How much is enough?

Review optimisation methods to deliver best value from electronic monitoring of commercial fisheries

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What did we do?

- Considered fisheries management data needs that EM can support
- Developed *EMoptim,* a prototype simulation tool, to explore:
    - minimum EM review rates for single monitoring objectives
    - optimised EM review rates for more than one monitoring objective
    - effects of accuracy criteria on review rates
    - review costs
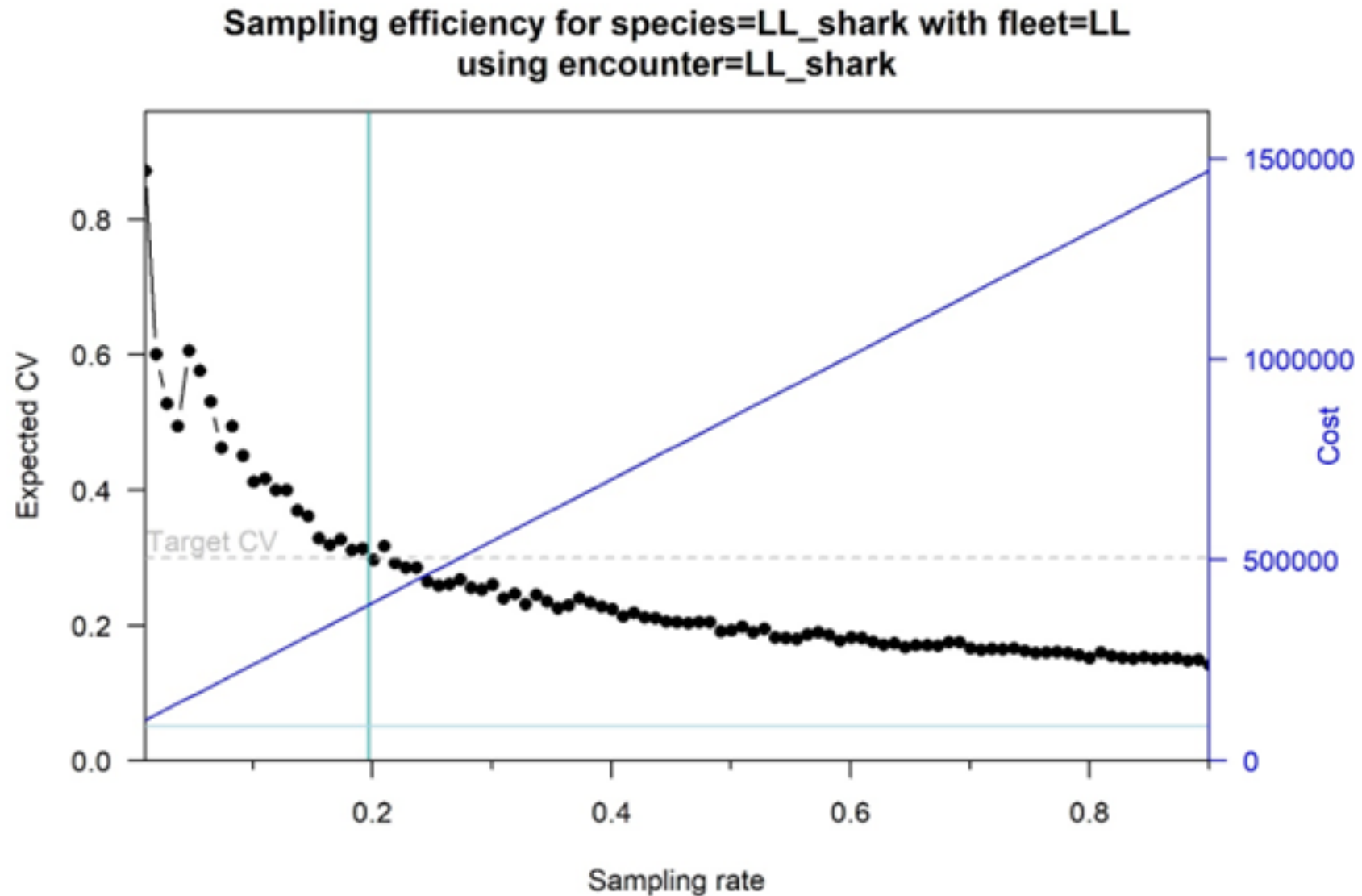- Looked at other ways to reduce cost of EM review

Saltwater Inc.

EMoptim: A prototype simulation tool

- Operating model:
  - Spatially explicit
  - Customisable: region, fishery, fleet, etc.
- Evaluation model:
  - Explores P(event detection), uncertainty, bias
  - Calculates relative cost
- Optimisation framework:
  - 2+ monitoring objectives
  - Provides review rate for best dataset
    - Specified confidence requirements, minimum review cost

- Inputs: fishery data, published information, expert opinion, etc.
- Stratified random sampling structures review effort

McElderry et al. 2010

What does *EMoptim* produce?

Sampling efficiency for species=LL_shark with fleet=LL using encounter=LL_shark

What did we find?

- Western and Central Pacific Ocean (WCPFC Convention Area)
- Longline, purse seine fisheries

- Stratified review can reduce required review rates
  - Less effective for rare, geographically widespread capture events
- Higher confidence -> more review
- Statistical characteristics of capture events are critical determinants of review rates
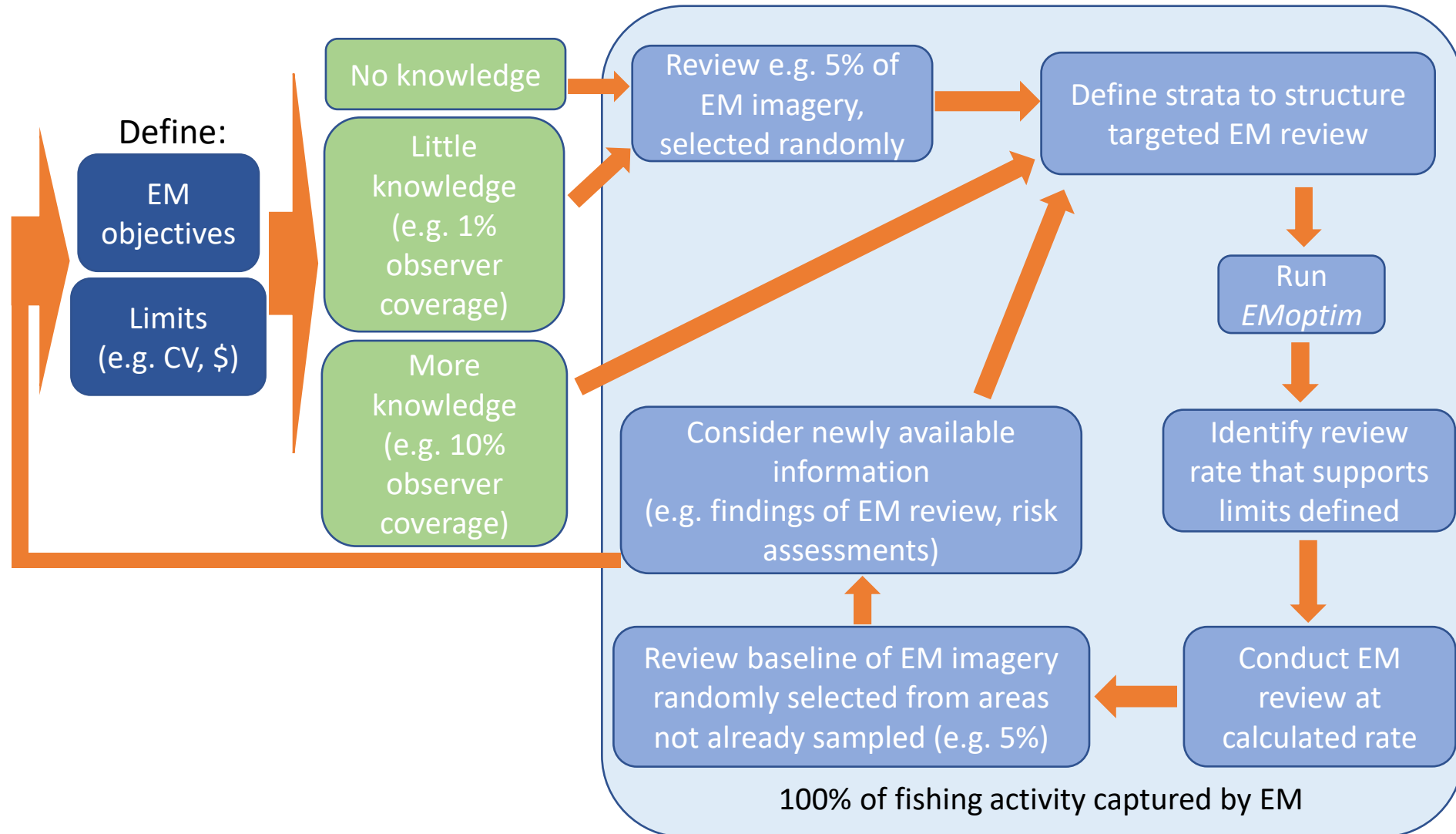- Best to use set-level data

Brown et al. 2021
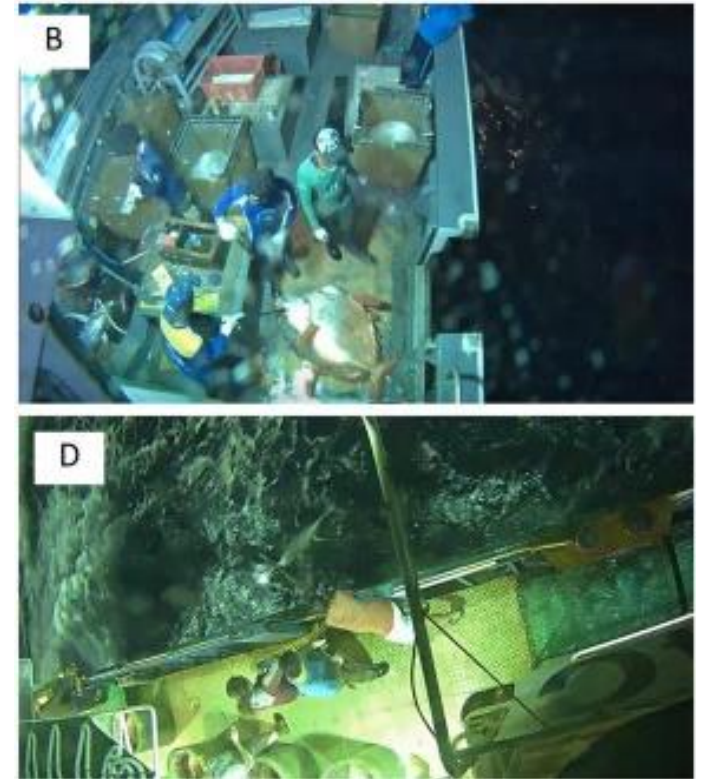
How much review is enough?

<u>Very broadly generalising</u> review rates at moderate CVs to estimate catch composition:
- Commonly caught species   5-10%
- Less commonly caught species 10-50%
- Rarely caught species   50-85%
- Very rarely caught species   85-100%

- The least commonly caught species drive optimised review rates
  - e.g. 1: Choose a review level and understand the accuracy associated with that.
  - e.g. 2: Accept that if the monitoring objectives include commonly and rarely caught species, commonly caught species will be oversampled if a single optimised review rate is used for all taxa.

Above: AFMA 2018; Below: Piasante et al. 2012

What if the budget for review is limited?

Define:

- **EM objectives**
- **Limits (e.g. CV, $)**

- No knowledge
- Little knowledge (e.g. 1% observer coverage)
- More knowledge (e.g. 10% observer coverage)

Review e.g. 5% of EM imagery, selected randomly

Define strata to structure targeted EM review

Run *EMoptim*

Identify review rate that supports limits defined

Conduct EM review at calculated rate

Review baseline of EM imagery randomly selected from areas not already sampled (e.g. 5%)

Consider newly available information (e.g. findings of EM review, risk assessments)

100% of fishing activity captured by EM

How to secure best value?

- Best practice remains 100% capture of fishing activity
  - Different levels of review are possible for different monitoring objectives (with scaling costs)
  - Closer management of 'cost per datum' is possible

- Support review efficiency through all EM programme stages:
  - Design phase (e.g. clear objectives, data definition)
  - Onboard data capture (e.g. catch handling, camera views)
  - Review processes (e.g. hotkeys, AI assistance)

- Build on what others have already learned, to progress faster and at lower cost

Thank you

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