint regime and disputed areas);
* The vessel’s flag-state is Norway, Svalbard and Jan Mayen, Iceland, or a member state of the European Union (EU) and the EEZ in which it is fishing is administered by Norway, Svalbard and Jan Mayen, Iceland, or a member state of the EU (e.g., a French flagged vessel fishing in Spain’s EEZ);
* The sovereign of the vessel’s flag-state of the vessel’s flag state is Norway, Svalbard and Jan Mayen, Iceland, or a member state of the EU, and the EEZ in which it is fishing is administered Norway, Svalbard and Jan Mayen, Iceland, or by a member state of the EU (e.g., a vessel flagged to the Azores fishing in Spain’s EEZ).

Therefore, our definition of distant water fishing does include “sovereign fishing” and that is therefore captured in this tool. Even if the flag-state of the vessel and the EEZ in which that vessel is fishing share a sovereign state, we consider this activity to be distant water fishing. Therefore, when either of the following conditions are met, we DO consider the activity to be distant water fishing:

* The vessel’s flag-state is also the sovereign of the administering state of the EEZ in which it is fishing (e.g., a US flagged vessel fishing in the EEZ of Palmyra Atoll);
* The sovereign of the vessel’s flag-state is also the sovereign of the administering state of the EEZ in which it is fishing (e.g., a Puerto-Rican flagged vessel fishing in the EEZ of Palmyra Atoll).

**Estimating Subsidy Allocations**

A global database with the types and magnitudes of subsidies provided to individual vessels (particularly distant-water vessels) does not exist. We therefore overcome this with a series of assumptions regarding how subsidies are allocated to all vessels in our global database of industrial fishing vessels derived from Global Fishing Watch (GFW). Our methods used to allocate subsidies are based on those used by [Sala et al. (2018)](https://urldefense.proofpoint.com/v2/url?u=https-3A__advances.sciencemag.org_content_4_6_eaat2504&d=DwMFaQ&c=2qwu4RrWzdlNOcmb_drAcw&r=zUfWn8Bf2T9FOXTIZ8z5XNqw64LjySGoFIg27jhUX18&m=9uwsseKu9elGZTBfcmAyqzA2HOCA-Oa5ibL6FwXX3wg&s=WS8Pk6szfijtDDVBo82RuegAVeMp2Zd6amov-nhwiYc&e=). We first identify the magnitudes of subsidies for each fishing nation estimated by [Sumaila et al. (2019)](https://www.sciencedirect.com/science/article/pii/S0308597X19303677?via%3Dihub) that were provided to large-scale fisheries based on the breakdown from [Schuhbauer et al. (2020)](https://www.frontiersin.org/articles/10.3389/fmars.2020.539214/full?utm_source=Email_to_authors_&utm_medium=Email&utm_content=T1_11.5e1_author&utm_campaign=Email_publication&field&journalName=Frontiers_in_Marine_Science&id=539214). We then extract information on all vessels from GFW that fulfill certain quality criteria to create our global vessel database, which we assume to be representative of the entirety of the global large-scale fishing fleet. Using this global vessel database, we then calculate the total annual amount of large-scale fishing effort (in kWh) for each flag-state. Then we calculate the ratio of large-scale fisheries subsidies to total fishing effort for each state and subsidy type. These subsidy rates (in units of 2018 USD/kWh) are then applied to all vessels on our global vessel list by flag state. Each vessel’s annual fishing effort is then used to calculate an estimate of the monetary value of subsidies that vessel received. We then isolate just the vessels and activity that meet the distant water fishing criteria outlined above. Note: Only capacity-enhancing subsidies are included in the value of subsidies shown. **This approach assumes that all vessels are subsidized solely by their flag-state.**

**Flags of Convenience**

A key limitation regarding our assumptions about how to define distant water fishing and how to estimate subsidy allocations comes from the fact that many states choose to register their fishing vessels in locations where the costs to do so are lower and/or regulations are less stringent. These states are often referred to as “flags of convenience”. In reality, vessels flying a flag of convenience are usually subsidized by the state from which the vessel’s owner (and/or operator) originates, which our approach cannot capture. There is very little data globally on vessel ownership, making such attributions for the purposes of subsidy allocation untenable. Flags of convenience potentially pose another problem for our analysis because they could lead to the accidental inclusion of vessels that are not actually engaged in distant water fishing in this tool (e.g., a Chinese owned vessel flagged to Vanuatu fishing in the EEZ of China), or alternatively, the accidental exclusion of vessels that are likely engaged in distant water fishing (e.g., a Chinese owned vessel flagged to Vanuatu fishing in the EEZ of Vanuatu).

We recognize that the inability to capture flags of convenience is a major limitation of our analysis, but did not feel that it was one we could remedy with defensible assumptions given existing data. A definitive list of states that should be considered to flags of convivence does not exist, particularly not one agreed upon by all WTO Members. For those that are interested in which states represented in our data might be considered to be flags of convenience to some parties, the [International Transport Workers’ Federation](https://www.itfglobal.org/en/sector/seafarers/flags-of-convenience) has created their own list of such states.