Indonesian port-sampling activities under the current ACAIR project

Jessica Farley | 4 Nov 2020

Outline

1. Project objectives and need
2. Spatial variation in life history parameters
3. Productivity
4. Research questions, methods
5. Summary of sampling

Harvest strategies for Indonesian tropical tuna fisheries to increase sustainable benefits

Objective 2: *Determine the productivity of skipjack, yellowfin and bigeye tuna in Indonesia by estimating relevant life-history parameters (age, growth, reproduction, maturity)*

Undertake a large scale sampling program across the Indonesian archipelago, to enable statistically robust analysis of the **population biology** between the sampling regions

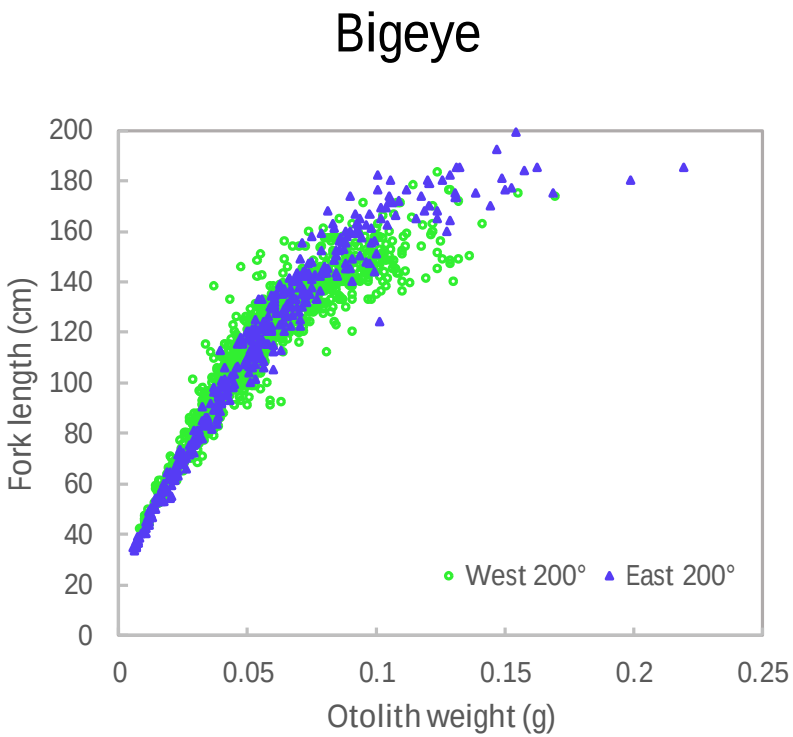
Information gaps

- Information underpinning stock assessments / harvest strategies of tuna species in Indonesia is limited
- No comprehensive studies of tropical tuna growth, reproductive dynamics or maturity in Indonesia (or much of IO)
- Locally obtained parameters are best!
- Pressing need to initiate targeted life-history research

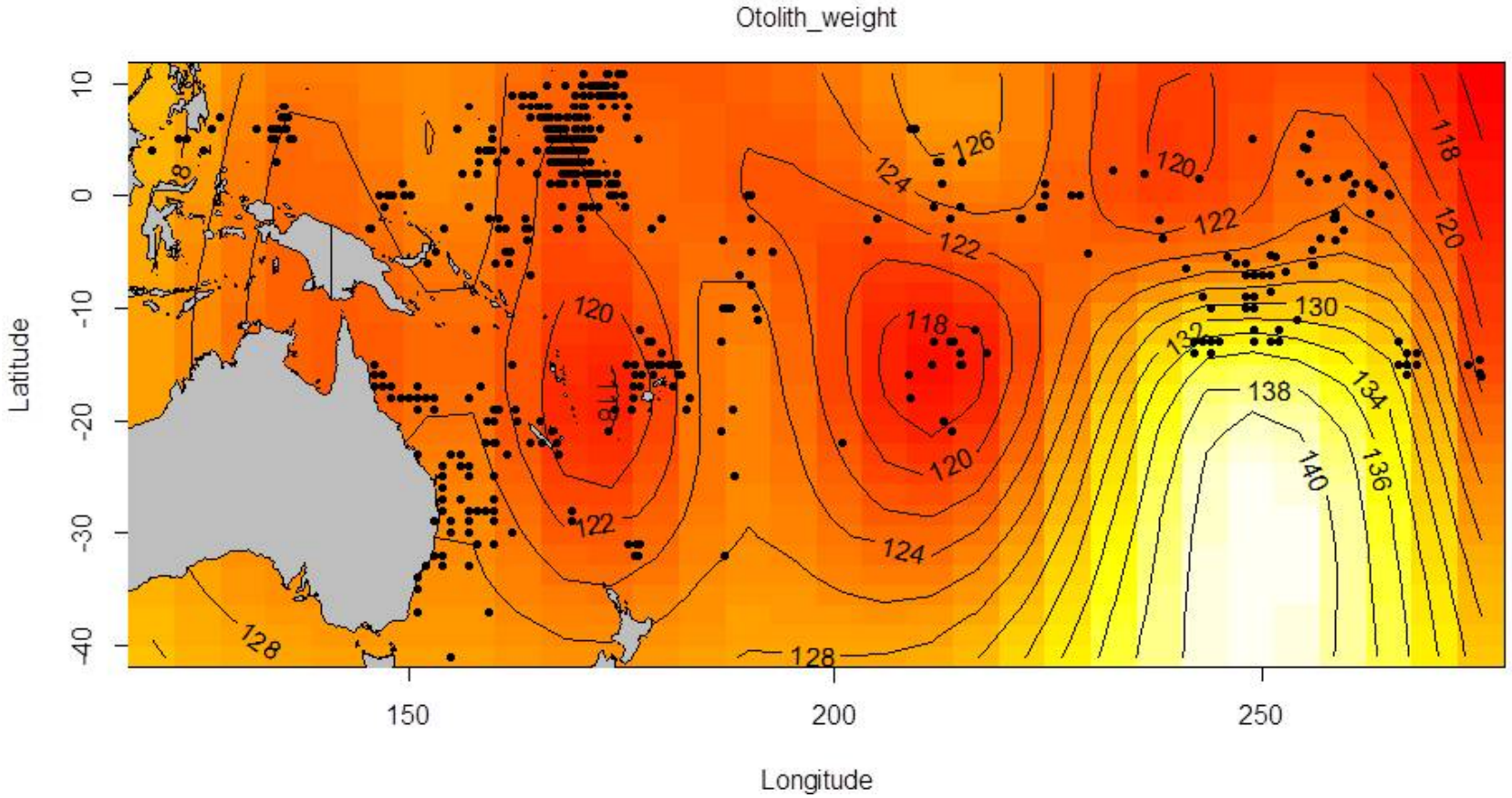
Population biology study

- Well designed sampling plan
- Standardised sampling protocols
- Sufficient samples/data across an entire population & size range
- Tissue bank?
- Trained otolith readers (consistency)
- Age validation (ongoing)
- Important to get it right!

Spatial variation in growth

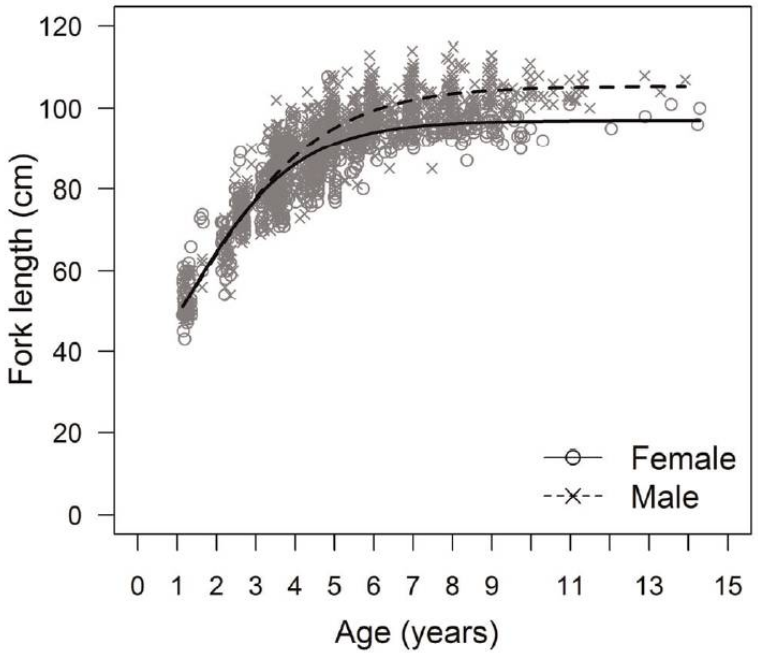


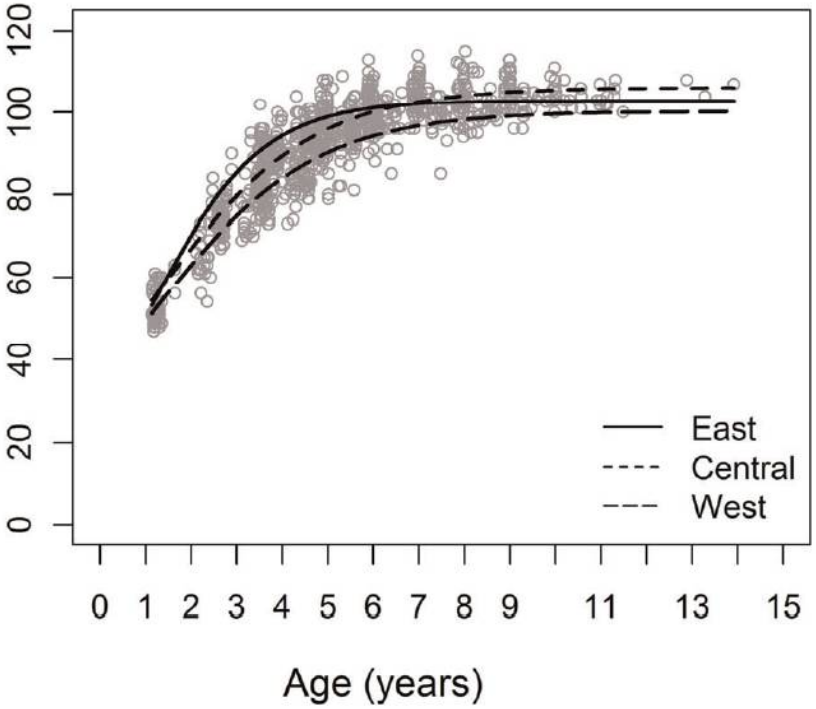
Spatial variation in growth



Sex & spatial variation in growth

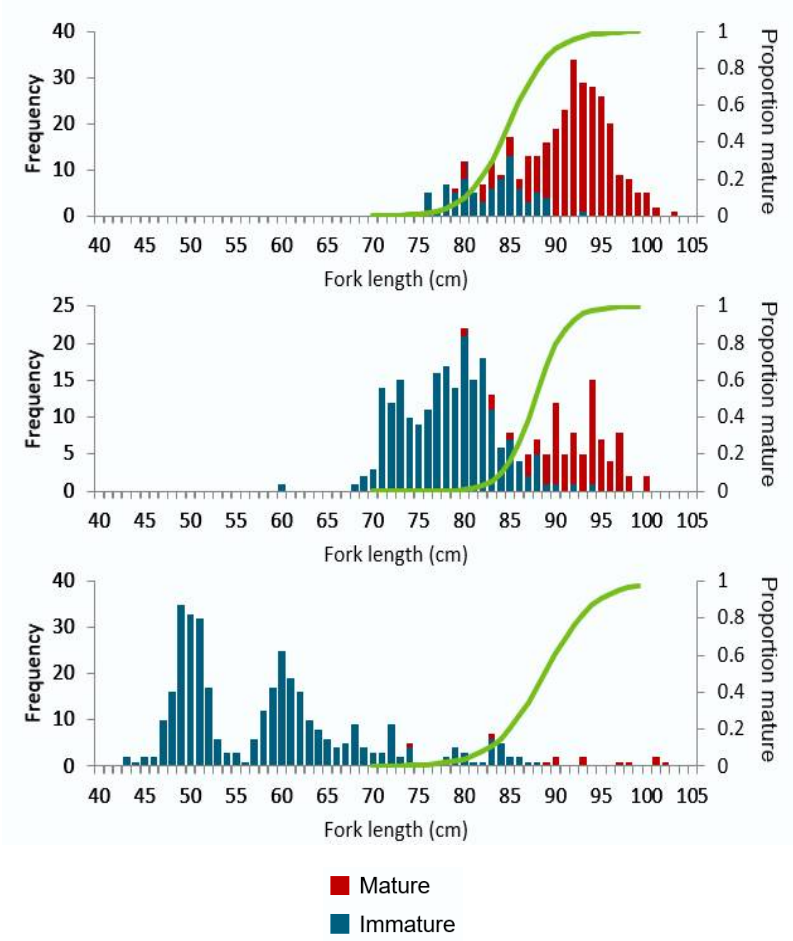
Albacore





Spatial (& temporal) variation in maturity

- Albacore
- Females in north were mature at smaller length than in south
- Need to account for spatial variation in distribution of mature & immature fish
- Single weighted maturity ogive

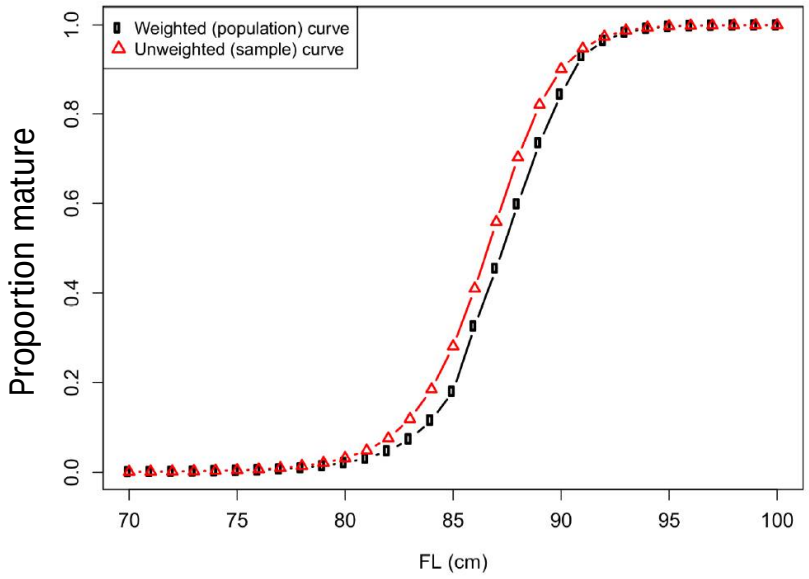


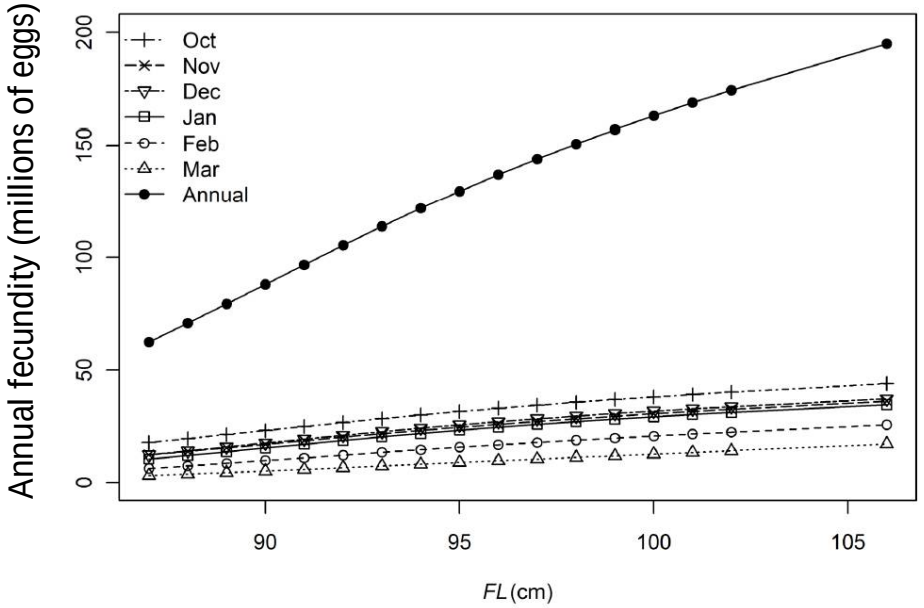
North
L_{50} = 85 cm

Central
L_{50} = 88 cm

South
L_{50} = 89 cm

Maturity and fecundity are the fundamental factors that affect population productivity





*Need to sample from below minimum size at maturity!

Research questions

- Do the fundamental growth and reproductive biology parameters of tropical tuna vary significantly among regions of Indonesia and the wider Indo-Pacific Oceans?
- What are the seasonal and inter-annual variation in the reproductive biology of tropical tuna in Indonesia?
- Can fin spines or other “hard parts” be used to accurately age skipjack tuna?

Methods

1. Develop sampling plan & protocols
2. Conduct monthly sampling (gonads and hardparts)
3. Prepare histological sections of gonads
4. Prepare hardparts for ageing
5. Provide training
6. Produce manuals and other extension materials

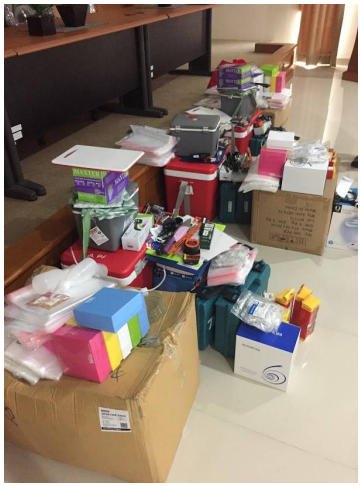
Three workshops in 2019

Sampling protocol, sampling gear and training


ACIAR Project FIS/2016/116

SAMPLING PROTOCOL
FOR POPULATION BIOLOGY STUDY

Australian Government
Australian Centre for
International Agricultural Research

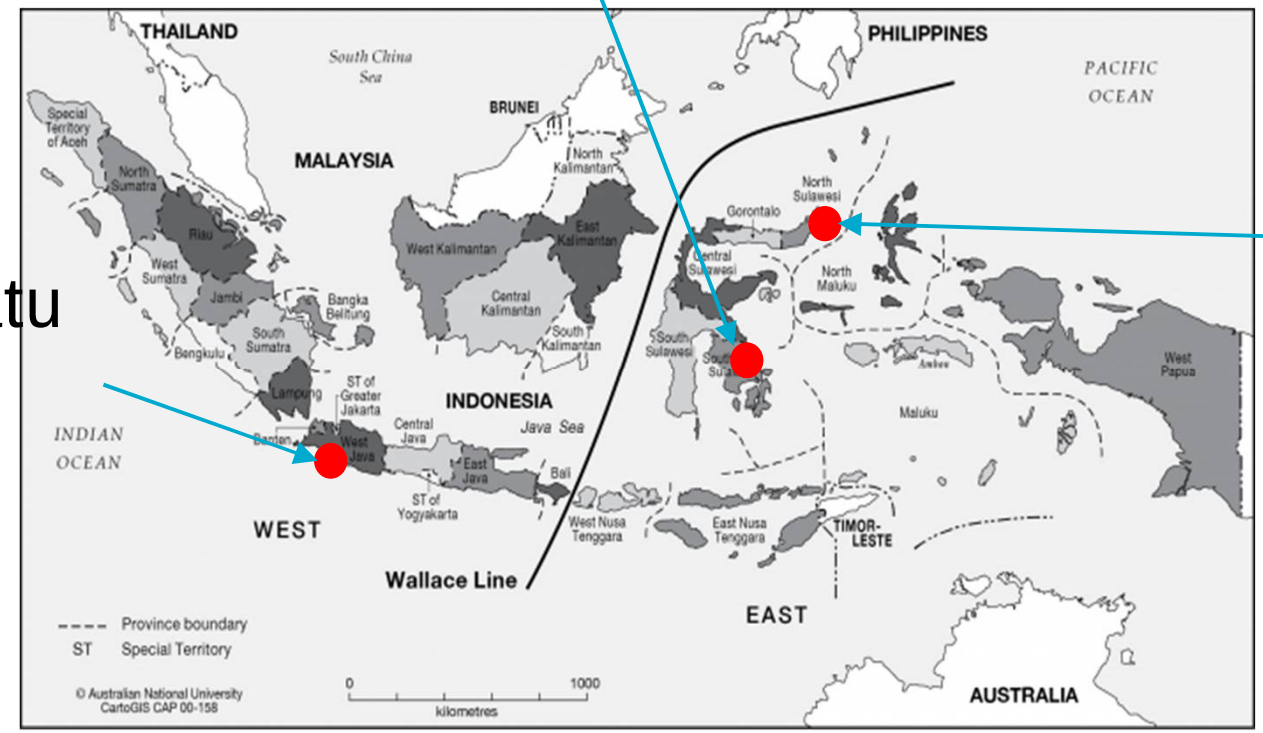


Sampling plan – 3 regions

Kendari

Palabuhanratu (Cilacap)

Bitung



Sampling goal – gonads, otoliths, spines

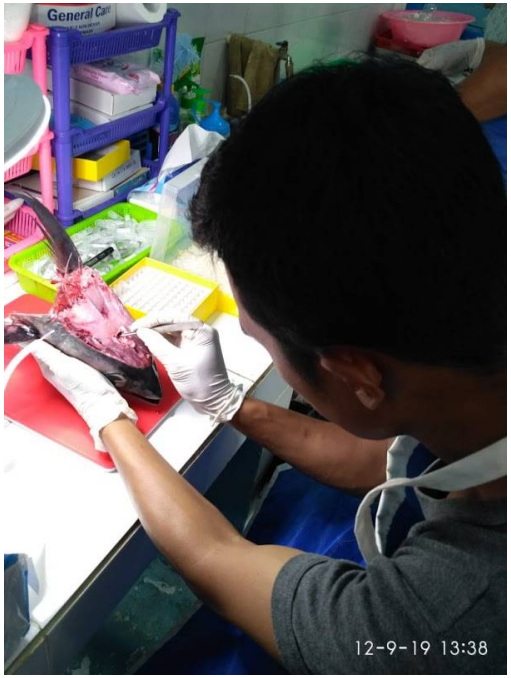
Year 1

- 100 fish sampled
  - per species
  - per month
  - per location
  - Length stratified
  - (50 male, 50 female)

Year 2

- 50 fish sampled
  - per species
  - per month
  - per location
  - Length stratified
  - (50 female)

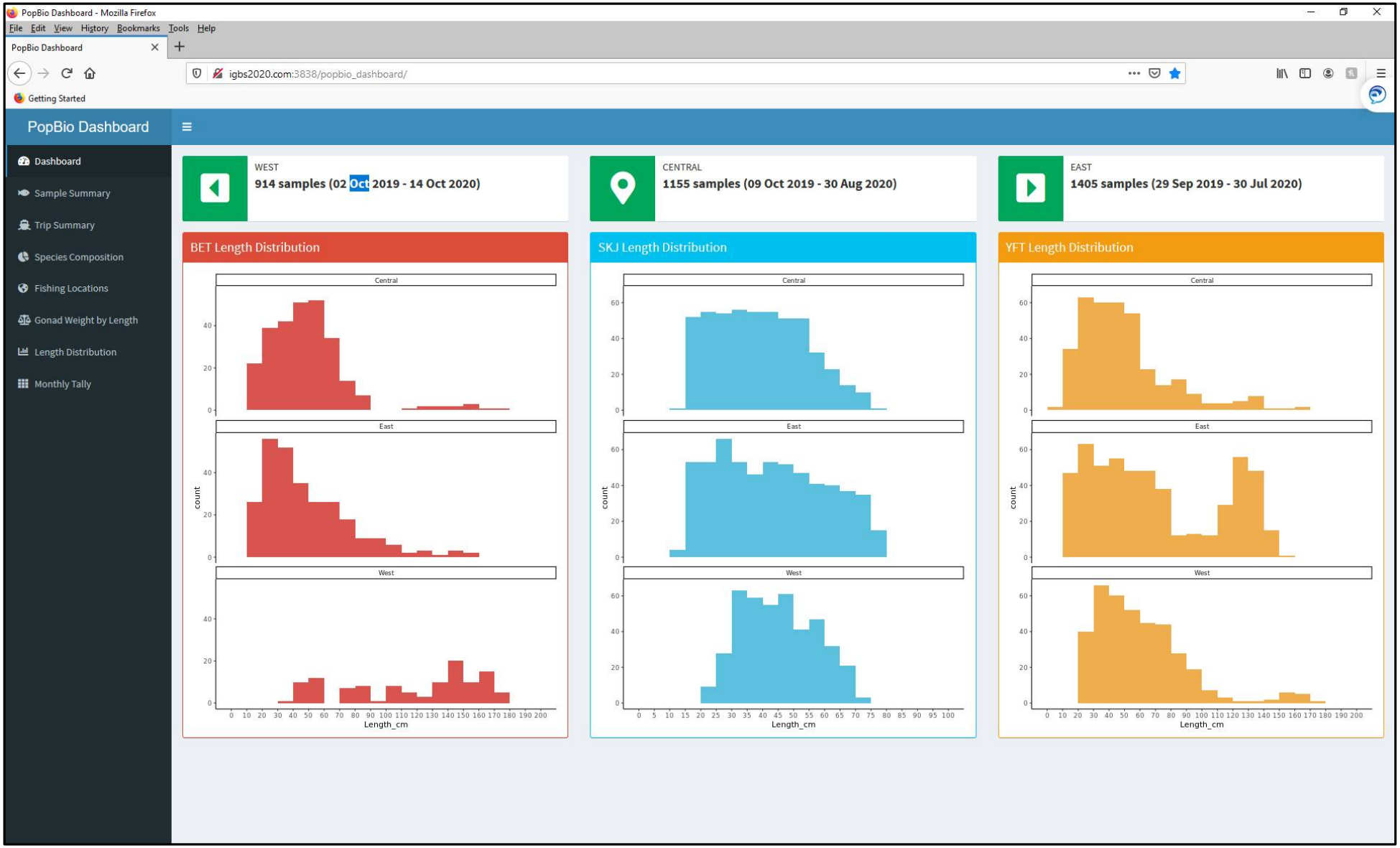
Sampling started in September 2019

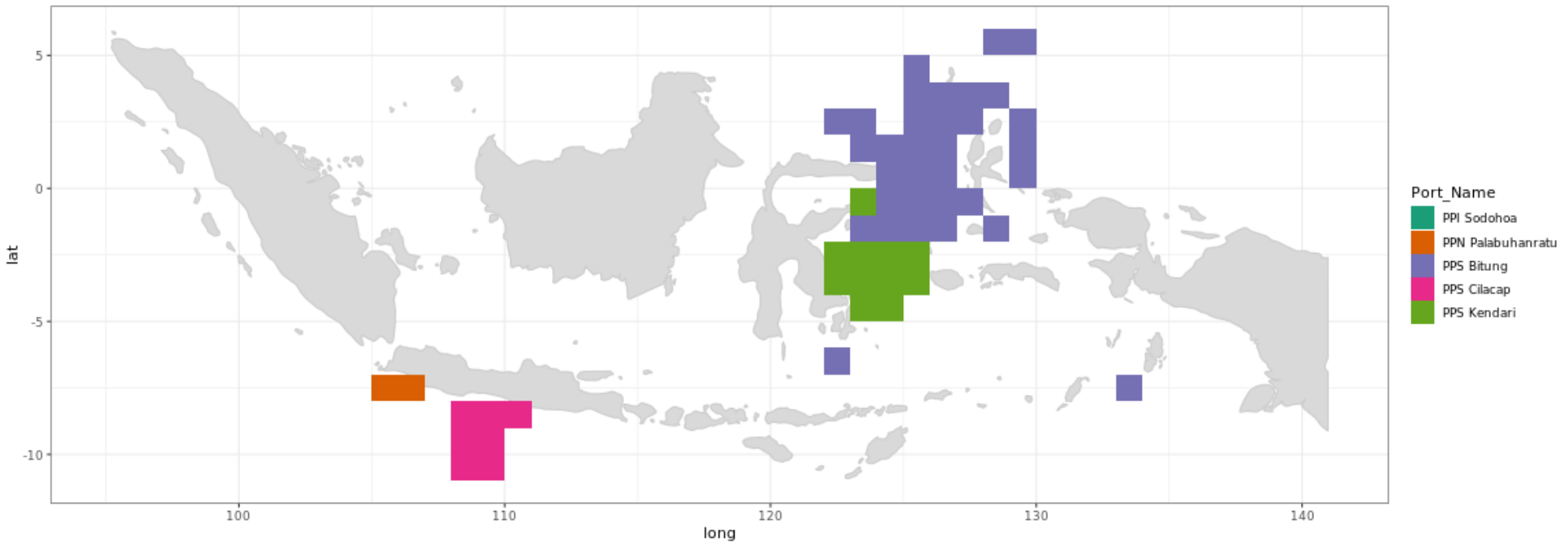

12-9-19 13:38


09:23

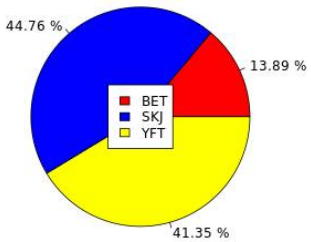

12-9-19 13:35

“PopBio Dashboard”

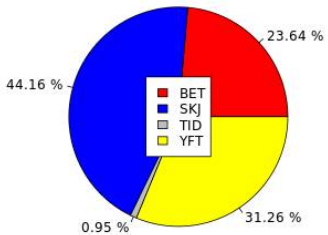




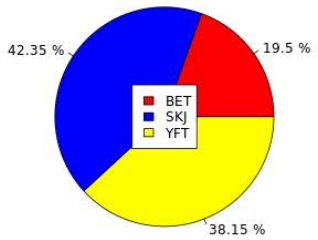
West Species Composition

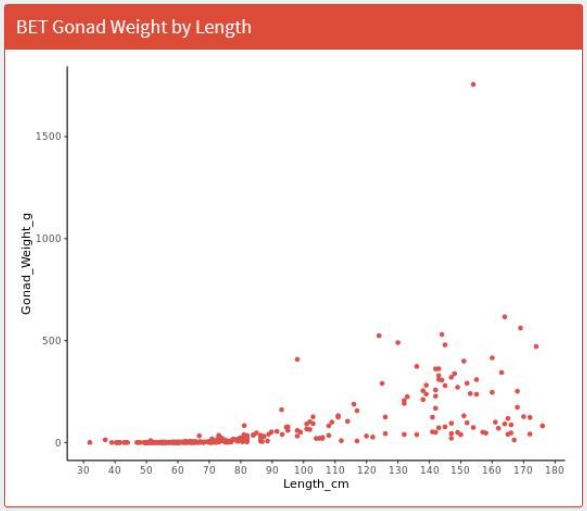


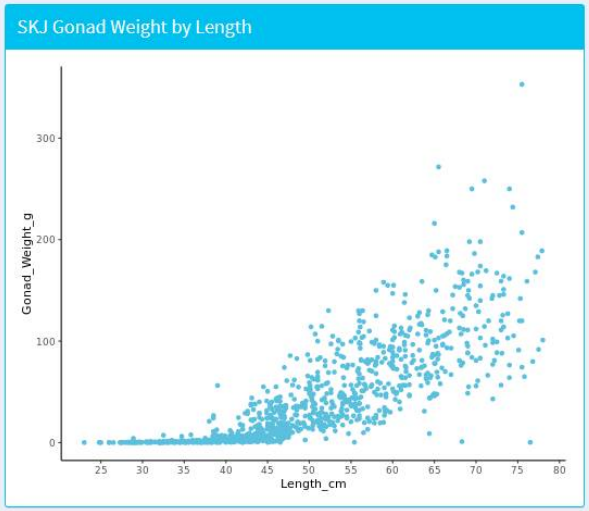
Central Species Composition

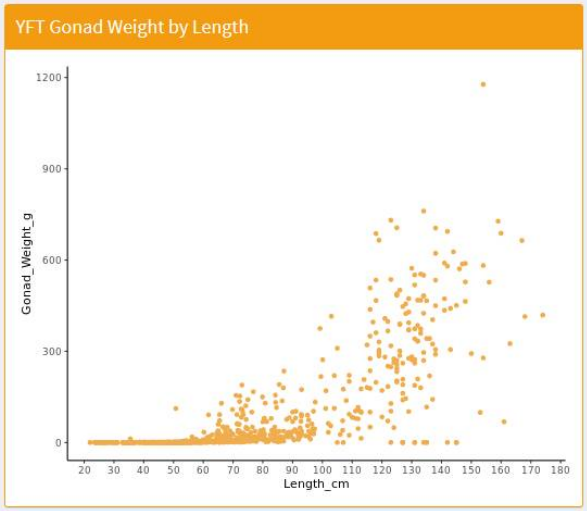


East Species Composition




BET Gonad Weight by Length
Gonad_Weight_g
Length_cm


SKJ Gonad Weight by Length
Gonad_Weight_g
Length_cm


YFT Gonad Weight by Length
Gonad_Weight_g
Length_cm

Tally by species, size, month & location

Parameters

Select Sampling Location

SITE: Kendari

Select Species

Skipjack tuna

Update Table

Table Output

kelas	2019-09	2019-10	2019-11	2019-12	2020-01	2020-02	2020-03	2020-04	2020-05	2020-06	2020-07	2020-08	2020-09	2020-10	total
-5 - 4.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 - 9.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 14.9	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
10 - 19.9	0	0	5	6	7	6	6	5	5	6	0	6	0	0	52
15 - 24.9	0	0	14	6	5	5	5	5	5	5	0	3	0	0	53
20 - 29.9	0	7	5	5	6	5	7	5	5	4	0	0	0	0	49
25 - 34.9	0	10	6	5	5	5	5	5	5	5	0	3	0	0	54
30 - 39.9	0	8	5	5	5	5	5	6	5	6	0	5	0	0	55
35 - 44.9	0	7	10	5	4	4	5	5	10	0	0	3	0	0	53
40 - 49.9	0	8	5	5	5	5	5	5	6	2	0	2	0	0	48
45 - 54.9	0	2	9	7	7	3	5	3	5	5	0	2	0	0	48
50 - 59.9	0	2	4	4	5	3	1	1	6	4	0	2	0	0	32
55 - 64.9	0	2	2	6	4	1	0	1	5	0	0	2	0	0	23
60 - 69.9	0	2	1	2	0	0	0	0	5	0	0	0	0	0	10
65 - 74.9	0	5	0	1	0	1	0	0	2	0	0	0	0	0	9
70 - 79.9	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
75 - 84.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80 - 89.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85 - 94.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CSIRO

Next steps

1. Develop sampling plan & protocols
2. Conduct monthly sampling (gonads and hardparts)
3. Prepare histological sections of gonads
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Thank you

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