

Illustrating the effects of bias in independent monitoring

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Three take home messages

1. **Definition** of ‘monitoring’ matters
2. **Design:** what vessels get EM coverage
3. **Design:** how much imagery is reviewed

Accurately estimating catch

AN ILLUSTRATION OF THE EFFECTS OF BIAS
IN INDEPENDENT MONITORING OF FISHERIES

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Brown et al. 2021 WCPFC EM Trials - Marine Policy



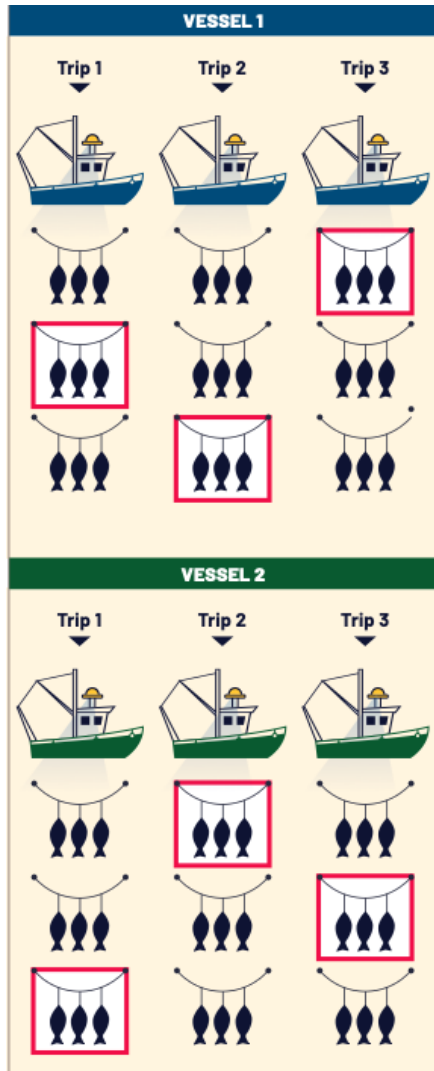
Report on effects of bias



What are EM catch records used for?

- Data for stock assessments
- Data on endangered, threatened and protected species
- Compliance and enforcement
- Fishery restructures
- Standards for certification

1. Define monitoring coverage and review

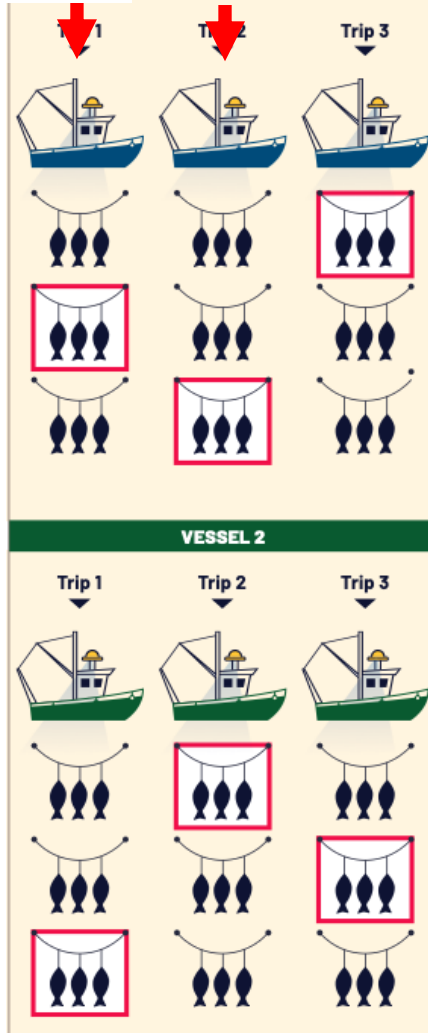


Vessel 1

Vessel 2

1. Define monitoring coverage and review

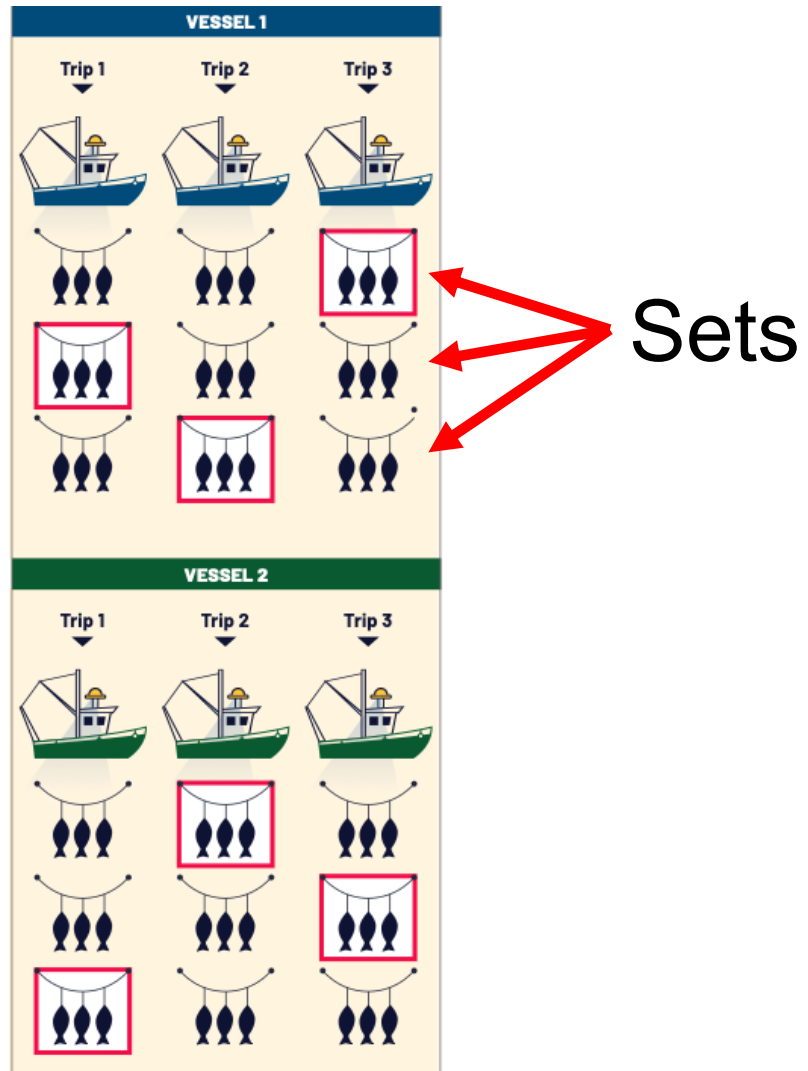
Trip 1 Trip 2



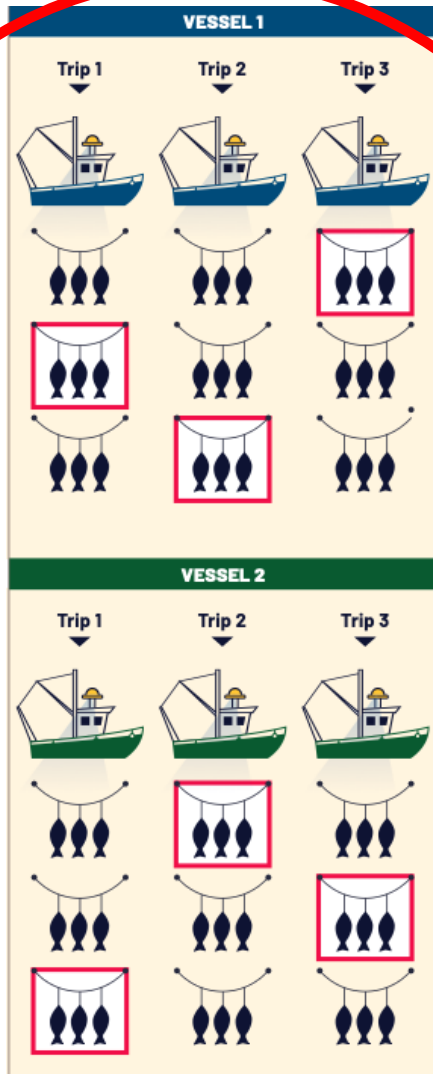
Vessel 1

Vessel 2

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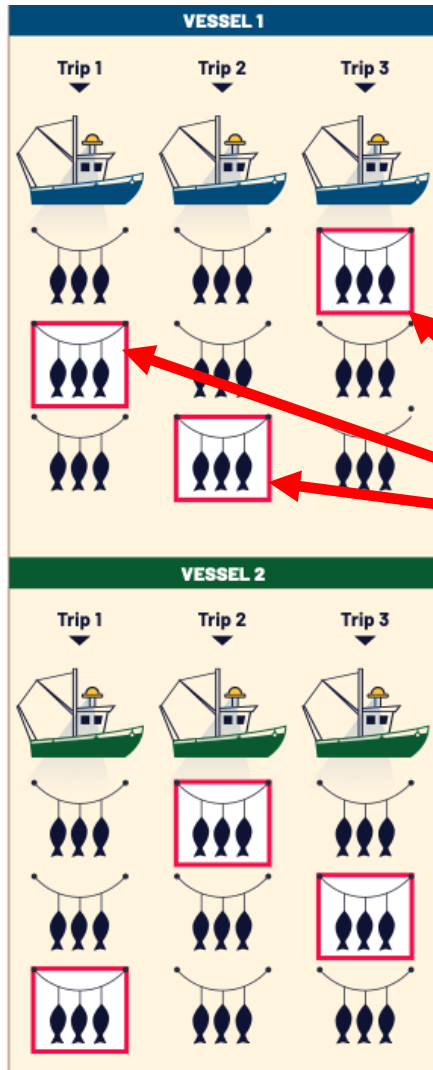


This study: 100% coverage:
all vessels have operational EM

WCPFC

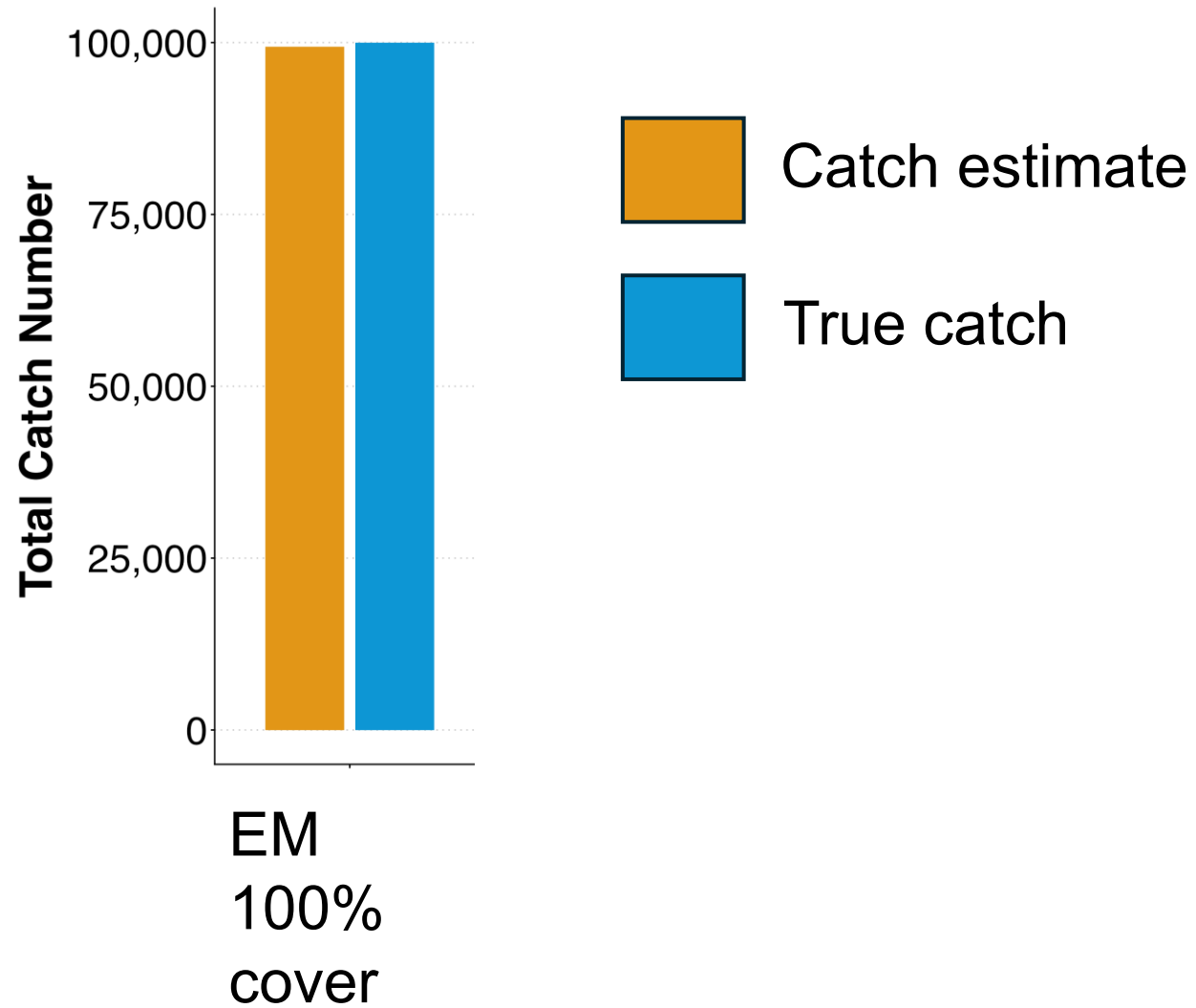
“The proportion of vessels or fishing effort that have operational EM system installed and are recorded by the EM Program to collect EM Records to meet the EM Data Requirements.”

1. Define monitoring coverage and review

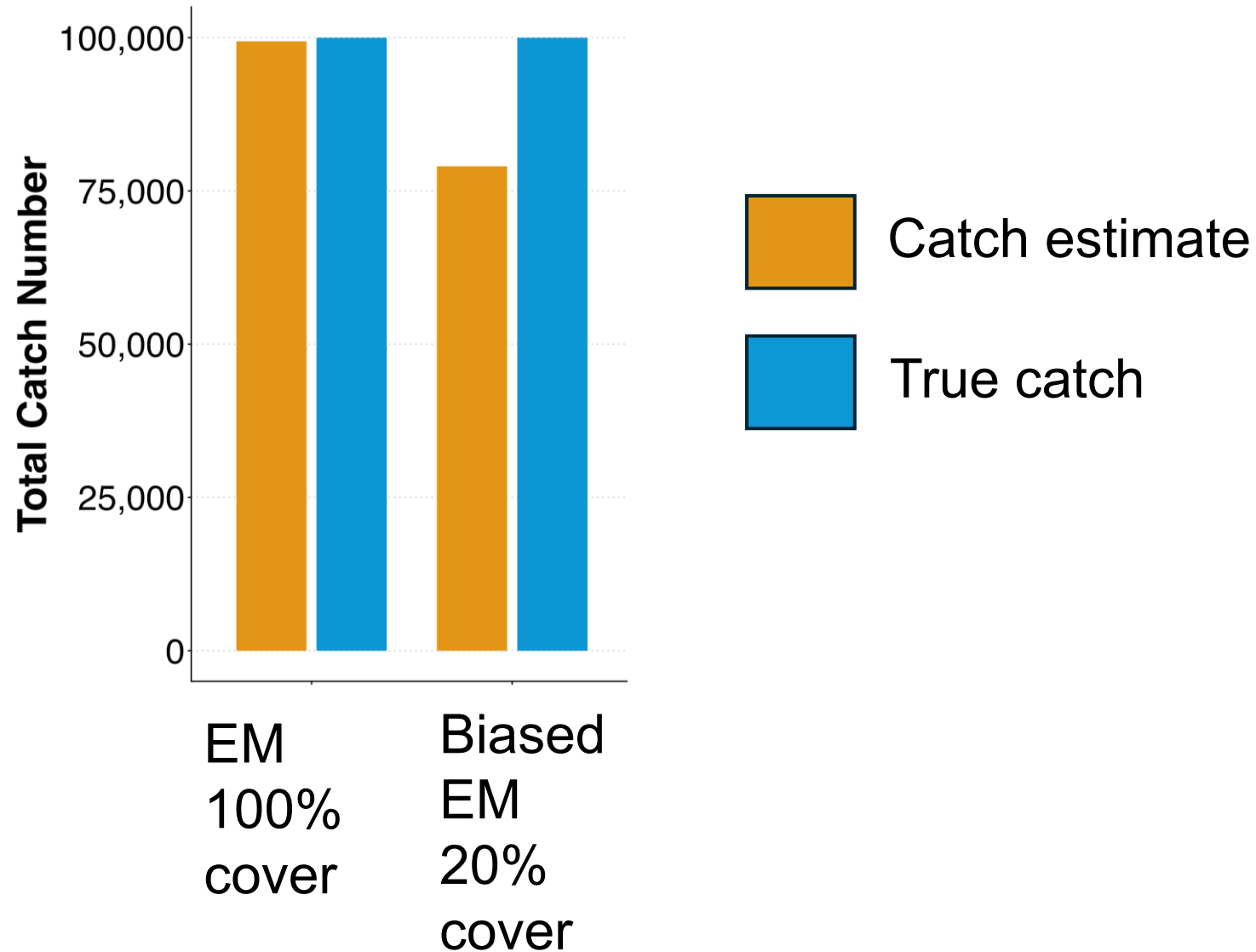


Review: Sets that are reviewed for data collection
Usually not every set

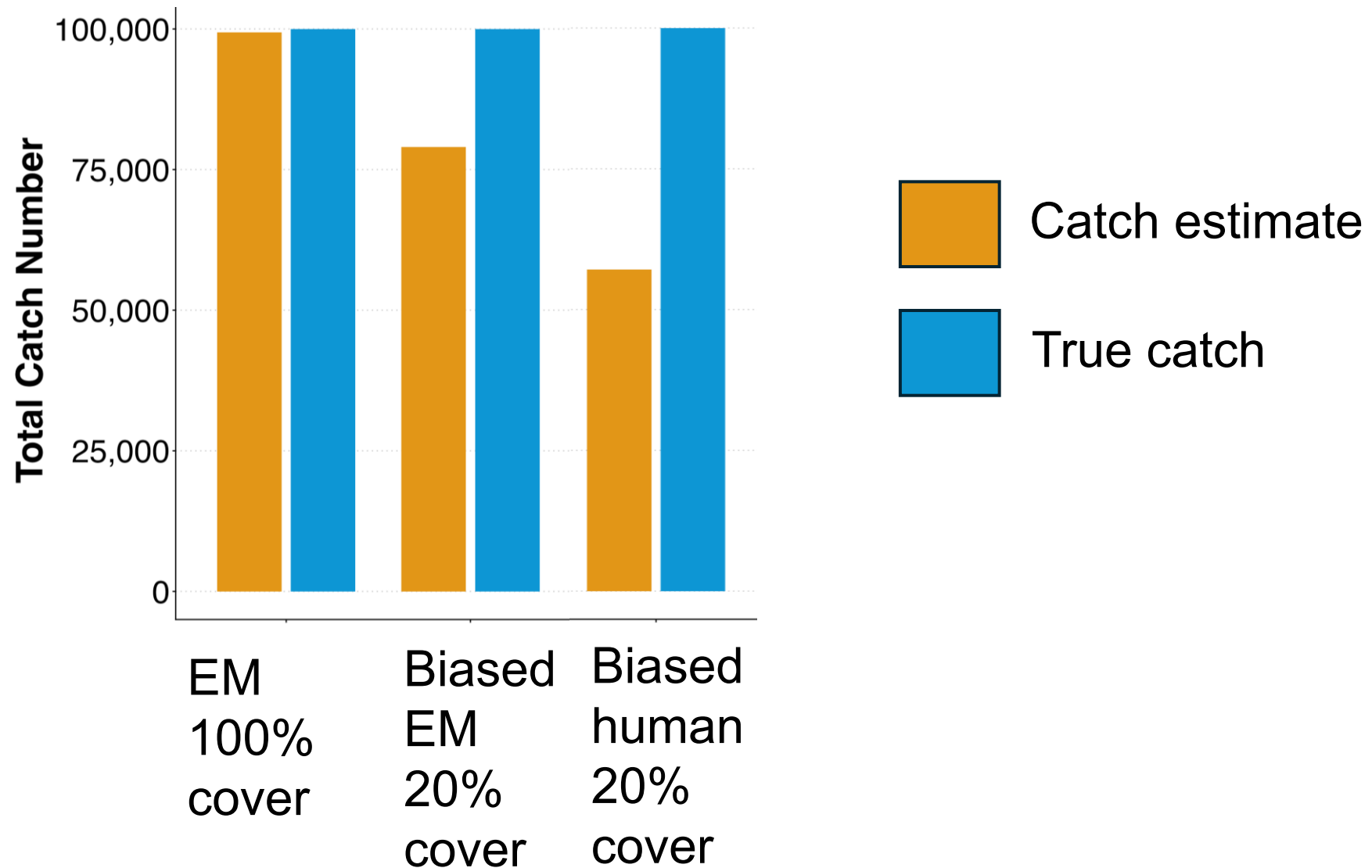
2. Market species catch in one year



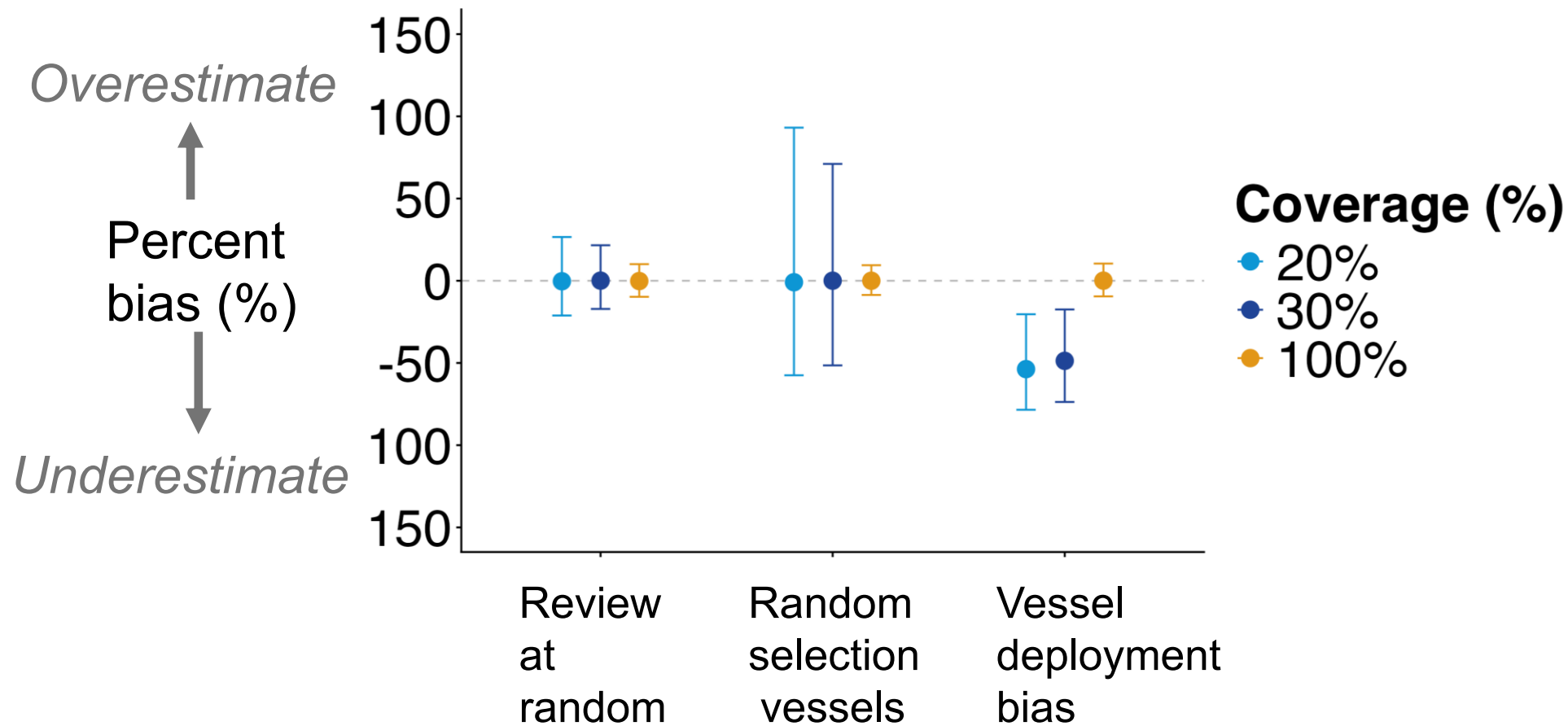
2. Market species catch in one year



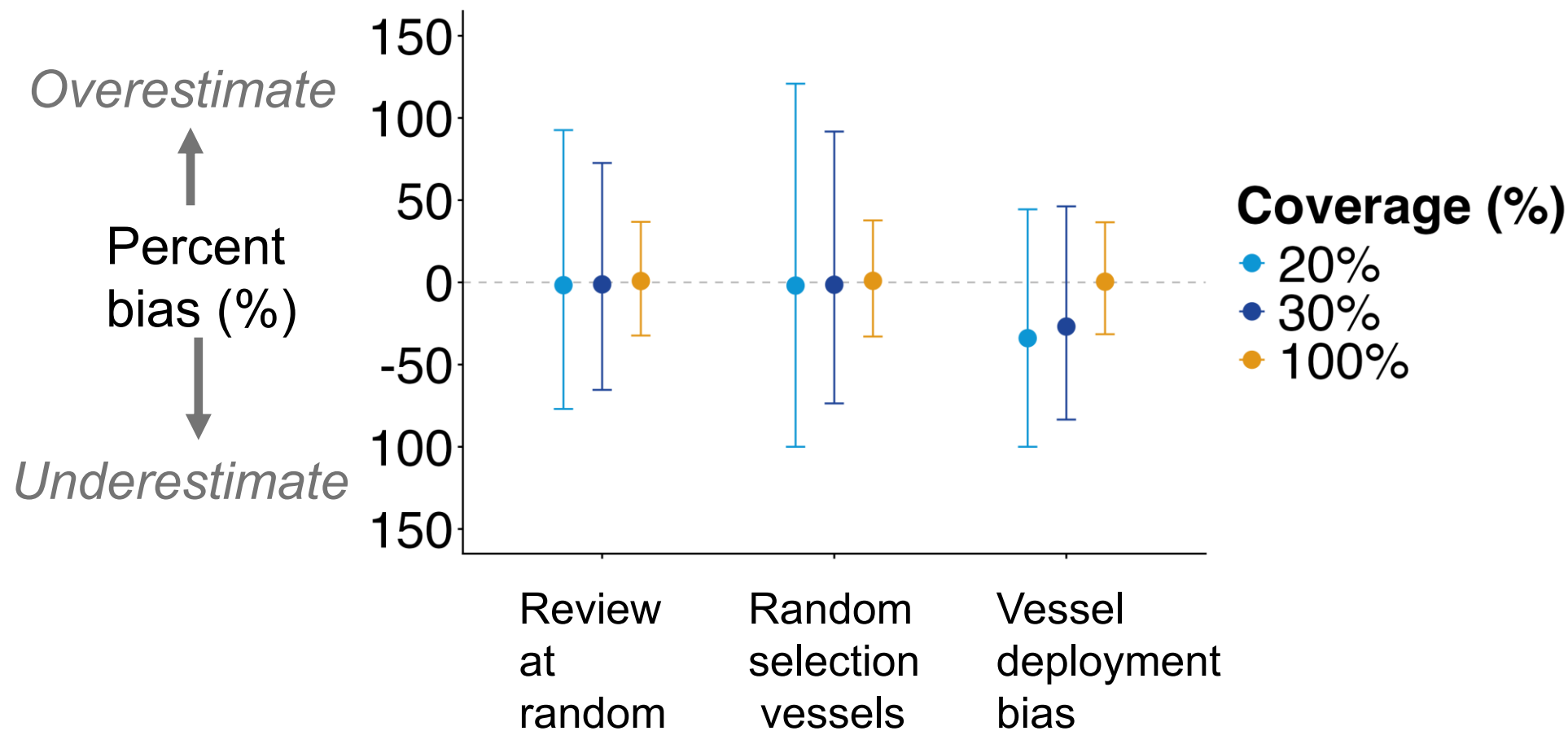
2. Market species catch in one year



3. More review = more precision



3. More review = more precision



See *Pierre et al. 2024 EM Optim* for a detailed study of optimizing review rates

Conclusions

- Best practice: 100% coverage with random review
- Less than 100% coverage creates a risk that data are unreliable
- Many examples of 100% EM coverage from around the world

Image: Kydd Pollock/TNC



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Electronic monitoring coverage and review

Country	Fishery	EM coverage (%)	EM image review %	Benefits
Canada	Groundfish	100	Random selection of 10 % of sets per trip, could be 100 % subject to accuracy of catch reporting	Enumerate catch by species to validate logbook
Australia	Eastern and Western tuna and billfish, Gillnet, Hook and Trap Fishery, and the Small Pelagic Fishery	100	At least 10 % of sets per vessel but may be reviewed, increasing to 100 % cases involving protected species.	Cost-effective, improved logbook reporting, data validation, compliance, improve public confidence in sustainable practices
Scotland	Scallop and pelagics	100	?	?
Spain	ANABAC-OPAGAC Tropical tuna purse seine programme	100	100 %	Validation of fishing effort; total catch per set, and large bycatch
Denmark	Bottom trawlers	100	?	?

International examples

Australia - Gillnet Hook and Trap

- 100% EM coverage
- Random review of footage with minimum per vessel
- 100% review of gear retrieval with ETP

International examples

Australia - Gillnet Hook and Trap

- Logbook reporting improved on vessels with EM
- Especially for discards and bycatch





Conclusions

- 100% coverage is better for:
- High quality catch data for assessments and TEP
- Certification and standards
- Evidence for fishery restructures



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