**Big problem:** helping consumers make an informed decision about the origins of the marine products they purchase at a store

**Big solution:**

Create a system that uses AIS data and satellite imagery to determine:

* when and where each vessel was fishing,
* whether each vessel was fishing legally or illegally,
* target species based on spatial and temporal patterns of marine life,
* how much and the type of fish stock that was transferred to a transshipment vessel based on changes in the ship’s wake (waves created by ship’s hull displacing water) before and after transshipment.

After doing this, we know for each transport vessel roughly what % of the cargo is of legal origin and what % of the cargo is of illegal origin.

Then create the means by which:

* Stakeholders can publicly know who purchased marine products from what vessel
* Consumers can determine which vessels were purchased from in order to produce the seafood lot of their target product at the store (ideally by barcode)

Then the customer may scan the barcode of their tuna can and see: where the fish came from, what percentage of the lot was legally obtained, when it was brought to port, etc. This would enable the consumer to make an informed decision.

**Steps and existing solutions:**

1. Determine when and where each fishing vessel is fishing (done, AIS system)
2. Determine whether each vessel was fishing legally or illegally based on behaviour (done, [source using passive acoustic telemetry](https://link.springer.com/article/10.1186/s40317-019-0163-9), [source using vessel trajectory](https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9006545&casa_token=fuMnkqC5rlQAAAAA:Z_uajAVJY6jc225eJacVdMeSMluIuiZYHvZQpofJBr9KsT8wsIJ0T0j3SYy11GbfcU5310hCOA), [source looking at elasmobranchs in the Greek market](https://www.sciencedirect.com/science/article/pii/S0308597X19302027?casa_token=uZWXUZ40encAAAAA:oK47K9zUKkpWbJCp6rMOPaij3pl1asVUsM4s6tS0QhHXmG3hR9Npuk6W7nJIbsIDCuh5REcHtw)
3. Determine likely target species based on geographic location (done, [source](https://www.sciencedirect.com/science/article/pii/S0165783610001554?casa_token=UqAaTaVvhjQAAAAA:RUj6-raZZJlaiuXGWzz24O47LDRkdhDjRbsvTbM3FUOEvwpttkasQJ05WrDXGPZmCRO5-5Xrhg) on matching vessel location to declared catch, [source on how fishermen select target species and location](https://cdnsciencepub.com/doi/pdf/10.1139/f04-007)
4. Determine change in reefer (transport vessel) mass after transshipment event (done, [source](https://cdnsciencepub.com/doi/pdf/10.1139/f04-007) on historical approaches to modelling vessel wake based on a series of parameters. Can apply the same process with a known wake and regress the vessel mass using any of the listed models)
5. Determine who purchases catch from each transshipment vessel (work in progress, nothing solid yet. [Block chain approach](http://www.fao.org/3/ca8751en/ca8751en.pdf), [open government site search results](https://search.open.canada.ca/en/od/?mlt_id=fa1cd4cf-c8fe-4102-b3cd-19e2dde9f703), [dataset on these from quebec (ftp link)](ftp://ftp.mapaq.gouv.qc.ca/gouvernement_ouvert/Ventes_Produits_Valeurs_Transf_reg_maritimes.csv))
6. Tie purchased marine products to the produced lots of seafood (nothing yet)

**Slightly smaller (narrowed down) problem statement from the bigger problem:**

How might we integrate existing open-source technology tools used to monitor illegal fishing behaviour at sea in a way that could empower stakeholders to verify the supply chain (and legality thereof) of the marine products arriving at port? (does not address steps 5 and 6, which are post-port stages)

**Group’s solution:**

Create a system that combines the existing solutions described above, and implement it to monitor the legality and origins of fish within the scope of the [Greater Vancouver Fishing Industry](http://www.gvrd.com/industry_fishing/index.html) at the port level (not past the port, i.e.: not tackling steps 5 and 6).

**Questions for Bruce:**

* Is the scope acceptably narrow given the definition above?
  + Gap is nobody has put together data that gives us the critical understanding
  + Specify a certain port
    - If three is continuity to the GVFI, maybe we do not specify a port
    - Continuity: if it is a coordinated collection of fishing boats and processors, it may not be necessary to specify a single port
* Validation of the problem?
  + Knowing that the problem really exists today in the form we’re describing it
  + Interacting with problem holders or experts working to try and solve the problem
  + This week’s material talks about that
    - Tips on interacting with people to validate the problem

By next week:

* Well ideated solution to our validated problem

Amlan: Let's discuss the current laws, regulation and legislations - in order to stand out our points.

* There are established laws for illegal fishing in Canada and resolutions under the Fisheries Act, which acquaints Fish and Fish Habitat Protection and Pollution Prevention, fines, Fish Stocks, Applications of Penalties and Forfeitures, etc.
* [Causes of IUU Fishing](https://www.dfo-mpo.gc.ca/international/isu-iuu-drvrs-eng.htm)
* Fines : [Fisheries Act](https://laws-lois.justice.gc.ca/eng/regulations/sor-96-313/page-8.html)

Appendix

Fisheries Act R.S.C., 1985, c. F-14 - <https://laws-lois.justice.gc.ca/eng/acts/f-14/FullText.html> (incl amendments)

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