Report
First workshop on stock assessments for 3 important species in Thailand

January 24-February 1, 2024

Eastern Marine Fisheries Research and Development Center (EMDEC), Rayong, Thailand

Co-organizers: [DOF], [SEAFDEC] and [MENU]

Reported by Tom Nishida (PhD) (Representative)

[MENU] Menu-driven stock assessment software developing team(Japan)

https://www.esl.co.jp/products/menu

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[MENU] is supported by Environmental Simulation Laboratory (Japan)

Apology! First names are mainly used in this report for convenience (Full names are available in Appendix A).

The venue


ศูนย์วิจัยและพัฒนาประมงทะเล ระยอง
RAYONG MARINE FISHERIES RESEARCH AND DEVELOPMENT CENTER

Contents

Acronym(1/2)

Acronyms	Meanings
ABC	Allowable Biological Catch
ASPIC	A Stock-Production Model Incorporating Covariates
ASPM	Age-Structured Production
B	Total biomass or Spawning Stock Biomass
BMSY	Total biomass or Spawning Stock Biomass at MSY
Bo or B1	Initial Biomass
BOT	Bootstrap
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CI	Confidence Interval
CPUE	Catch Per Unit Effort
DOF	Department of Fisheries, Government of Thailand
DOS	Disk Operation System
ELEFAN	Electronic Length Frequency Analysis
EMDEC	Eastern Marine Fisheries Research and Development Center (DOF)
EST	Estimated
F	Fishing mortality
FAD	Fish Aggregating Device (PS)
FAO	Food and Agriculture Organization
FiSAT	FAO-ICLARM Stock Assessment Tools
FIT	To estimate (ASPIC)
F_{MSY}	Fishing mortality at MSY
GPS	Global Positioning System
HCR	Harvest Control Rule
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IOTC	Indian Ocean Tuna Commission
IT	Information Technology
JABBA	Just Another Bayesian Biomass Assessment
K	Carrying Capacity
LBSPR	Length-Based Spawning Potential Ratio
LRP	Limit Reference Point
MPA	Marine Protected Area
MSC	Monitoring, Control and Surveillance
MSY	Maximum Sustainable Yield
NAFO	Northwest Atlantic Fisheries Organization
NG	No Good

Acronym(2/2)

Acronyms	Meanings
OBS	Observed
ODA	Official Development Assistance
OK	All Correct or OKay
PM	Production Model
PT	Pella and Tomlinson
QC	Quality Control
r	Intrinsic population growth rate or Recruitment
R	R programming language
RFMO	Regional Fisheries Management Organization
RMS	Root Mean Square (Error)
RP	Reference Point
S/R (SPR)	Spawning Per Recruitment
SA	Stock assessment
SB or SSB	Spawning Biomass or Spawning Stock Biomass
SB_{MSY} or SSB_{MSY}	Spawning Biomass or Spawning Stock Biomass at MSY
SC	Species Composition
SCAA	Statistical Catch At Age
SCAS	Statistical Catch At Size
SEAFDEC	Southeast Asian Fisheries Development Center
SEAFO	South East Atlantic Fisheries Organization
SIOFA	Southern Indian Ocean Fisheries Agreement
SM	Short mackerel
SRA	Stock Reduction Analysis (catch only SA)
SS3	Stock Synthesis 3
STD	Standardized (CPUE)
SWO	Swordfish
TB	Total Biomass, Threadfin Breams or Thompson & Bell Model
TB_{MSY}	Total Biomass at MSY
TPS	Thai Purse Seine
TRP	Target Reference Point
UNEP	United Nations Environment Programme
VMS	Vessel Monitoring System
VPA	Virtual Population Analysis
WG	Working Group
WS	Workshop
Y/R (YPR)	Yield Per Recruitment

Acknowledgments

Participants

Coordinator

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WS helpers (EMDEC)

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Rayong inland fisheries research & development center

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Short mackerel WG members

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Nipa Kulanujaree

Weerapol Thitipongtrakul

Demersal fish WG members

Sichon Hoimuk

Weerapol Thitipongtrakul

Carp WG members

Nipa Kulanujaree

Wiparat Thong-ngok

Kajitpan Jarernnate

Interpreters to Thai languages

Weerapol Thitipongtrakul

Nipa Kulanujaree

Supapong Pattarapongpan (technical)

Abstract (1/2)

- It is noted that Production Model (ASPIC & JABBA) are the primary SA models for [MENU] to conduct training & collaborative works.
- 3 newly developed Manager (all-in-one type) series of Menu driven software were introduced and practiced, i.e. CPUE_Manager, ASPIC_Manager & Kobe I+II Manager.
- WGs for 3 important species group in Thailand were established in the preparatory meeting in June, 2023, i.e. Short Mackerel WG, demersal fish WG & Carp WG. For demersal WG, threadfin breams & for Carp WG, Nile tilapia were selected as case study, demo and practices.

Abstract (2/2)

- The ASPIC results (3 species) will not be used for any advices due to the problems identified for each species. Future assessments will be improved by mitigating these problems.
- During 2024-2025, SA with additional 1or 2 important species in each WG will be conducted by ASPIC & JABBA.
- The next WS will be in 2025 & additional new JABBA_Manager will be introduced, practiced & applied for working species in each WG.

Software Copyrights & Rules

- [MENU] software are @ copyright & all reserved by [MENU].
- Participants may use software for their own practices & private works [No problems].
- In such case, it is suggested to work with [MENU] to avoid misuse, mistakes... to confirm your works are OK [Optional].
- But if participants conduct official works (reports, publication..) using software, participants must work with [MENU] as [MENU] is responsible for such works [Mandatory].
- Please don't give copies to others [Mandatory].

2. Objectives (with supplementary information)

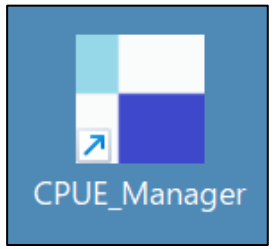
(1) To learn & practice 3 newly developed menu driven software.
(CPUE_Manager, ASPIC_Manager & KOBE I+II Manager）
(Note : "Manger" means one system, all-in-one or suit including all necessary applications)

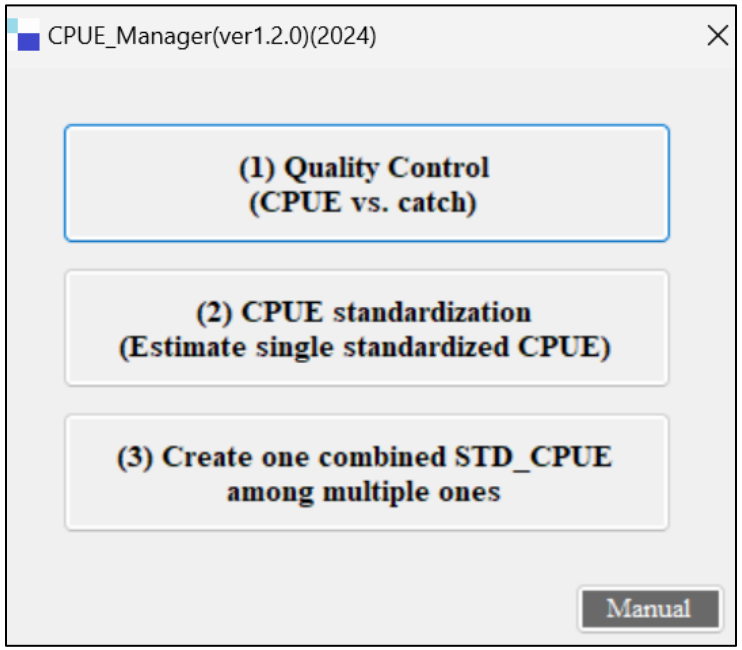
(2) To introduce CPUE analyses, ASPIC, Kobe I+II for 3 important species
(Short mackerel, threadfin breams & Nile tilapia)
using 3 software as trials, demo & practice.

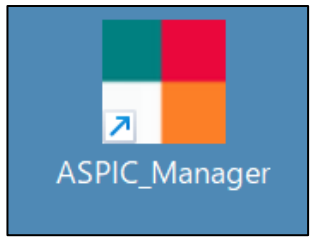
(3) To discuss problems, methods, results & management for these 3 species.

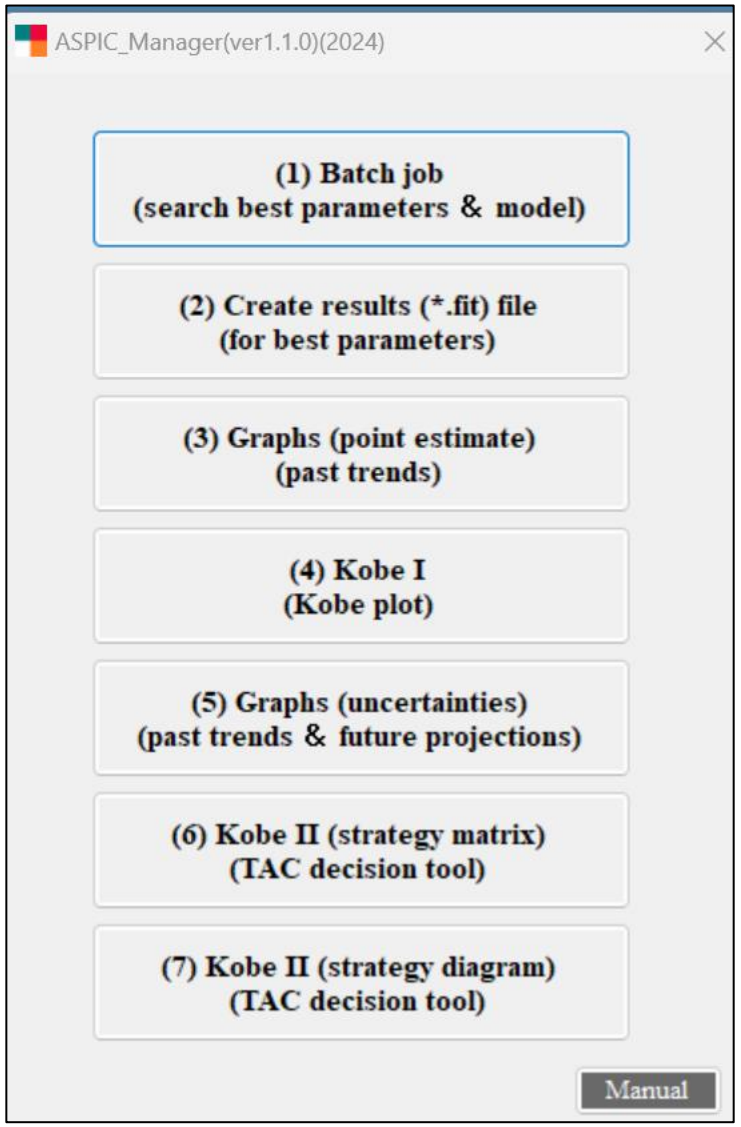
(4) To discuss future works.

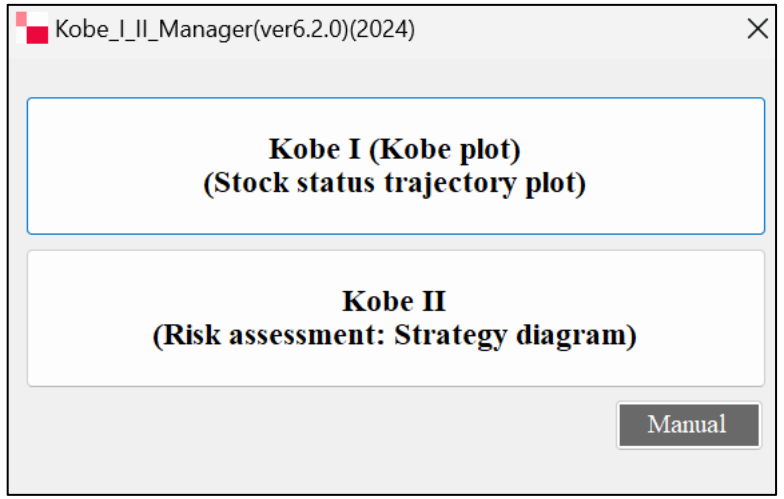
3 newly developed Menu-driven software Manager (all-in-one) series (icons & main menus)

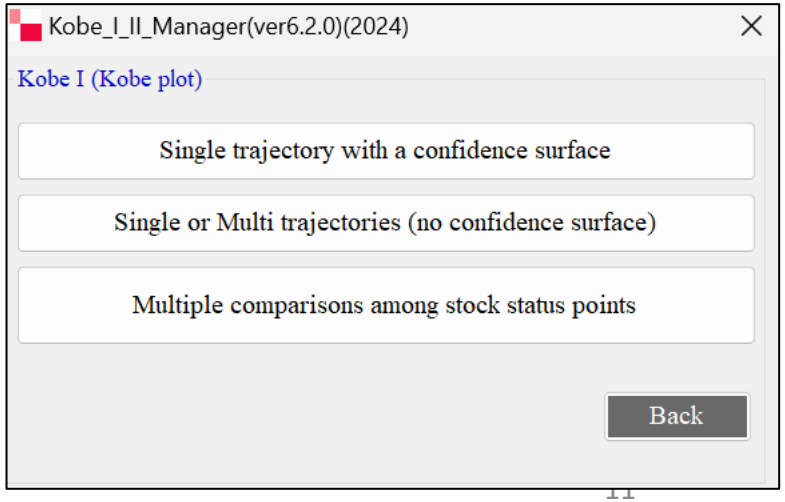




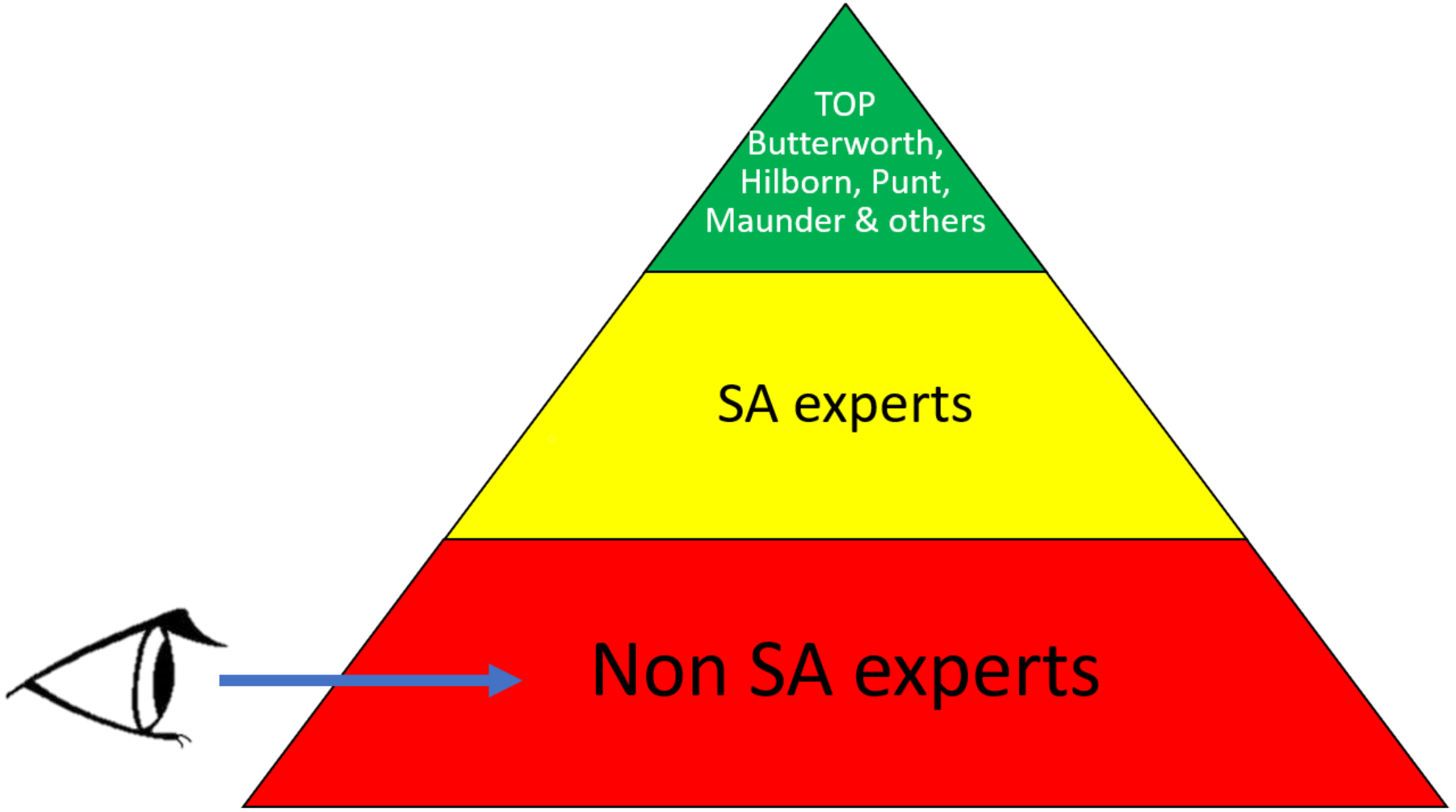








Target ➔ Beginners ➔non SA (Stock Assessment) scientists



WS communications
(language, interpretations & technical words)

- WS was conducted in English using more casual words, less mathematical notations & less complicated technical terms because participants are SA beginners & also non-native English speakers.
- To make sure for participants to understand well, consecutive interpretations by Thai language were carried by Weerapol & Nipa (general) and Supapong (technical) (thanks for all).
- For participants to understand well, PowerPoints (large fonts) were mainly used, which were distributed in advance.

3. Background information

3 types of stock assessment models (Nishida, 2024)

	Data type	Information	Data period	Reference Point (RP) (MSY, Fmsy, Tbmsy, target & limit RP)	Models & Application (examples)	Implementation (R, own code, package) (example)
TYPE 1	Qualitative	Parameters			● ERA (Ecosystem Risk Assessment) ● PSA (Productivity Susceptibility Analysis)	✓ R ✓ Package
TYPE 2	Quantitative	✓ Real data ✓ Parameters ✓ Priors for Bayesian approach	Short term (a few years)	Temporal & Subjective	● Length based models (ELEFAN, FiSAT, Y/R, S/R, LBSPR, Thompson & Bell) ● SRA (Stock Reduction Analysis) (Longer term catch also can be applied)	✓ R (Y/R, S/R) ✓ Packages (FAO)
TYPE 3			Long term (> 10 years)	Realistic & Objective (important for management)	● Production models (ASPIC & JABBA) ● Age (size) structured model (VPA, ASPM, SCAA, SCAS) ● Integrated models (SS, CASAL)	✓ Own codes (SS) ✓ R (JABBA) ✓ Package (MENU: ASPIC_Manager)

3. Background information

- This WS (training) is for a single species specific SA using 3 software, CPUE_Manager, ASPIC_Manager & Kobe I+II Manager.
- This WS (training) is for PM (TYPE 3) (ASPIC & JABBA) (see the previous slide).
- TYPE 3 SA uses a longer term data (> 10 years), which provides more plausible stock status, Target & Limit Reference Point….
- On the other hand, Type 2 SA is based on a short term data (a few years) thus provide snap shot (current, temporal & relevant) stock statuses.

Why [MENU]'s primary SA is PM (ASPIC & JABBA)?

- As length based SA (FiSAT, ELEFAN, Y/R, S/R, LBSPR, TB model…) using a short period of the data, there are packages from FAO and others.
- In addition, their R based trainings have been implemented by FAO, SEAFDEC and others.
- Thus, those who are interested in such application, they can utilize the packages and trainings.
- Under such circumstances, [MENU] has been focusing PM for 20 years since 2005 when its original training started for King Mackerel using ASPIC in Trinidad & Tobago (Caribbean Sea) and will continue to do so.
- [MENU] uses ASPIC (most popular PM) & JABBA (the best PM) (next slide)

Evolution of PM (Production Model)

Evolution	Type	Primnary author	Features				Comments
			Equilibrium Condition (EC) (death=increase) (un-reaistic)	Error type		Bayesian (better) Approach	
				Observation (data) error	Process (model) error		
old	Original PM	Shaeffer(1954), PT(1969) & Fox (1970)	YES				Classical (Not recommended to use due to EC)
	ASPIC (Ver5.05)	Prager (2004)	NO				Basic, standard & commonly used among RFMOs & fishing countries
	ASPIC (ver7.5)	Prager (2017)					
new	JABBA (Just Another Bayesian Biomass Assessment)	Winker (2018)					Best but high standard (slowly expanding) Recommended

(Note) PT: Pella and Tomlinson

3. Important note

How single species specific [MENU] ASPIC results can be utilized for Multi-species & Multi-gear fisheries Management (MMM)?

- ASPIC is for single species specific stock assessment.
- Single species specific ASPIC results (stock status & TAC), should be used as just reference for MMM.
- This is because a single species TAC cannot be used directly for MMM as stock statuses are different among multi-species.
- MMM should be implemented by mangers considering relevant factors together, i.e., stock statuses (all species), singles species specific TAC, socio-economics (effort allocation by gear, boat & fishing ground for fishers), MPA to conserve ecology (migration, habitat, life cycles..) & others.

Summary of discussion and future work by species WG

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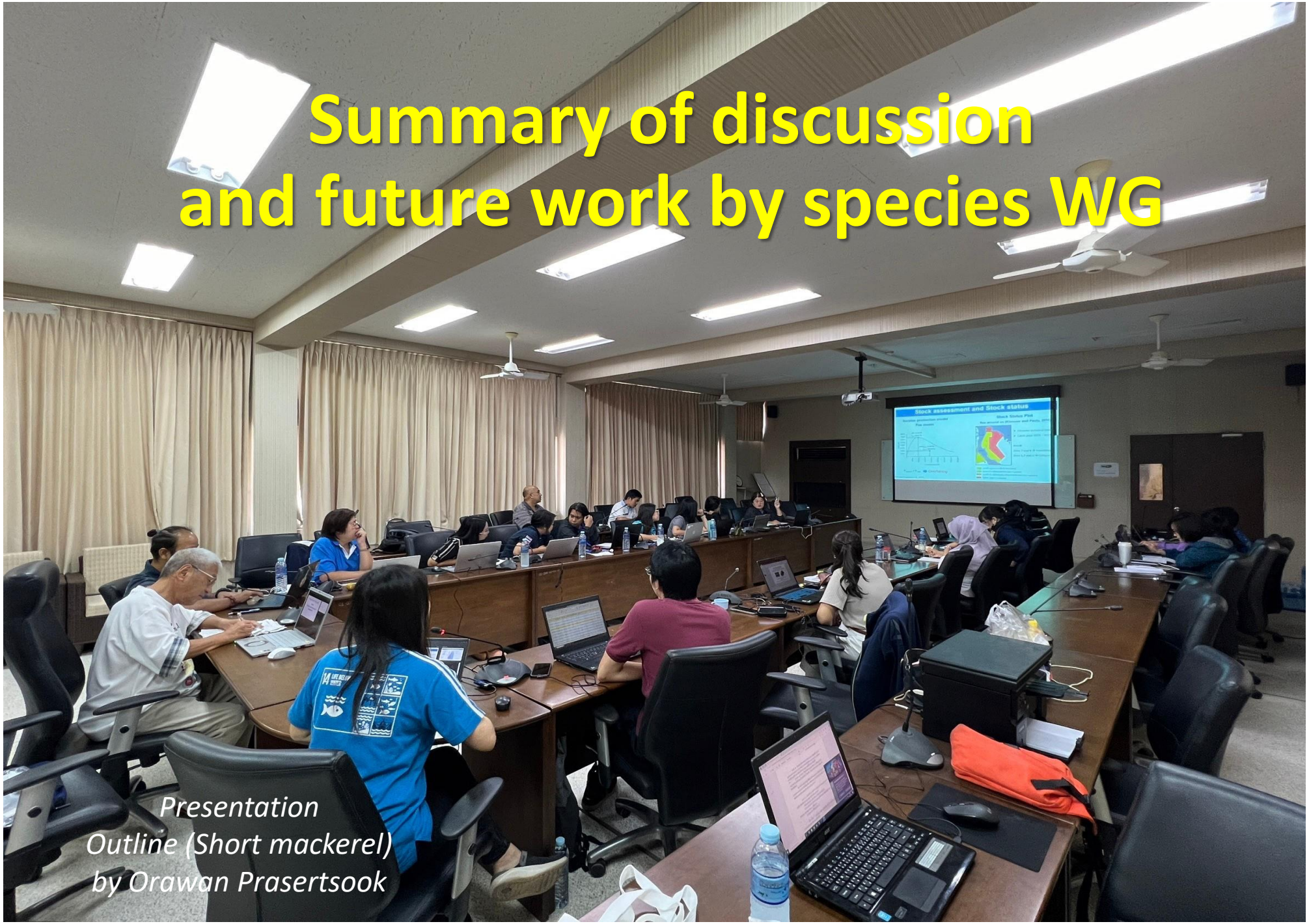
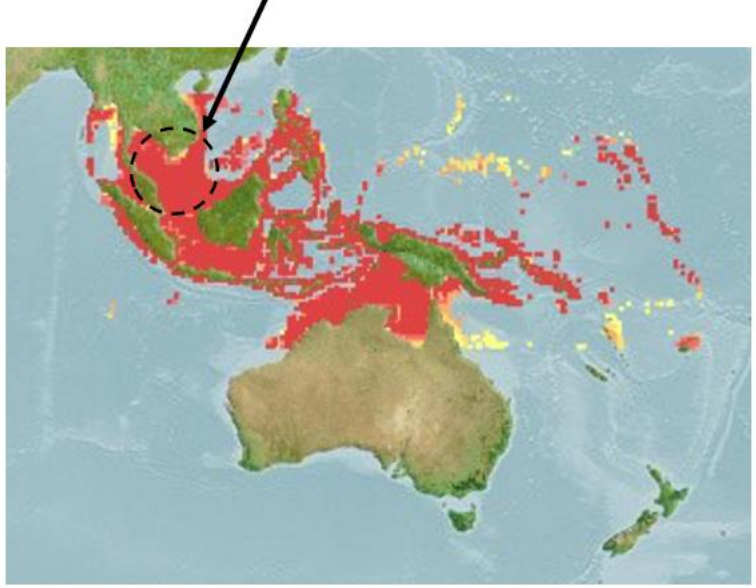


Presentation Outline (Short mackerel) by Orawan Prasertsook

Short mackerel WG

Discussion

Discussion : Stock structure



Genetic study
➔ may be difficult (as we need corporation from neighboring countries)

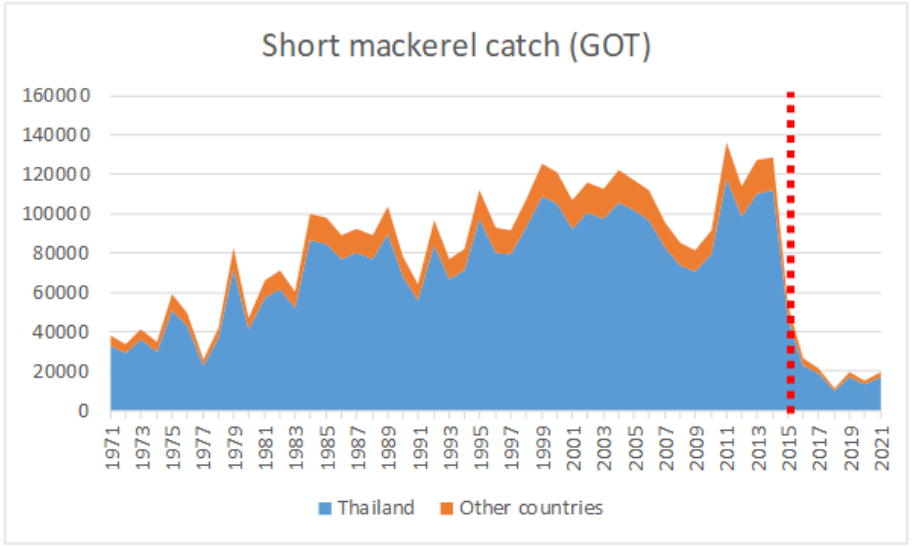
GOT is OK because the majority catch in the assumed stock around the GOT area is covered.
Less priority ?

2015 sharp catch drop affect SA

Due to new regulations (MPA & others)

➔ Catch significantly dropped from 2015

➔ q (catchability) ➔ heterogenous (before & after 2015)



2 approaches to overcome this problem (ASPIC & JABBA)

(1) SA incorporating 2 different q (fleets) using all data.

(2) SA using data only after 2015 ➔ need to wait for a few more years as we need at least 10 years of catch/CPUE data.

Consideration of TAC by Harvest Control Rule (HCR) or Allowable Biological Catch(ABC)

Currently No reliable TAC as SA cannot be implemented due to the problem of the 2015 sharp catch drop.

HCR or ABC are the plausible solution until reliable SA are available

(see example ➔ next slide)

HCR/ABC

TAC decision method for data limit and/or no SA results available situation (precautionary approach)

Available data	Source	Method	application (example)
CATCH	ICES	Ave Catch	SEAFO
CATCH CPUE	Butterworth	Ave CPUE slope	NAFO+CCSBT +SEAFO
	ABC		Japan

Example : Comparison of SM TAC (2022) (tons) by HCR

<table>
<tr><th colspan="3">HCR</th><th>Catch (2021)</th><th>TAC (2022)</th><th>Note</th></tr>
<tr><td rowspan="2">ICES (catch)</td><td rowspan="2">precautionary coefficient</td><td>0.7</td><td rowspan="3">19,598</td><td>13,718</td><td rowspan="2">more conservative</td></tr>
<tr><td>0.8</td><td>15,678</td></tr>
<tr><td colspan="3">Butterworth
(catch & CPUE)</td><td>18,618</td><td>less conservative due to CPUE trend (good for fisher)</td></tr>
<tr><td colspan="6">For details on methods,
please refer to the PowerPoint distributed in the Short mackerel WG.</td></tr>
</table>

Note : HCR (Butterworth) is more realistic & plausible as more information (catch & CPUE) are incorporated, especially CPUE slope is the key information for TAC.

Discussion

Data collection (sampling) for migration patterns
Cover the life cycle ➔ Need update

May be difficult (budget, Man power & Time)
(same situation as tagging project in the past
➔ recovery very short time➔ No good results)

DOF needs to discuss further

Discussion
Develop Quota System by boat

Good idea ➔ complicated & sensitive for Fishers
DOF needs to monitor
➔ Daily catch report (need Budgets, Time & manpower)
Need feasibility study (important) ➔ Other countries?

[MENU] can cooperate..
Need to discuss with DOF (in the long time base works)
➔ meeting with stake holders, design, field trips…..

Discussion

Fisheries management after open season

DOF➔ Right avenue to cover because DOF has long time accumulate knowledge & experiences (knows details)

[MENU] can cooperate..

➔ Need to discuss with DOF (long term works)

(meeting with stake holders, design, field trips)

Discussion
Multi gear & Multi species managements

DOF➔ Right avenue to cover
because DOF has long time accumulate knowledge & experiences (knows details) & already implementing.

[MENU] can cooperate (see next slide)

How single species specific [MENU] ASPIC can be utilized for Multi-species & Multi-gear fisheries Management (MMM)?

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Discussion
SA methods for short life span spp. (squid 1 year, SM a few years)

Theoretically yearly based PM NOT appropriate as "recruitment dynamics" is not well reflected.

➔Need Quarterly based PM (difficult)

➔Length based SA (Length cohort analysis)

or other approaches ?

Nonetheless RFMO use yearly based PM (may be OK)

Question

UNEP (Fish refugia project) affect SM?

Minor as MPA is a small area

Short mackerel WG

Future work

Orawan + Weerapol + Nipa + Nishida
(assisted by DOF scientists + Supapong)

Future work (2024-2025)

(1) DOF to consider TAC by [HCR/ABC] (until SA is available)

(2) JABBA (2025) (Training) (incorporating 2 q before/after 2015)

(3) Publication (current situation discussed in WS)

SEAFDEC (Fish for the People) [DOF] + [MENU] + [SEAFDEC]

(4) Investigation on CPUE/Catch data (2 points) (see next slide)

(5) SA model (short life span)(Supapong) (optional)

Communication (e-mail, on-line or visit)

Future works : CPUE/Catch data

(1) Use SM specific CPUE/Catch ➔ Mixed species CPUE/Catch ➔ NG
we need to estimate SM specific CPUE/Catch using species compositions.

(2) Investigate 3PS combined CPUE (TPS, FAD, LPS) if OK to use.

(3) 2 different CPUE (fleet) needs to be investigated before & after 2015.
➔Need to re-evaluate 2 fleets (q) based CPUE.

Future works : Tasks for DOF
[MENU] can cooperate.

- Life cycle sampling (migration patterns)
- Individual Vessel Quota system
- Stock structure(genetic)
- Fisheries management after open season
- Multi gear & multi species fisheries managements
- Stock structure (genetic study)

Demersal fish WG Discussion

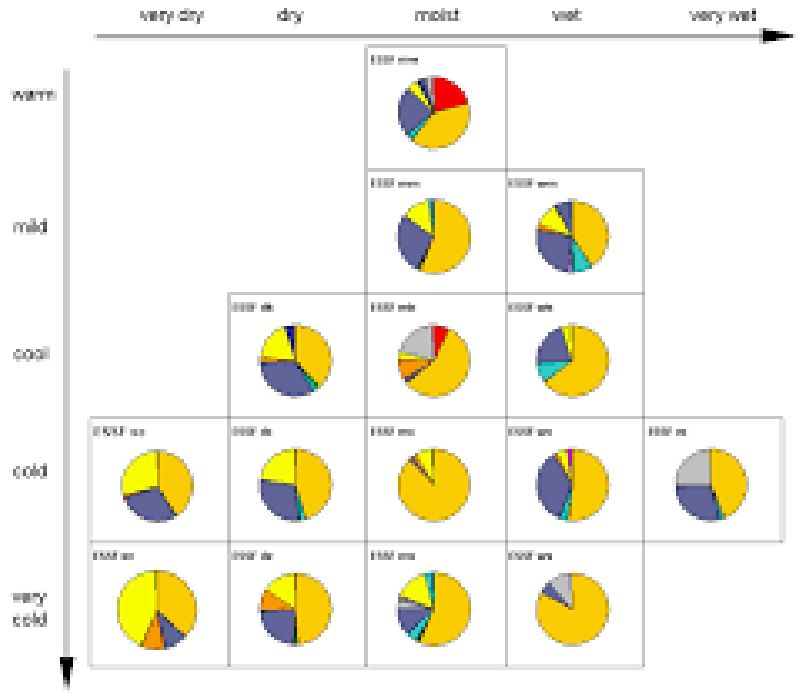
Discussion SA by species

- Threadfin breams (GOT) ➔ 8 species combined
- SA by species ➔ more plausible & important
- Separate catch by species using Species Composition (SC)

  ➔ Survey data (2003-2023) make it possible (future work)

Discussion
Species Composition (SC) (types)(best➔ worst)

(1) BEST ➔ By Year, Season (Q) & Area (GOT 1-5)
(2) 2nd BEST ➔ ROUGH (no annual) (like 10 years Ave) by Season (Q) & Area (GOT 1-5)
(3) 3rd BEST by Season (Q) (all area) or Area (GOT 1-5) (all season)
(3) NG but better than nothing just one SC (year, season and area combined)



Discussion

Catch data collection method

➔Need to understand the method change (past)

➔Evaluate if they are consistence

➔If no, need to re-estimate catch.

Big job ! May be difficult ?

Discussion
Multi gear & Multi species managements

DOF➔ Right avenue to cover
as DOF has long time accumulate knowledge & experiences (details) & already implementing

[MENU] can cooperate (see next slide)

How single species specific [MENU] ASPIC results can be utilized for Multi-species & Multi-gear fisheries Management (MMM)?

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Discussion : Current measures
(well organize by DOF)

- **Effort control (Limit boat & days)**
- **MSC scheme (VMS, logbook & others)**
- **Technical measures (mesh size & MPA)**

Discussion MPA

- UNEP Refugia project affect demersal fisheries ?

➔ No as MPA is small area.

Discussion

Evaluate CPUE by species considering 3 different q in 3 different period (future works)

Discussion r
intrinsic population growth rate

r will be estimated by species using PM (ASPIC & JABBA)
by setting plausible scenarios.

A few plausible scenarios will be set up
based on ranges of r from FISHBASE and/or other sources

Demersal fish WG
Future work
Weerapol + Nishida (assisted by DOF scientists + Supapong)

Future work

- We will work 1-2 most important species each for Threadfin breams & Lizardfish after catch by species are estimated by species composition.
- Estimate CPUE/catch by species using species compositions(SC) using survey data.

  ➔ Make a report how to estimate SC

  then submit to SEAFDEC (Fish for the People) (2024)
- Estimate 3 different q by 3 different periods.

Future work

- ASPIC/JABBA incorporating 3 q (2025).
- JABBA training (2025)
- Comparison between commercial & research CPUE
  ➔ by species
- Publication (2025) (after we get good results)

Future work (Weerapol) (optional) (difficult)

- Catch data collection & estimation method

➔Need to understand the method by period in the past.

➔Evaluate if they are consistent.

➔If no, need to re-estimate catch (may be difficult)

Future works (DOF)

MEMU can cooperate…

- Update biological parameters

  (focus on important species/indicator species)

- Less important : Conduct a study to determine stock structure (genetic analyses) /movement (tagging) (need $$$ and man power & time)

Carp WG
(Discussion)

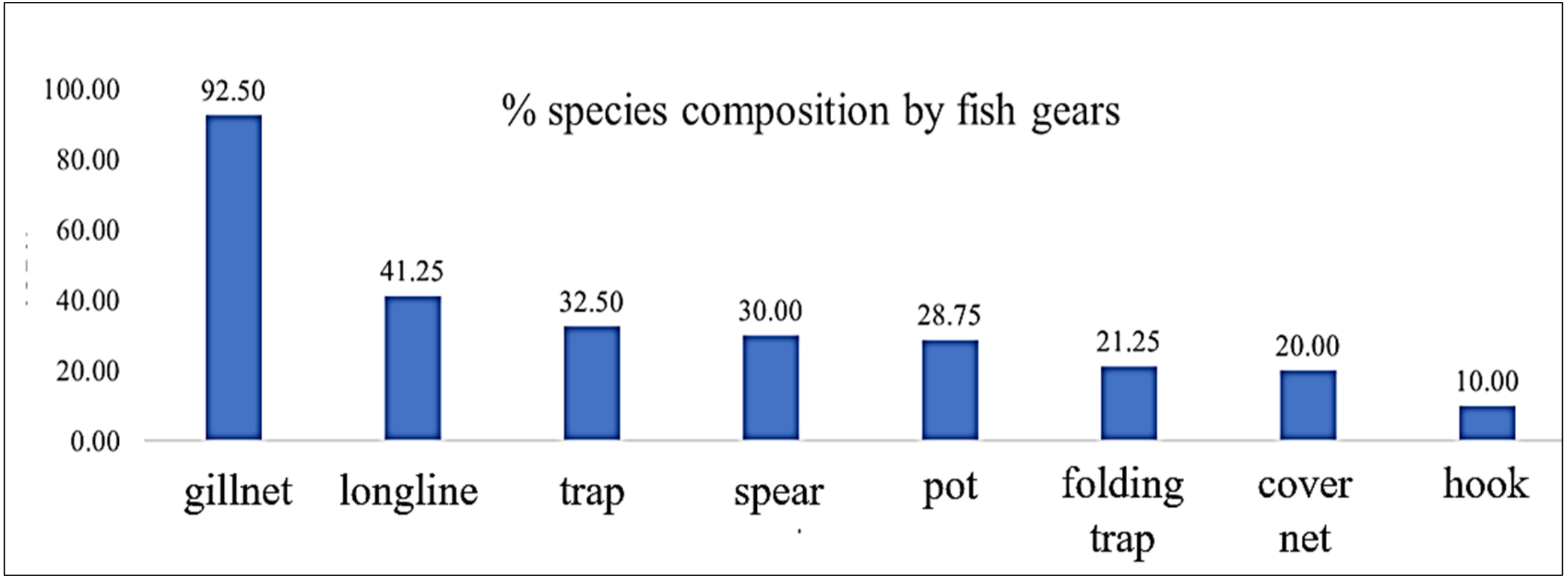
Carp WG (Discussion)

Field trip to observe landing activities (Prasae reservoir, Rayong) (Jan 23, 2024)

We consider 5 most important species each in 2 most important reservoirs. Among them, we select the most unsafe stock (*Oreochromis niloticus*, Nile tilapia) (Ubonrat reservoir) as a case study.

	Ubonrat reservoir		Pasak jolasid reservoir	
species	2021	2022	2021	2022
	stock status	stock status	stock status	stock status
Henicorhynchus siamensis	not overfishing	not overfishing	not overfishing	not overfishing
Puntioplites proctozysron	not overfishing	overfishing	not overfishing	overfishing
Oreochromis niloticus	overfishing	overfishing		
Clupeichthys aesarnensis	not overfishing	not overfishing		
Barbonymus gonionotus	not overfishing	not overfishing		
Barbonymus gonionotus			not overfishing	not overfishing
Hemibagrus filamentus			not overfishing	overfishing
Notopterus notopterus			not overfishing	not overfishing

Gear types


% species composition by fish gears
100.00
80.00
60.00
40.00
20.00
0.00
92.50
41.25
32.50
30.00
28.75
21.25
20.00
10.00
gillnet
longline
trap
spear
pot
folding trap
cover net
hook

Global CPUE data (Survey)

Consider to use all CPUE

(90 samples/night)

(expanded data from limited DOF non-0 catch data)

including 0 catch → real abundance

DOF uses CPUE only with non-zero (0) catch

(a few samples/night in 90 samples) → Bias

CPUE standardization

Standardize nominal CPUE
（CPUE_Manager ）

Even for a simple model

(even just year ➔OK)

Catch (2016)

- Investigate any affect to catch data before & after 2016, when the collection system has changed (may be difficult).
- If found and if possible, revise the catch data

➔May be difficult.

If we use the same catch for ASPIC/JABBA & make a paper, state this problem & results with caution.

Sampling (catch & size)

One survey sampling per trip (Q)

➔ Not enough

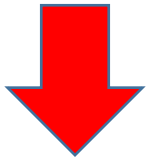
➔ideal to increase sampling per Month (4➔12)
($$$ if possible) (also for size)

However, CPUE trends seems to be OK.

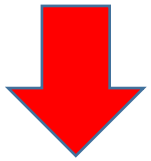
➔ Need to evaluate using available CPUE

CPUE + Size (survey)

Now 1 time/Trip (Q)



Need more (1 time/month)



Can we do for 2 reservoirs?

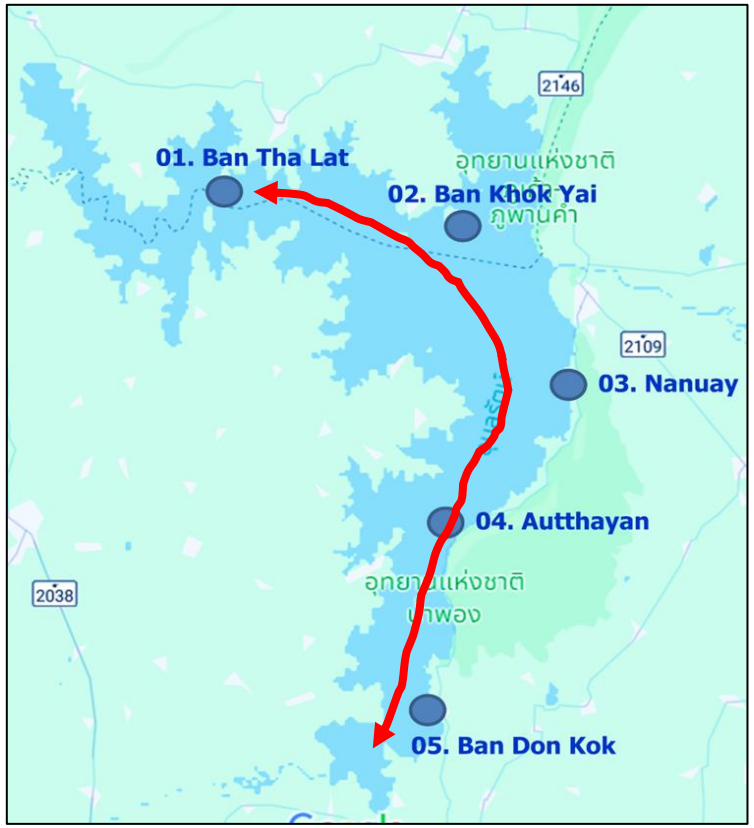
(if budgets are available)

Sampling sites seems OK (5 points)

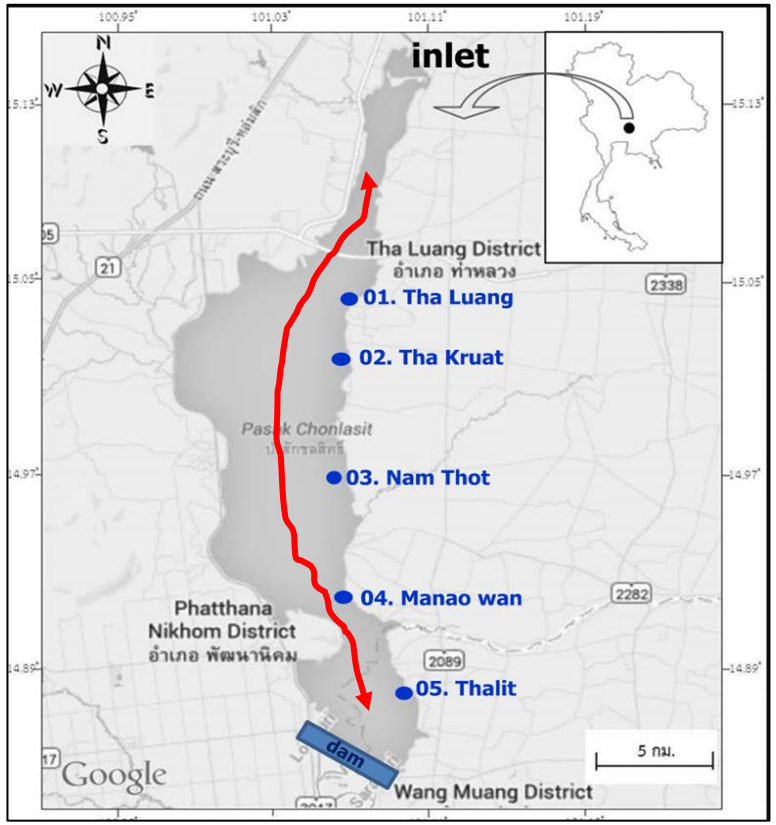
(Cover whole areas ➔ movement of fish & boat)

5 sampling CPUE Gillnets Stations of two reservoir

Ubonrat reservoir



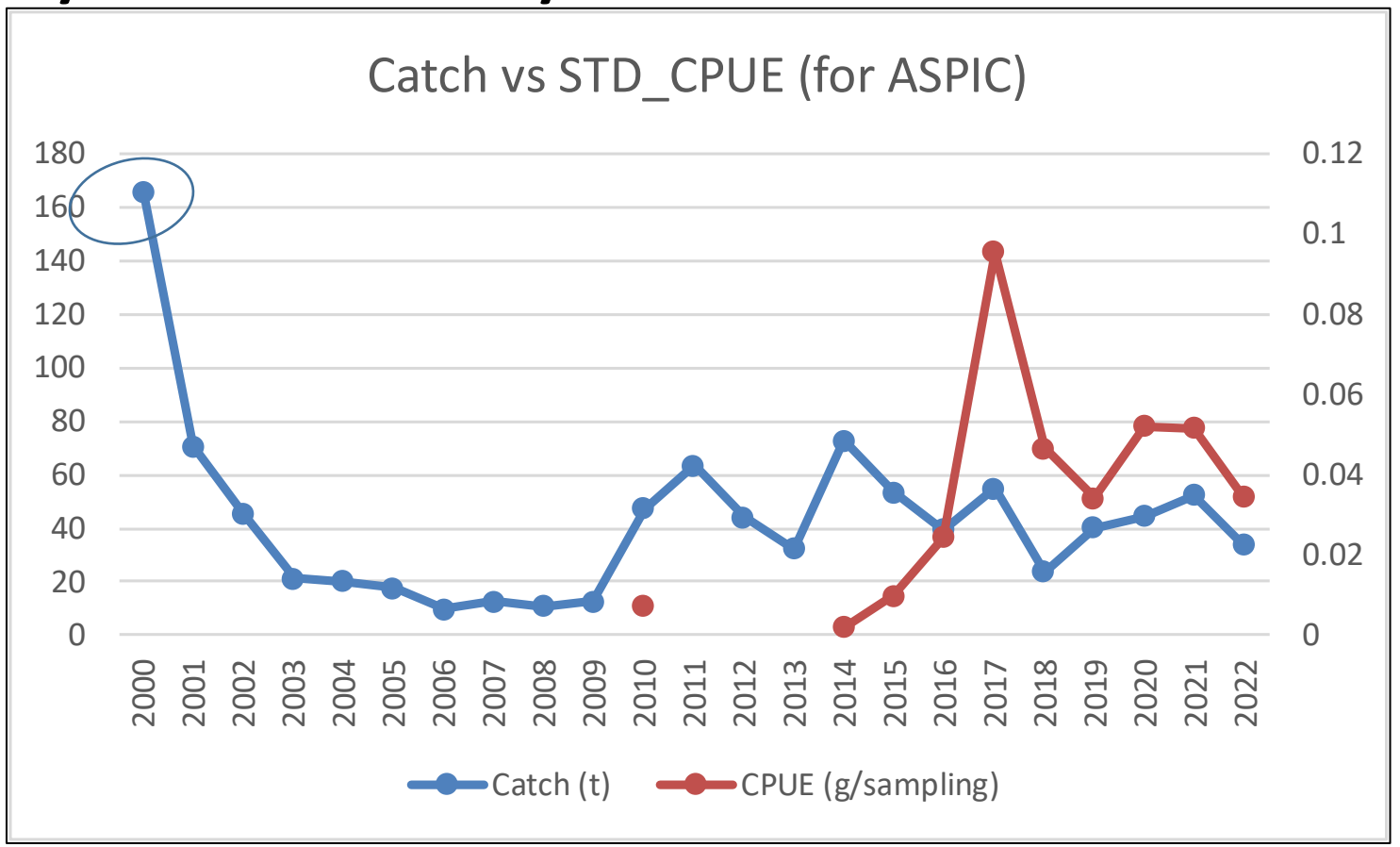
Pasak jolasid reservoir



ASPIC/JABBA ➔ try without the sharp drop

(remove 2000) ➔ Stock status ➔ more conservative ➔ maybe more realistic (like Short mackerel)

(dynamics may be different from 2001)



Investigation of the TB model

Supapong (SEAFDEC) investigated TB results using survey data

He pointed out lack of size data ➔ suggested to increase sample size

Actually there are more size data in addition to survey data used

Re-investigate using more (available) data

TB results may be OK..

Discussion How Enhancement affect SA?

BIOMASS（increase)

= POP Growth + Recruitment (R)

+ [A] Enhancement (additional R)

BIOMASS (decrease)

= M (natural mortality) + F (fishing morality)

Probably PM is OK to use as [A] additional R

Under the in-equilibrium condition

Increase ≠ decrease

Discussion How Enhancement affect SA?

Simple Age structure model (example VPA)
can explain this situation better?
as it can incorporate new R (enhancement)

But Age (size) data are limited
May be difficult

Carp WG (Future works)

Carp WG Future works
(2024-2025)

Wiparat + Khajitpan + Nishida

(assisted by DOF scientists + Supapong）

E-mail, on-line and/or face to face (visit)

We will work 1~2 species each (2 reservoirs)

Species for overfishing status (including 2023)

	Ubonrat reservoir		Pasak jolasid reservoir	
species	2021	2022	2021	2022
	stock status	stock status	stock status	stock status
Henicorhynchus siamensis	not overfishing	not overfishing	not overfishing	not overfishing
Puntioplites proctozysron	not overfishing	overfishing	not overfishing	overfishing
Oreochromis niloticus	overfishing	overfishing		
Clupeichthys aesarnensis	not overfishing	not overfishing		
Barbonymus gonionotus	not overfishing	not overfishing		
Barbonymus gonionotus			not overfishing	not overfishing
Hemibagrus filamentus			not overfishing	overfishing
Notopterus notopterus			not overfishing	not overfishing

Investigation Catch before & after 2016

- Investigate any affect to catch data before & after 2016, when the collection system has changed (may be difficult).
- If found and if possible, revise the catch data

Use all CPUE data including 0 CPUE in each sampling
(n=90 samples/night)

Currently only non 0-CPUE are used to compute CPUE

As 0 CPUE is also important statistics,

use the all data including 0 CPUE

Need to investigate

how CPUE with & without 0 CPUE are different.

Publication

It is suggested that the CPUE computation method to be published to SEAFDEC (Fish for the People).

More sampling (catch & size)

One survey sampling per trip (Q)

➔ Not enough

➔ideal to increase sampling per Month (4➔12)

($$$ needed) (also for size)

for our working 2 reservoirs

Investigation on CPUE

- Explore available CPUE (commercial & survey)

  (all gears➔ Target & bycatch)

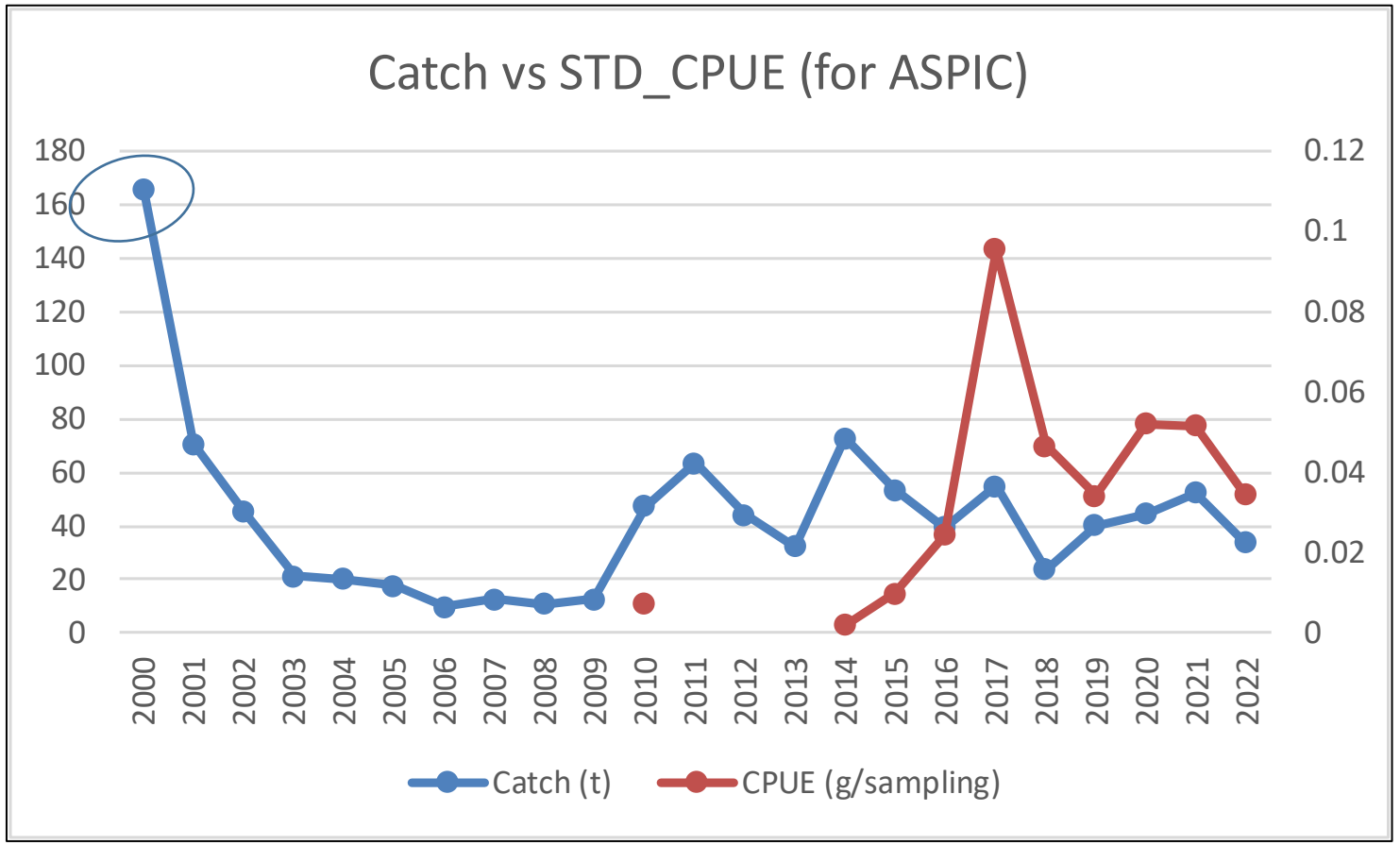
  Bycatch gear (simple random sampling)

  ➔ provide <u>sometimes</u> good CPUE
- Survey (2000~) (only GILL) & Commercial Logbook (2018~)

ASPIC/JABBA ➔ try without the sharp drop

(remove 2000) ➔ Stock status ➔ more conservative

(dynamics may be different from 2001)



Wrap up

Summary and
Common issues across 3 WGs


[Wrap up]
Summary and
Common issues across 3 WGs

Summary

- Very good & effective WS through in-depth & fruitful discussion with DOF scientists & SEAFDEC.
- All can learn details on 3 species.
- We will continue to make progress (@once/year)
- As emphasized many times, it will take many years to get satisfactory SA. We need to progress year by year.

Common issue

Multi gear & Multi species managements

DOF➔ Right avenue to cover
as DOF has long time accumulate knowledge & experiences & already implementing.

[MENU] can cooperate (see next slide)

How single species specific [MENU] ASPIC results can be utilized for Multi-species & Multi-gear fisheries Management (MMM)?

- ASPIC is for single species specific stock assessment.
- Single species specific ASPIC results (stock status & TAC), should be used as just reference for MMM.
- This is because a single species TAC cannot be used directly for MMM as stock statuses are different among multi-species.
- MMM should be implemented by mangers considering relevant factors together, i.e., stock statuses (all species), singles species specific TAC, socio-economics (effort allocation by gear, boat & fishing ground for fishers), MPA to conserve ecology (migration, habitat, life cycles..) & others.

Common issue CPUE/Catch : 2 points

(1) If mixed species, estimate & use CPUE/Catch <u>by species</u>
by species compositions
➔more meaningful & plausible for SA
➔If mixed species, CPUE/Catch data are NG information for SA

(2) Examine ALL available CPUE by gear & effort
➔ target & bycatch and survey & commercial..
➔ Even annual CPUE (one point/year)
➔ Use good CPUE/Catch with negative CORR

Common issue CPUE

Standardize nominal CPUE（CPUE_Manager ）

Even for a simple model

(even just year ➔OK)

Common issue
Compare results from 2 SA

It is suggested that 2 SA need to be implemented

using different data sets

(for example, TB by size and PM by catch/CPUE)

Then compare results

If both are similar ➔ Confidence on results ➔ reliable advice

If different, check the data ➔ if problem, do not use results for advice

If data NG for both models ➔ No advice ➔ apply HCR/ABC

Common issue : SA Results

If no SA results due to poor quality of CPUE/Catch data,

➔You should say no results were obtained.

➔ it is also <u>one of answers</u>

<u>Don't</u> force to do SA using bad CPUE/Catch data

No meanings (Garbage in ➔ Garbage out)

Apply HCR/ABC (see the next slide)

Common issue
No good SA results ➔ HCR/ABC

If SA is not available due to bad data quality, limited data..

⬇

Consider to apply HCR/ABC by catch and/or CPUE

➔ Simple, effective, no drastic change (TAC)

& precautionary approach

➔ Good for both managers & fishers

Common issue
Management advice (TB & PM)

TB ➔ provide status only for F (fishing pressure)

PM➔ provide status for both F and TB (total Biomass)

Consider both results to provide plausible advice to managers

If inconsistency in results between TB and PM

➔Check data and select results with good data

➔If both data are NG ➔ consider HCR/ABC

AI for stock assessment OK??

- Automated stock assessment is convenient.
- Full automatic
  ➔ FAO Length – based S/R (LBSPR)
- Semi Automatic
  ➔ ASPIC_Manager
- Some issue if SA can be done by AI (full automated)
- Is it OK?

AI for stock assessment OK??

- Full automatic (AI) Not OK
  - ➔ you don’t know inside (mechanism & input/output)
  - ➔ It will be the garbage in & garbage out syndrome
- Best one : by R
  - ➔ as you understand mechanisms & INPUT/OUTPUT
  - ➔ not possible for all as many people cannot make programs
- Semi automatic (like ASPIC_Manager）may be OK for ALL
  - ➔ anyone can use (easy to do step by step)
  - ➔ but users need to know mechanisms & INPUT/OUTPUT

Tasks (high priority) (2024-2025)

<table>
<tr><th>WG</th><th>Species to work</th><th>CPUE/Catch by species</th><th>CPUE</th><th>ASPIC/JABBA</th><th>Publication (SEAFDEC)</th><th>JABBA_Manager (training & application)</th></tr>
<tr><td>Short mackerel</td><td>Short mackerel</td><td rowspan="2">Estimate by species composition</td><td>3PS combined CPUE</td><td>before & after 2015</td><td>Current situation</td><td rowspan="4">2025</td></tr>
<tr><td>demersal fish</td><td rowspan="2">a few important species</td><td rowspan="2">Explore more CPUE</td><td>incorporating 3 q</td><td>Species composition</td></tr>
<tr><td>Carp</td><td>Check catch before & after 2016 and increase samplings</td><td>remove 2000 (Nile tilapia)</td><td>CPUE computation</td></tr>
</table>

Appendix A: Logistics

Appendix A: Logistics

- List of participants
- WG Members
- WG tasks
- WS Program

List of participants

No.	Name-Surname	status in WS	Organization	Based office
1	Dr. Pavarot Noranarttragoon	advisor	Marine Fisheries Research and Development Division	HQ, Bangkok
2	Mr. Weerapol Thitipongtrakul	core person	Fisheries Resources Assessment Group, Marine Fisheries Research and Development Division	
3	Miss Nipa Kulanujaree			
4	Miss Orawan Prasertsook			
5	Miss Wiparat Thong-ngok		Inland Fisheries Research and Development Division	
6	Miss Kajitpan Jarernnate			
7	Mr. Deka Ratanachamnong			
8	Dr. Supapong Pattarapongpan	Technical assistant	SEAFDEC/TD	Samut Prakan
9	Miss Pawanrat Buarouy	observer	Fisheries Resources Assessment Group, Marine Fisheries Research and Development Division	HQ, Bangkok
10	Miss Budsayaphon Thongprang			
11	Miss Suwanthana Tossapornpitakkul		Songkla Marine Fisheries Research and Development Center	Songkhla
12	Miss Kotchakarn Punturat		Ranong Marine Fisheries Research and Development Center	Ranong
13	Miss Jidapa Setthatham		Marine Fishing Ground Survey and Assessment Group	Samut Prakan
14	Miss Nantana Nakosiri		Phuket Marine Fisheries Research and Development Center	Phuket
15	Miss Sirinuch Khamsuwan		Samut Prakan Marine Fisheries Research and Development Center	Samut Prakan
16	Miss Chaweewan Taweerat			
17	Miss Waekorleeyoh Waesalaemae		Narathiwat Prakan Marine Fisheries Research and Development Center	Narathiwat
18	Miss Phatcharin songkai		Satun Marine Fisheries Research and Development Center	Satun
19	Mr. Jirawut Kumpirod		Chumphon Marine Fisheries Research and Development Center	Chumporn
20	Miss Panida Bualangka		Rayong Marine Fisheries Research and Development Center	Rayong
21	Miss Narakorn Somwantana			
22	Dr. Tom Nishida	Co-organizer (Resource Person)	[MENU] Menu-driven stock assessment software developing team	Japan

Thanks for your hard works !

Members, Tasks & Program

Members and Assignments

Supervisors : Amnuay (Division Director), Pavarot and Sichon
Coordinator : Weerapol
Technical assistant : Supapong (SEAFDEC)

3 Working Group (WG)	Members	Working species for trial & demo (Nishida) Practice and Discussion (WG members) During the workshop	Species to be worked by WG members in the future with Nishida
Short mackerel	Puy, Nipa & Weerapol	Short mackerel	
Demersal	Weerapol & Sichon	Threadfin breams	Lizardfish Threadfin breams (to finalize)
		Comparison between standardized commercial CPUE and nominal CPUE of independent survey (research vessel)	
Carp	Nipa Wiparat & Khajitpan (Fresh water Division)	*3. Oreochromis niloticus* (Nile tilapia) (Ubonrat reservoir)	*1. Henicorhynchus siamensis* *2. Puntioplites proctozysron* *3. Oreochromis niloticus* *4. Clupeichthys aesarnensis* *5. Barbonymus gonionotus* For 2 reservoirs (Ubonrat & Pasak jolasid)

Date	Subject	Activities	Participants	
Jan 23 (Tue)	Field trip	Visit the landing site (Prasae reservoir) to observe landing activities (6:30 AM-)	Nishida, Wiparat & Khajitpan	
Jan 24 (Wed) and Jan 25 (Thu) (2 days)	Openings		All	
	Software	Introduction & practice of 3 new menu driven software (Nishida & core participants) ● ASPIC_Manager ● CPUE_Manager ● Kobe I+II Manager	**Core participants** 6 (Puy, Nipa, Weerapol, Sichon Wiparat & Khajitpan)	**Observers** Anyone is welcome. Please note well that [MENU] will be **responsible only** for core participants, but comments and questions from observers are welcome.
Jan 26 (Fri) and Jan 29 (Mon) AM (1.5 day)	Short mackerel	● Presentation: Outline (Fisheries, stocks & current management) (Puy) ● Presentation & demo: Preliminary stock & risk assessment (Nishida) ● Practice (WG members) & discussion (all) ● Future works (all)	Short mackerel WG members (Puy, Nipa & Weerapol)	
Jan 29 (Mon) PM and Jan 30 (Wed) (1.5 day)	Demersal	● Presentation: Outlines (Fisheries, stocks & current management) (Weerapol) ● Presentation & demo: Preliminary stock & risk assessment (threadfin breams) (Nishida) ● Practice (WG members) and discussion (all) ● Presentation (Nishida) & discussion (all) Comparison between standardized commercial CPUE & nominal CPUE of independent survey (research vessel) ● Future works (all)	Demersal WG members (Sichon & Weerapol)	
Jan 31(Wed) and Feb 1 (Thu) AM (1.5 day)	Carp	● Presentation: Outline (Fisheries, stocks & current management) (Wiparat) ● Presentation & demo: Preliminary stock & risk assessment (Nile tilapia *Oreochromis niloticus*) (Ubonrat reservoir) (Nishida) ● Practice (WG members) and discussion (all) ● Future works (all)	Carp WG members (Nipa, Wiparat & Khajitpan)	
	Closings		All	
Feb 1 (Thu) PM	Spare time if any extra works need to be done (a half day)			

Additional programs

(1) Pre & Post tests
(Nantana got the highest score) ➔ ยินดีด้วย

(2) Home work (report)
for all participants (all OK B~A++)

(3) Presentation of home works by core participants
➔ interesting ➔ different answers for same question(scenarios) because results are sensitive even to small different values used.
➔ also happened in RFMO ➔ the median may be the best answer.

[MENU]'s Goal


Stock assessments for ALL
STOCK ASSESSMENT
SOFTWARE DEVELOPING TEAM
33%
60%
7%
STOCK ASSESSMENT FOR ALL
MENU-DRIVEN SOFTWARE DEVELOPMENT TEAM