



Pacific
Community
Communauté
du Pacifique

Boosting data collection in Pacific Island's coastal fisheries using AI technologies

Background info on the Landing & market surveys system

- 1 Data collectors interview fishers and take pictures of the catch with Ikasavea (offline) or by a separate camera
- 2 Synchronisation of the tablet with server once internet is available to upload data and pictures
- 3 Uploaded photos are processed by AI (every 15 minutes)
- 4 Data can be validated and used by fisheries officers and scientists

Programs using CFAP's eData system

- Fisheries authorities or observatories of SPC members
- Universities - community surveys via ANCORS*, USP**
- Building partnerships with NGO's***

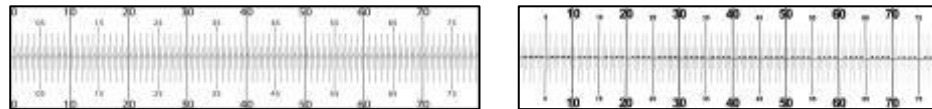
*Australian National Centre for Ocean Resources & Security (University of Wollongong)

**University of the South Pacific

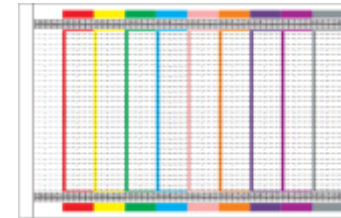
*** e.g., The Nature Conservancy

Standardised mats & boards for the AI to use for measuring length

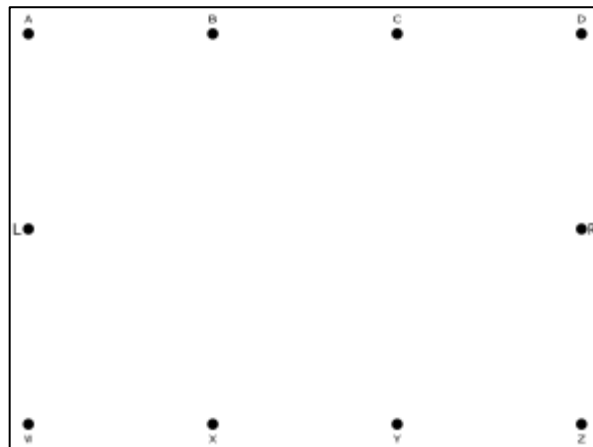
SPC Boards



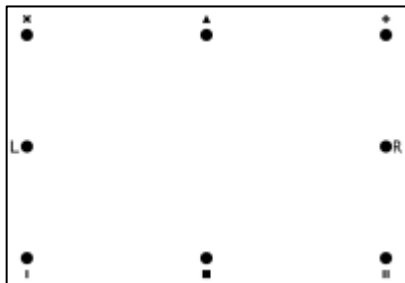
TNC Board



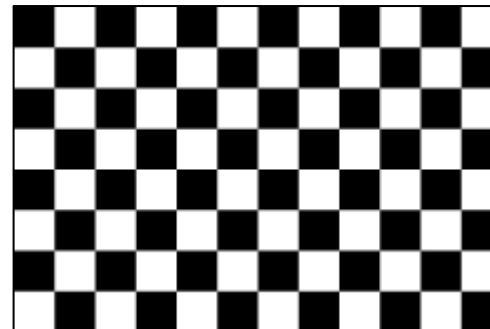
SPC Mat 2



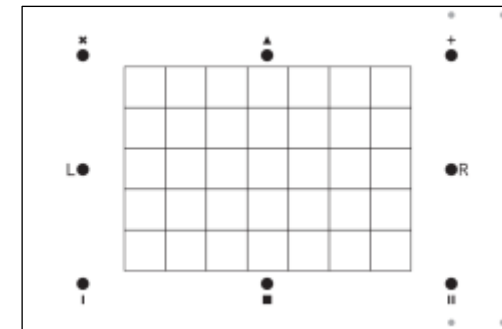
SPC Mat 1



Pathways 12x8



Pathways V2 (beta)



Coastal finfish and AI

- Man vs Machine?
 - Machine wins

- Built-in error flags




Species : *Parupeneus ciliatus* Last modified by George Shedrawi on 9/16/2023

Search species :

Previously recorded :

Suggested :

Length : cm Detected: 17.2

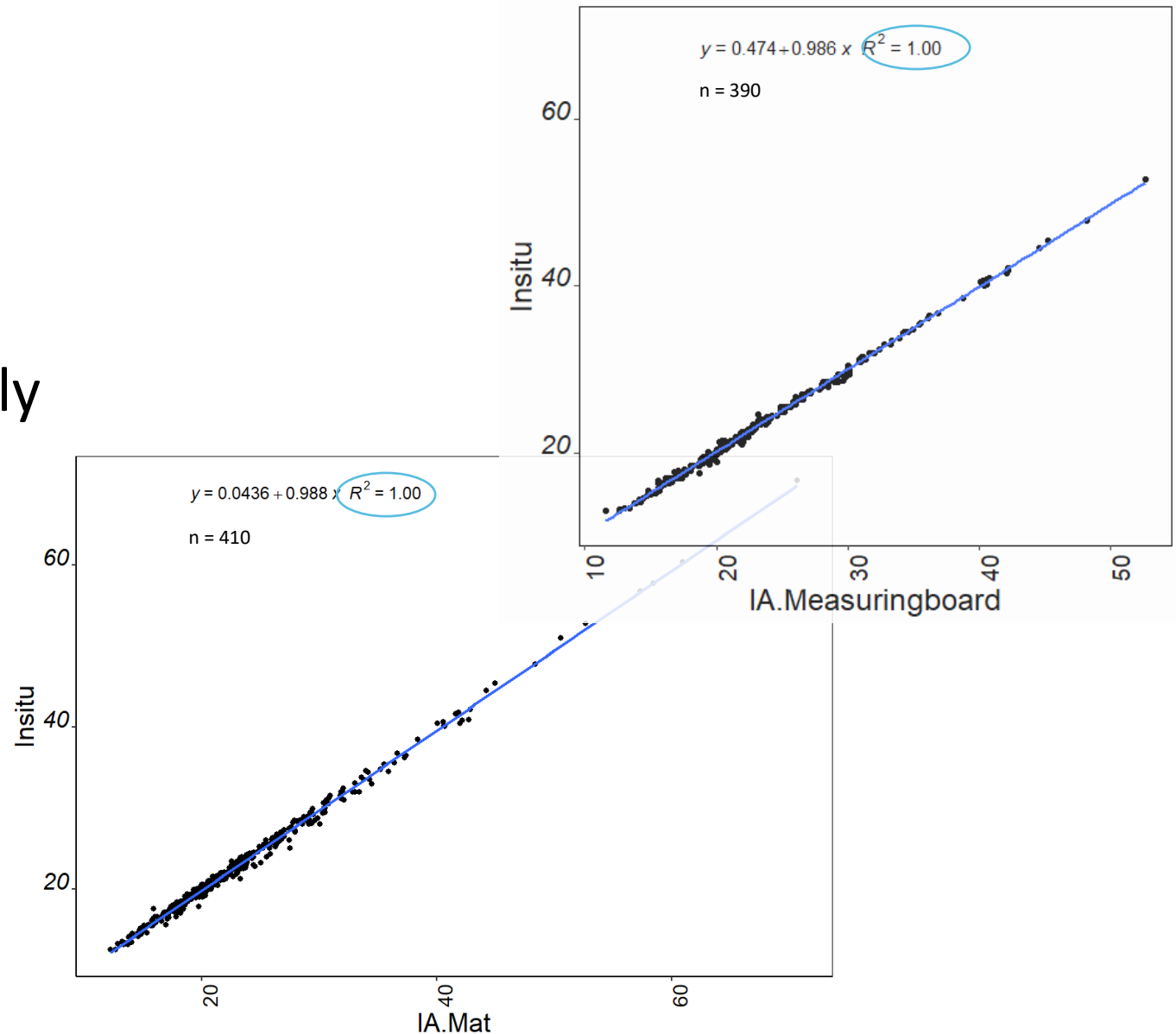
Weight : g Detected: 10  **Save & Next**

Detected weight & length are not consistent with length/weight relationship for suggested species

Detected weight & length are not consistent with length/weight relationship for suggested species

Coastal finfish and AI

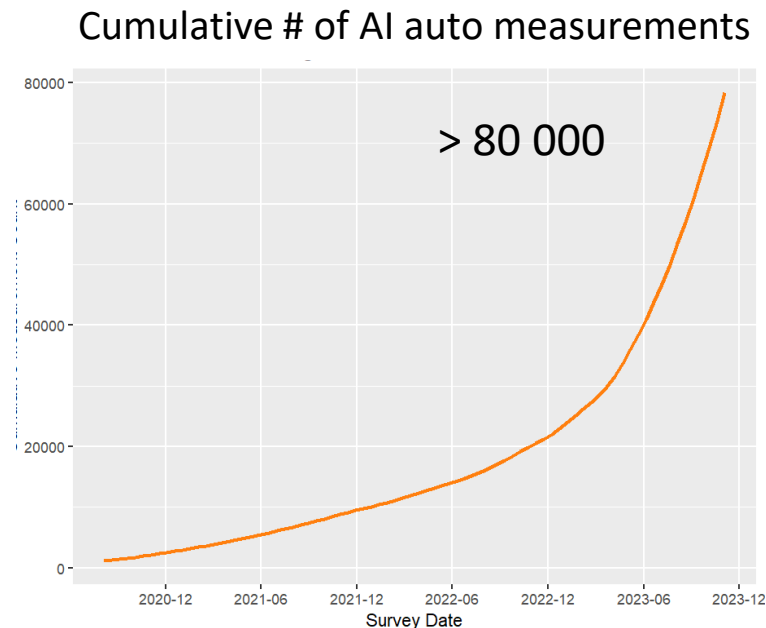
- AI measurements are identical to a person carefully and accurately measuring a fish
- Confidence in the data



Coastal finfish and AI

- Cumulative measurements using AI from market surveys
- Other members using AI in landing survey (e.g., KI, TO, WF)

PICT's first use of CFAP's AI system

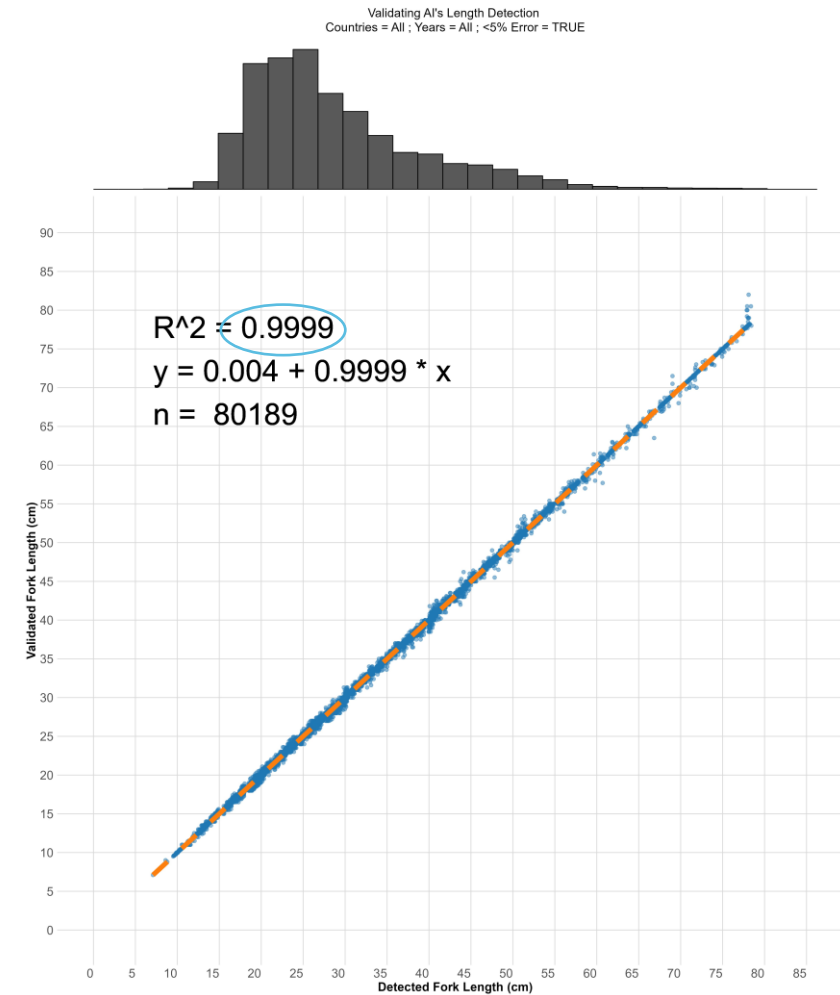


Market
 NC – Mar 2020
 SAM – Sep 2020
 TO – Sep 2021
 FJ – May 2022
 FP – June 2022
 PG – Dec 2022
 SB – May 2023

Landing
 KI – May 2019
 WF – Jan 2020

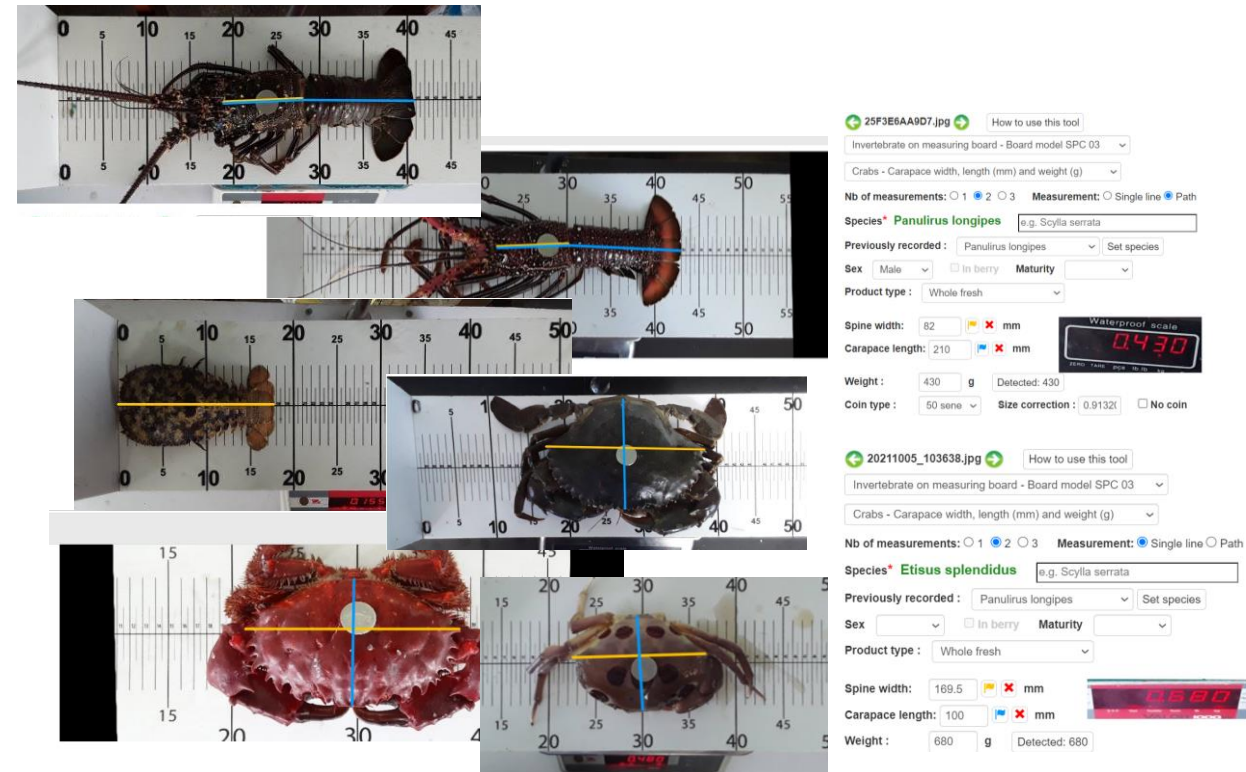
Coastal finfish and AI

- AI detected fork length against the fork length observed and validated
- Consistent accuracy through time



Invertebrates and AI - now

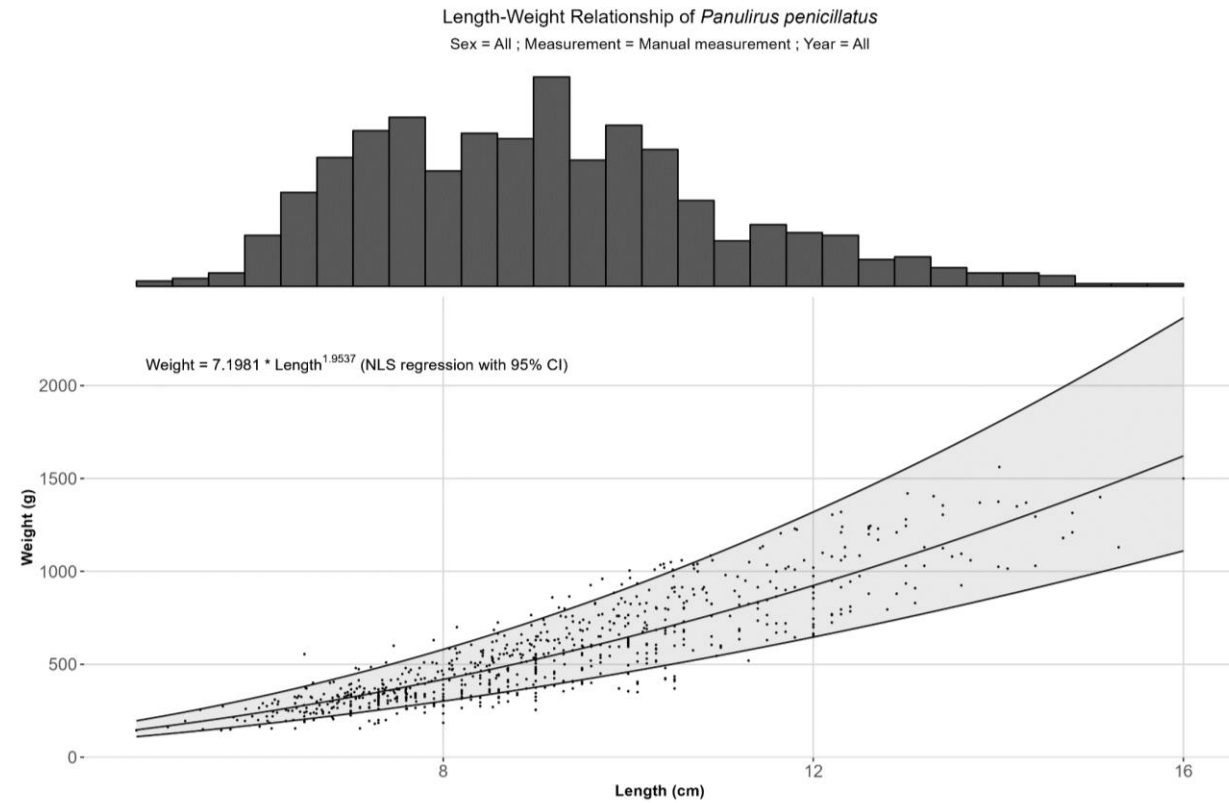
- The AI has fallen in love¹ with measuring lobsters and crabs
- Samoa have been instrumental in building the invertebrate AI capability
- Other countries are increasingly using this for inverts



¹ Franck Magron has persuaded it...

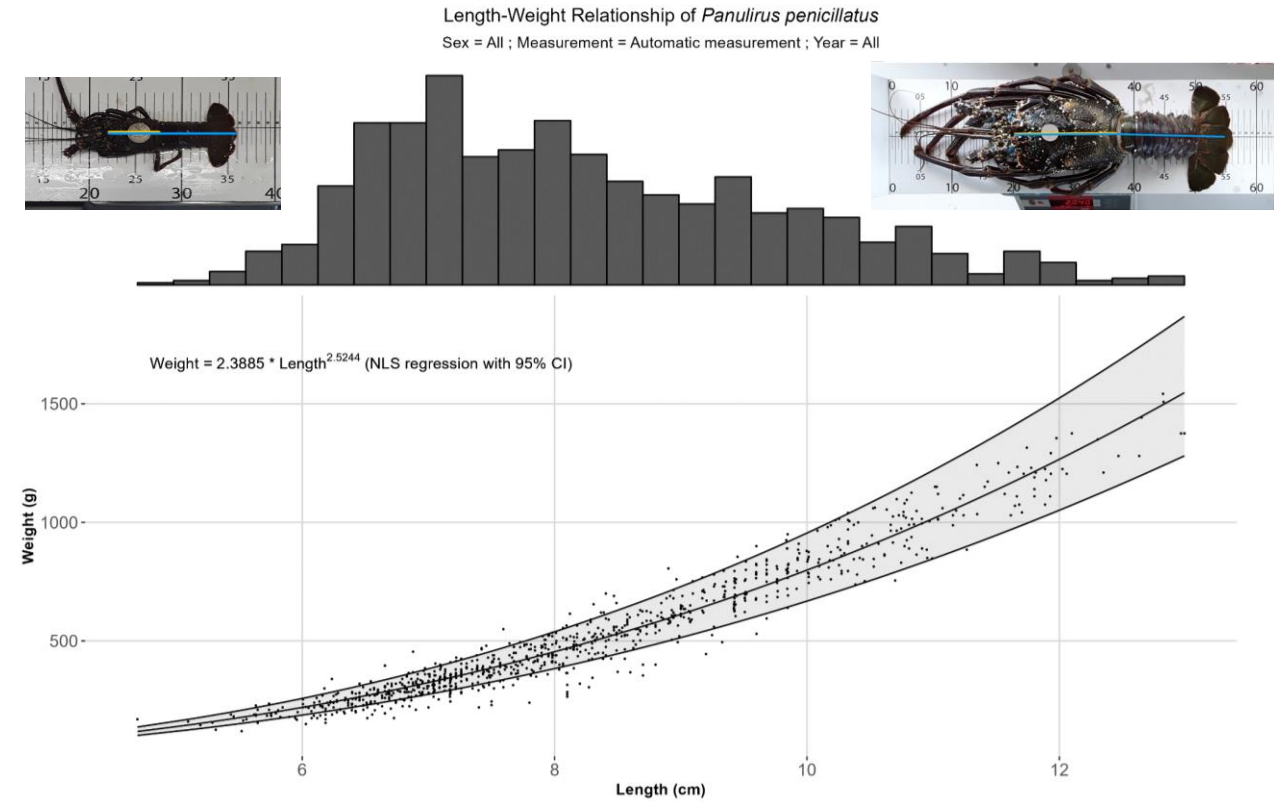
Panulirus penicillatus – spiny lobster

- Over 1980 automated length measurements in 36 months in Samoa's market survey program



Panulirus penicillatus – spiny lobster

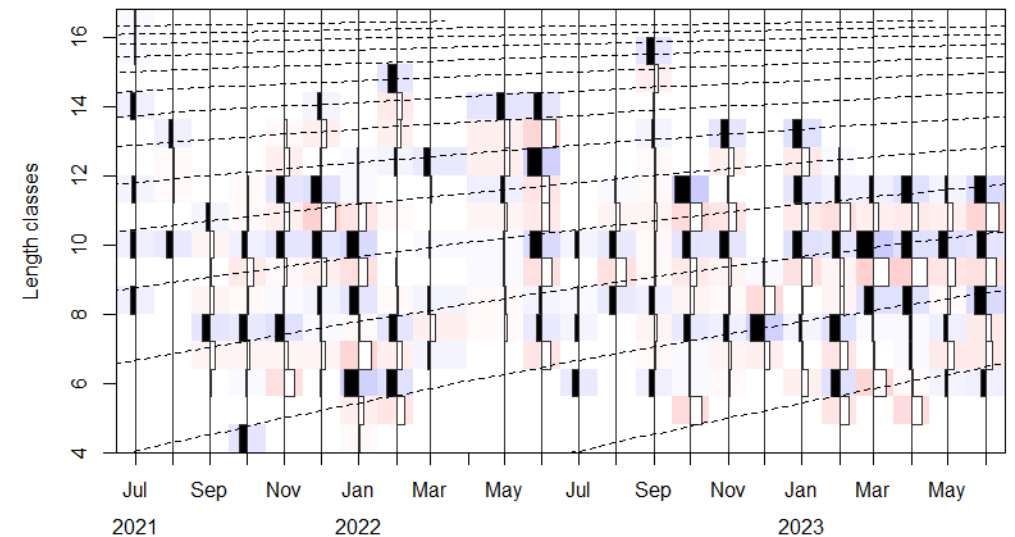
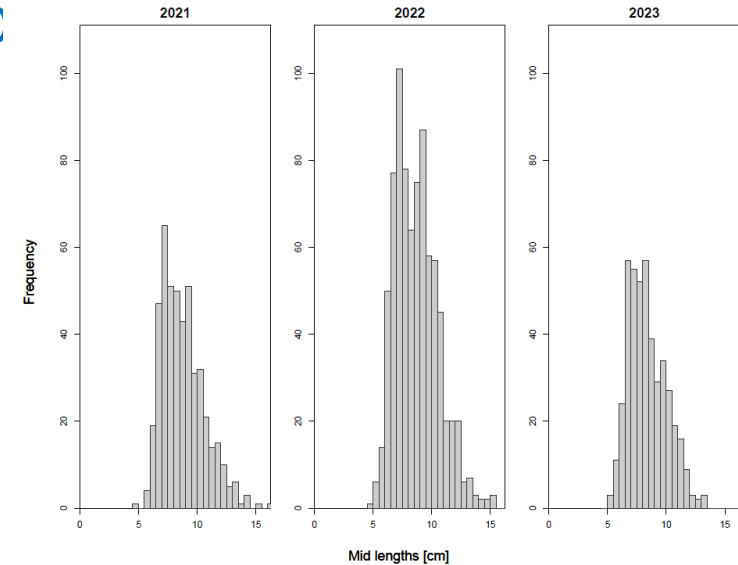
- AI increases precision dramatically



Taking Samoa's lobster measurements into length-based stock assessment

Trialling **E**lectronic **L**ength **F**requency **A**nalysis (ELEFAN) using TropfishR for estimating growth parameters using lobster length data generated by AI

- e.g., L_{∞} (17.1); K (0.13); t_{anchor} (0.43); Φ (0.316).
- FAO's Stock Assessment Virtual Research Environment (VRE)
- Fishpath – Stock assessment toolbox
- FishKit – The Nature Conservancy stock assessment toolbox
- The barefoot ecologist



Taking Samoa's lobster measurements into length-based stock assessment

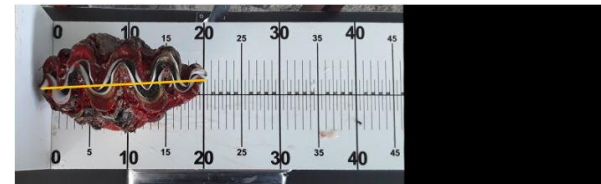
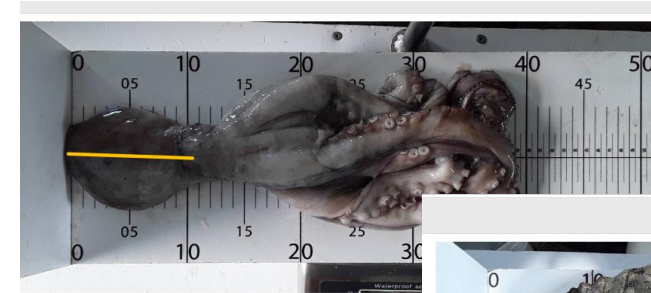
- Leads to LBSPR¹

Year	SPR [%]	$L_{s50\%}$	$L_{s95\%}$	F/M
2021	0.51 (0.41 - 0.6)	6.69 (6.49 - 6.89)	7.61 (7.24 - 7.98)	0.48 (0.31 - 0.65)
2022	0.51 (0.43 - 0.59)	6.62 (6.41 - 6.83)	7.77 (7.39 - 8.15)	0.47 (0.33 - 0.61)
2023	0.37 (0.29 - 0.44)	6.65 (6.4 - 6.9)	7.77 (7.32 - 8.22)	0.79 (0.56 - 1.02)

¹FAO's Stock Assessment Virtual Research Environment

Invertebrates and AI - soon

- Still trying to convince¹ AI to like bivalves (giant clams and *Anadara*), gastropods (*Trochus*, *Turbo* etc), octopus, squids and urchins.
- Further developing species ID capability
- Building invert auto-measurement capability on mats



24F2EC53FC1.jpg How to use this tool

Invertebrate on measuring board - Board model SPC 02

Other bivalves and gastropods - Longest length (mm)

Nb of measurements: 1 2 3 Measurement: Single line Path

Species* *Tridacna squamosa* e.g. *Scylla serrata*

Previously recorded: *Tectus niloticus* Set species

Sex In berry Maturity



¹ Franck can be very persuasive.

Summary

- Exponential growth in AI-aided data collection
- Continued developing the AI's country-specific invertebrate and fish species ID and invertebrate length-measurement capability
- Started on the first length-based stock assessment from AI-aided length measurements
- Integrating systems to use AI-aided and traditional length measurements for length-based stock assessment
- Further developing the system and required survey approaches for estimating production



Merci beaucoup

Fa'afetai lava

Vinaka vakalevu

Thank you

Malo 'aupito

Ko rabwa

Tagio tumas



EUROPEAN UNION



Sweden
Sverige



P E U M P

Pacific-European Union Marine Partnership Programme



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