Strengthening Statistical Literacy

to Better Understand and Unpack IUU Fishing

Today's Agenda

- Why Statistics Matter for IUU Fishing
- Key Statistical Concepts Explained Simply
- Reading & Questioning Data
- Common Pitfalls and How to Avoid Them
- Putting It All Together

SECTION 1

Why Statistics Matter for IUU Fishing

Understanding the invisible — what we can't see, we can't stop.

Why We Need Statistics — Not Just Stories

How much IUU is happening?

Anecdotes show cases. Statistics show scale.

Which policies are working?

We compare before vs. after using data — not gut feeling.

Where to allocate resources?

Statistics reveal where problems concentrate, so action can follow.

How confident are our estimates?

Statistics tells us the uncertainty range — and that matters enormously in policy.

SECTION 2

Key Statistical Concepts Explained Simply

No formulas. No panic. Just the ideas that matter.

Concept 1: Population vs. Sample

POPULATION

ALL the fish caught globally
(including IUU)

We can never observe this directly.
It's the 'truth' we are trying to estimate.

→ What we WANT to know

SAMPLE

The fishing vessels we
actually observed or monitored

Port inspections, VMS data,
observer programs, catch reports.

→ What we CAN observe

Concept 2: Estimates & Uncertainty

"IUU fishing represents 11–26 million tonnes per year."

Notice the range — 11 to 26. That range IS the message.

Point Estimate

The single 'best guess' number (e.g. 18M tonnes). Useful but incomplete without a range.

Confidence Interval

The plausible range given our data and methods. A wider range means more uncertainty — not failure.

Uncertainty ≠ Ignorance

Quantified uncertainty shows we've been rigorous. Pretending there is none is the real problem.

Concept 3: Correlation vs. Causation

CORRELATION

Two things move together.

Example:
Countries with less monitoring tend to have higher IUU rates.

This is a useful pattern to study — but it doesn't tell us WHY.

VS

CAUSATION

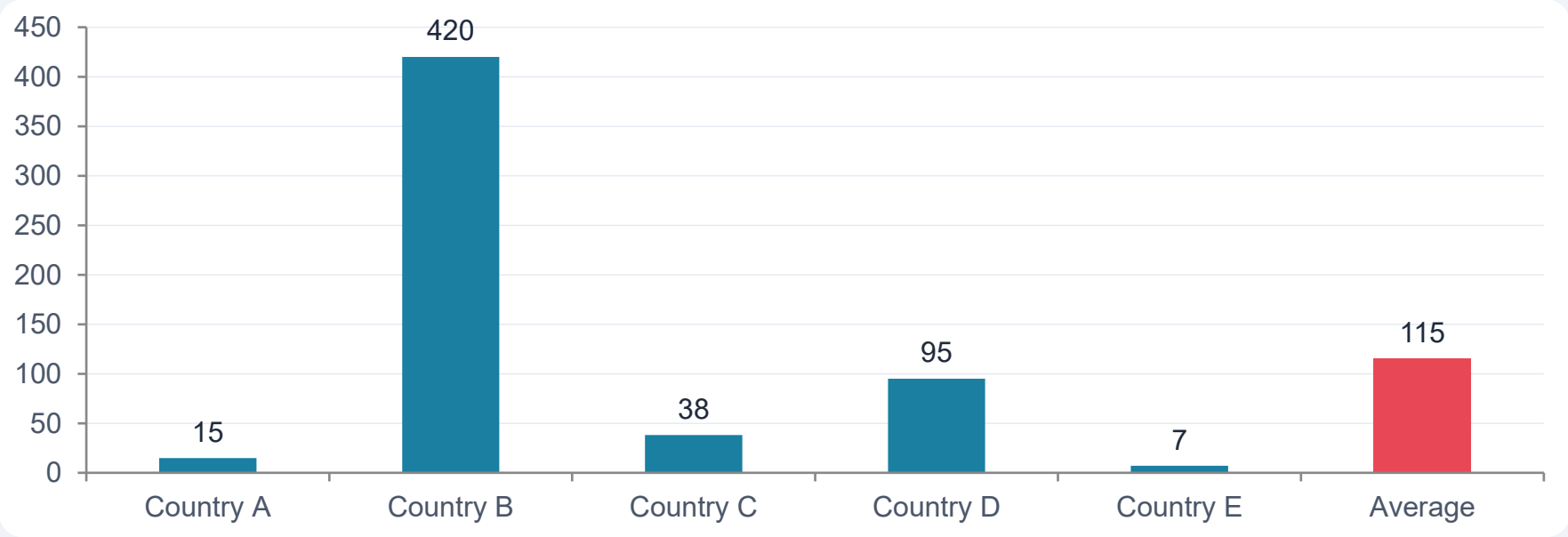
One thing directly causes another.

Example:
Reducing monitoring CAUSES more IUU — requires controlled study to establish.

Be careful: correlation can be misleading if third factors are involved.

Concept 4: Averages Can Mislead

⚠ "Average IUU losses per country" can hide enormous variation between small island states and major fishing nations.



Descriptive Statistics: The Basics

Skewed Means

In fisheries, mean catch is often misleading. A single massive factory ship (outlier) can mask that local artisanal catches are collapsing.

Variance Analysis

Consistent low variance in "perfectly stable" reporting logs is often a statistical red flag for logbooks.

Sample Bias

If we only sample vessels in major ports, we miss the "dark fleet" that transships at sea, creating a massive selection bias.

SECTION 3

Reading & Questioning Data

Being a critical consumer of statistics — not just a passive reader.

5 Questions to Ask Any IUU Statistic

1	**What is actually being measured?**	*Catch volume? Vessel days? Economic value? The choice shapes the result.*
2	**How was the data collected?**	*Self-reported? Observer programs? VMS tracking? Each method has blind spots.*
3	**What's the time period and geography?**	*A 10-year trend hides annual spikes. 'Global' can obscure regional hotspots.*
4	**What assumptions were made?**	*Every estimate rests on assumptions. If they're not stated, ask for them.*
5	**Who produced this, and why?**	*Government, NGO, industry? Funding source can shape what gets measured and reported.*

How to Read a Chart: Checklist

- [ ] Read the title first — what is this chart trying to show?
- [ ] Check the axes — what units are used? Does the y-axis start at zero?
- [ ] Look for the source and year — is this data recent enough to be relevant?
- [ ] Note the sample size — 'n=12 vessels' is very different from 'n=12,000 vessels'
- [ ] Spot the error bars or confidence ranges — if they're missing, ask why
- [ ] Watch for cherry-picked time ranges — a short window can tell a false story

SECTION 4

Common Pitfalls and How to Avoid Them

Knowing what NOT to do is half the battle.

Common Statistical Pitfalls in IUU Research

⚠ Precise Numbers That Aren't

"$23.5 billion" sounds exact. But this is built on multiple layers of estimates. Precision ≠ accuracy.

⚠ Ignoring Reporting Bias

Countries with better monitoring report MORE IUU — so they look worse. Better data ≠ worse performance.

⚠ Comparing Incomparable Studies

Mixing studies that define IUU differently, use different years, or different methods leads to false conclusions.

⚠ Assuming Absence = Zero

No data doesn't mean no IUU. Lack of evidence ≠ evidence of absence. Data gaps are common in high-risk areas.

Putting It All Together

1. Encounter an IUU statistic

In a report, news article, or policy document

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2. Ask the 5 Questions

What, How, When/Where, Assumptions, Who?

↓

3. Check for pitfalls

Precision ≠ accuracy, reporting bias, data gaps

↓

4. Draw a calibrated conclusion

State what it shows AND what it doesn't

Key Takeaways

- IUU fishing is a hidden problem — statistics are our best tool to estimate what we can't directly see.
- All IUU estimates carry uncertainty. A range is more honest — and often more useful — than a single number.
- Correlation is not causation. Use data to generate hypotheses, not just to claim proof.
- Averages hide variation. Always ask about the distribution behind any single number.
- Be a critical reader: ask who measured what, how, when, and why.
- Reporting gaps are not the same as zero IUU. Missing data is itself a signal.