Problem Day 1

```
> install.packages("devtools")
> install.packages("reshape2")
> devtools:: install_github("jabbamodel/JABBA")
```

This was not installed. Please run this in R console

Review Day 1

- Outline ＆ DEMO JABBA + New CPUE standardization
- Implementation of JABBA [MENU]

  - Scenario approach for data type [4]
  - Selection form (5)＋(14) (diagnostics）
  - 3 Strategy (Individual + Average+ hybrid)
- Practice new CPUE standardization
- Could not practice for JABBA due to problems

We might extend to 5PM
(if we need time)

Program + Plan

1. General session (today)

1.1 Introduction	PP#	
(1) JABBA (theory)	99	AM
(2) New CPUE standardization	11	AM
1.2 Demo + Practice		
(1) JABBA	35 + Practice	PM
(2) CPUE standardization	24 + Practice	PM
(3) Data process	1 + Practice	after WS2

2. WG session
   - 2.1 Demersal WG
   - 2.2 Short mackerel WG
   - 2.3 Carp WG
3. Homework (Presentation & submission)
4. Sum-up session
   - 4.1 Review, Summary & Recommendation
   - 4.2 Future plan

2.1 Demersal WG Agenda

1. Introduction
2. Data
3. Species composition
4. Catch & Effort
5. Selection of good CPUE
    5.1 Nominal CPUE
    5.2 CPUE standardization
    5.3 Selection of good CPUE

80

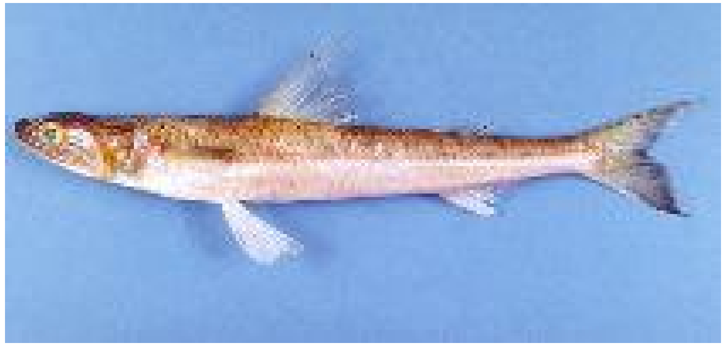
AM

6. JABBA
    6.1 Outline
    6.2 Implementation
    6.3 SU(*Saurida undosquamis)* & comparisons (TB)
7. Practice & Homework
    7.1 JABBA
    7.2 CPUE standardization
    7.3 Data process
8. Discussion, Summary and Future plan

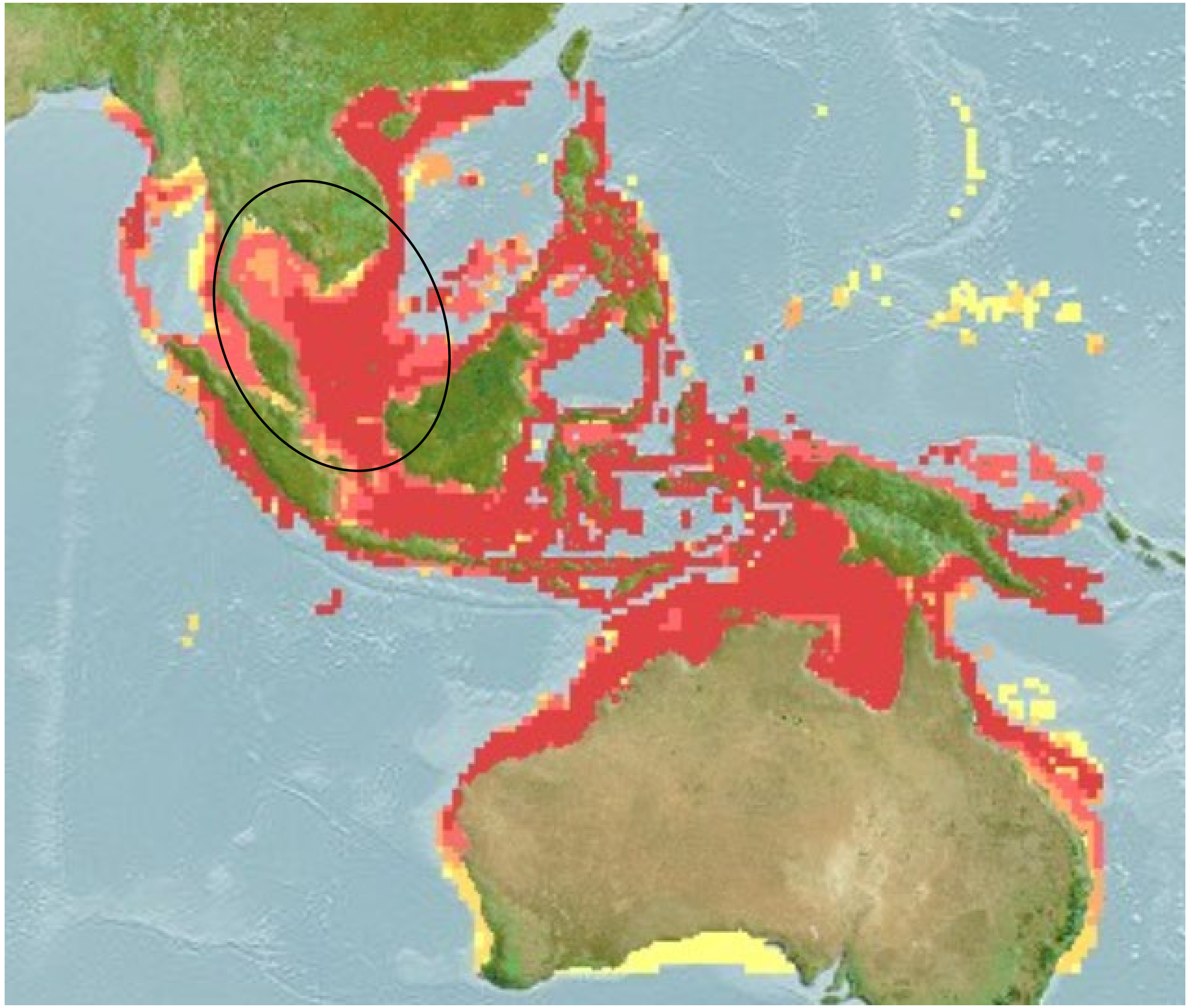
75

PM

2nd workshop
Demersal fish Working Group (WG)
Trail (JABBA), Discussion & Future



Sock assessment for Brushtooth lizardfish
Saurida undosquamis (SU) by JABBA
(one of important Lizardfish species)
(1971~2023)



ツケアゲエソ

อร่อย?

1. Introduction

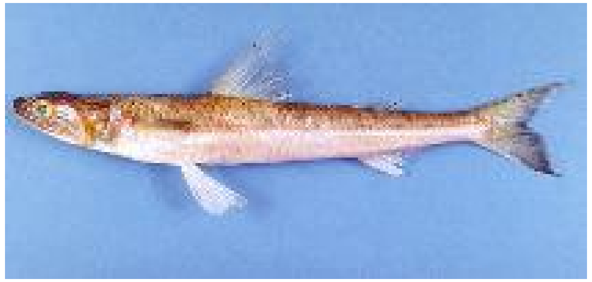
We work on SU as a trial (one of 6 species of Lizard-fish)

Synodontidae Lizard エソGOT						
Species name (6)	*Saurida elongata*	*Saurida isarankurai*	*Saurida micropectoralis*	*Saurida undosquamis*	*Synodontidae*	*Trachinocephalus myops*
Gear composition of total catch (6 species)	OBT(71%)+PT(21%)+OTH(8%)					

WG will work on NH for practice (after WS2) (one of 13 species of threadfin breams)(2026)

sp1	sp2	sp3	sp4	sp5	sp6	sp7	sp8	sp9	sp10	sp11	sp12	sp13
Nemipteridae	Nemipterus bipunctatus	Nemipterus furcosus	Nemipterus hexodon	Nemipterus japonicus	Nemipterus marginatus	Nemipterus mesoprion	Nemipterus metopias	Nemipterus nematophorus	Nemipterus nemurus	Nemipterus peronii	Nemipterus tambuloides	Nemipterus tolu

Demersal WG (work plan)



(1) Lizardfish (*Saurida undosquamis*) (WS2)

Trial [MENU] ➔ WG discussion ➔ practice ➔ finalize ➔ publication

(2) Threadfin bream (*Nemipterus hexodon*) (2026)

WG will practice ➔ WG discuss ➔ finalize ➔ publication

<u>2 species are important for DOF. Why ?</u>

We will work by online (Zoom) after WS2

Sri Lanka (just stared)➔ Effective

Face to face important but 1~1.5 years interval
<u>too long, less progress & more</u> 

ZOOM
Frequent (convenient time) by small topic (NO )
Good progress (if accumulated)

Demersal WG

1. Introduction
2. Data & q catchability
3. Species composition
4. Catch & Effort
5. Selection of good CPUE
    - 5.1 Nominal CPUE
    - 5.2 CPUE standardization
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2. Data & q (catchability)

Change of Catchability
Important topic before work

Weerapol san have a presentation

Consideration of q catchability in Thai Fisheries for CPUE standardization & JABBA runs（DOF/Weerapol）

Thai fisheries and corresponding q (1960~2023)			
#	period	Development (changes) of Fisheries affecting q (catchability)	Assignments of q for JABBA (Short mackerel & Lizardfish)
q1	1960~1974	● Initial development Thai Fisheries ● Expansion from coastal to offshore fisheries	● q12 (1971~1994) (n=24). Because q1 (1971~1974) is only for 4 years, combined q12 will be used.
q2	1975~1994	● Expansion of large trawl fisheries to neighbor countries (sharp catch increase) ● Fisheries are limited to EEZ	
q3	1995~2015	● Both Thai & Foreign vessels operated in Thai EEZ ● Mix operations in both open sea & EEZ	● q3 (1995~2015) (n=21)
q4	2015~2023	● Establishment of strict management measures (effort limit, MPA & others) ● Change of data collection & report systems	● q4 (2016~2023) (n=8)

Why we need different q ?
Simple example

(1) SU CPUE   PT (1971~1994) (before)   in 1 hour ➔ 10Kg

(2) SU CPUE   PT (2016~2023) (current) in 1 hour ➔ 20KG

Under same biomass level

(2) can catch 2 times higher than (1) in 1 hour

➔ Because gear & equipment **improvements**

Thus, in stock assessment,

we need 2 different q (same fleet)   q1(T1)+q2(T2)

or use 2 different gear   PT1 & PT2

Different q (same gear) ➔ important for another reason

For Example,

If strong regulation in 2000

Before & after 2000 ➔ quality & quantity of data are different

Difficult to adjust

So, we use 2 different q before & after 2000 (q1 & q2)

CPUE standardization & Stock assessment ➔ OK

<u>Like 2 different fisheries</u>

2 different q

Our example

2015 new regulation → sharp catch drop in 2016 (DOF)

q1 (before 2015) & q2(after 2016) → JABBA

Similar example (Carp WG)

In 1995, BIG data collection system change?

We will apply 2 q → JABBA (future)

Some different approach on q (example)(IOTC)

Tuna Longline 1950-2023 74 years data ➔ Different q

No clear knowledge of **<u>clear-cut year for q</u>** (DOF)

Bank interest method

(compound system) การคำนวณดอกเบี้ยทบต้น

If q increase by 1%

q (year i)=q(1 in 1950) X $(1+0.01)^{i}$

q(2023)=1x$(1.01)^{74}$ =2.1 (**<u>2.1 times increased</u>**)(Bias)

CPUE standardization incorporate this and <u>use standardize q</u>

Other factors affecting q ➔ technological evolutions (so many)

Bird Rader, echo sounder, sonar, navigation system,

gear development, Prediction of fishing grounds (HSI*）

Satellite system, oceanographic & weather conditions

Good Fishers (AI) *Habitat Suitability Index (HSI)

So many evolutions

Standardize q important (CPUE & SA)

Many ways to adjust

➔ cut-off, compound, ad hoc etc.

Let’s go back to Data

Gear codes

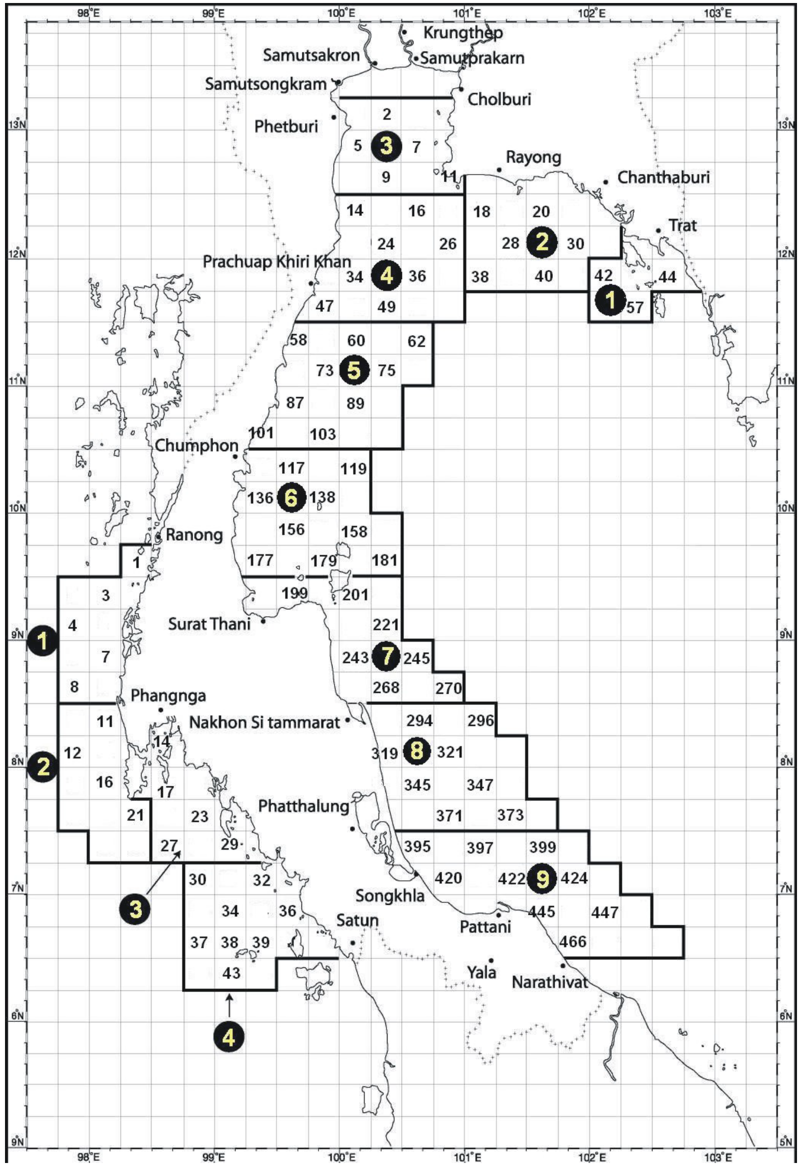
ALL	All gears combined
BT	Bottom Trawl
MEGL	Mackerel Encircling Gillnet (GL)
MGL	Mackerel Gillnet (GL)
OBT (OTB)	Otter Board Trawl (Otter Trawl Board)
OTH	Other gears
PS	Purse Seine
PT	Pair Trawl

Data catalog Demersal fish (53 years)

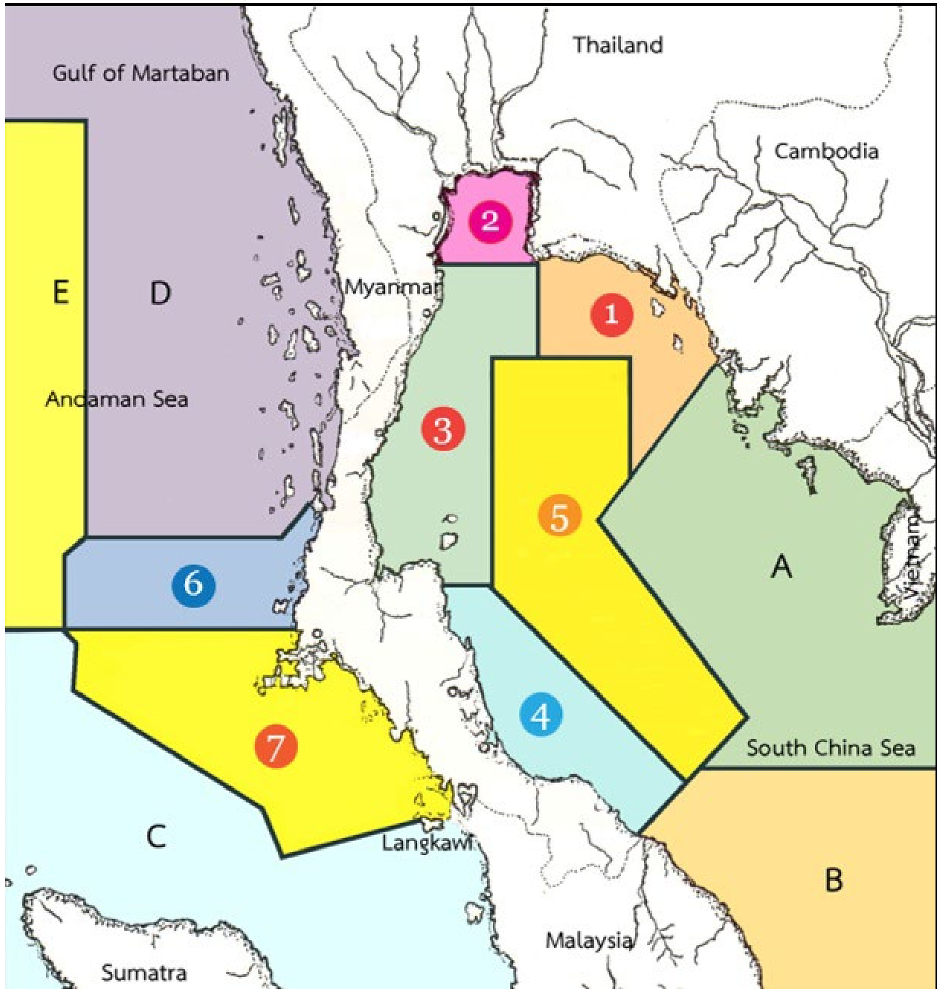
5 different nominal CPUE (based on q)

<table>
<tr><td colspan="2" rowspan="6">q
catchability
(see the text for details)</td><td rowspan="2">Source</td><td colspan="3" rowspan="2">Statistical division</td><td colspan="2">Research
(set by set data)</td></tr>
<tr><td>Port sampling</td><td>Demersal Survey by OBT</td></tr>
<tr><td>area</td><td colspan="3">1~5</td><td>1~5</td><td>1~9</td></tr>
<tr><td>Catch</td><td colspan="5">tons</td></tr>
<tr><td>Effort</td><td colspan="5">See the text for details</td></tr>
<tr><td>Covariate (CPUE standardization)</td><td colspan="2">Year and area</td><td colspan="3">Year, MO and area</td></tr>
<tr><td>Actual</td><td>Our case</td><td>Gear comp</td><td colspan="5">OTB (71%)+PT (24%)+ OTH (5%)</td></tr>
<tr><td>q1
(1960-1974)
q2</td><td>q12
(n=24)</td><td>1971
1994</td><td rowspan="3">(1)
(q1234)
CPUE
standardization
(1971~2023)</td><td>(2)
(q12)
CPUE
standardization
(1971~1994)</td><td></td><td rowspan="2"></td><td></td></tr>
<tr><td>q3</td><td>q3
(n=21)</td><td>1995
2015</td><td rowspan="2"></td><td rowspan="2">(3)
(q34)
CPUE
standardization
(1995~2023)</td><td rowspan="2">(5)
(q34)
CPUE
standardization
(2003~2023)</td></tr>
<tr><td>q4</td><td>q4
(n=8)</td><td>2016
2023</td><td>(4) (q4)
CPUE
standardization
(2014~2023)</td></tr>
</table>

Research



Statistics



Demersal WG

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3. Species composition(SC)

Lizardfish catch (6) species aggregated.

Need disaggregation by SC

Species composition of SU by gear

Estimation based on

OBT ➔ Demersal survey (2003~2023)

PT & OTH ➔ Port sampling (2014~2023)

2 ways to estimate SC

(1) Simple annual average SC (SC by year)

➔ Simple & quick but month & area are not considered

(2) Month & Area based SC (SC by year, month & area)

➔ Accurate but take a long time to estimate **missing data**

➔ **Complicated** Area conversion (1~9) to (1~5) (missing data)

➔ Accurate? yes but no if **many missing data**

So many missing data➔ Year, mo, 2 areas.

Many works & take very long time to substitute.

Demersal fish (Lizardfish & threadfin breams) (GOT) *Saurida undosquamis (SU)* (one of 6 Lizardfish species) is used for test trail.							
q catchability (see the text for details)		Source	Statistical division			Research (set by set data)	
						Port sampling	Demersal Survey by OBT
		area	1~5			1~5	1~9
		Catch	tons				
		Effort	See the text for details				
		Covariate (CPUE standardization)	Year and area		Year, M		
Actual	Our case	Gear comp	OTB (71%)+PT (24%)+ OTH (5%				
q1 (1960-1974)	q12 (n=24)	1971	(1) (q1234) CPUE standardization (1971~2023)	(2) (q12) CPUE standardization (1971~1994)			
q2		1994					
q3	q3 (n=21)	1995 2015			(3) (q34) CPUE standardization (1995~2023)		
q4	q4 (n=8)	2016 2023				(4) (q4) CPUE standardization (2014~2023)	(5) (q34) CPUE standardization (2003~2023)

?

We have only these data for short period

Need to use for much longer period

Comparison of 2 methods

(1) Simple annual average SC

(2) Month & Area average based SC

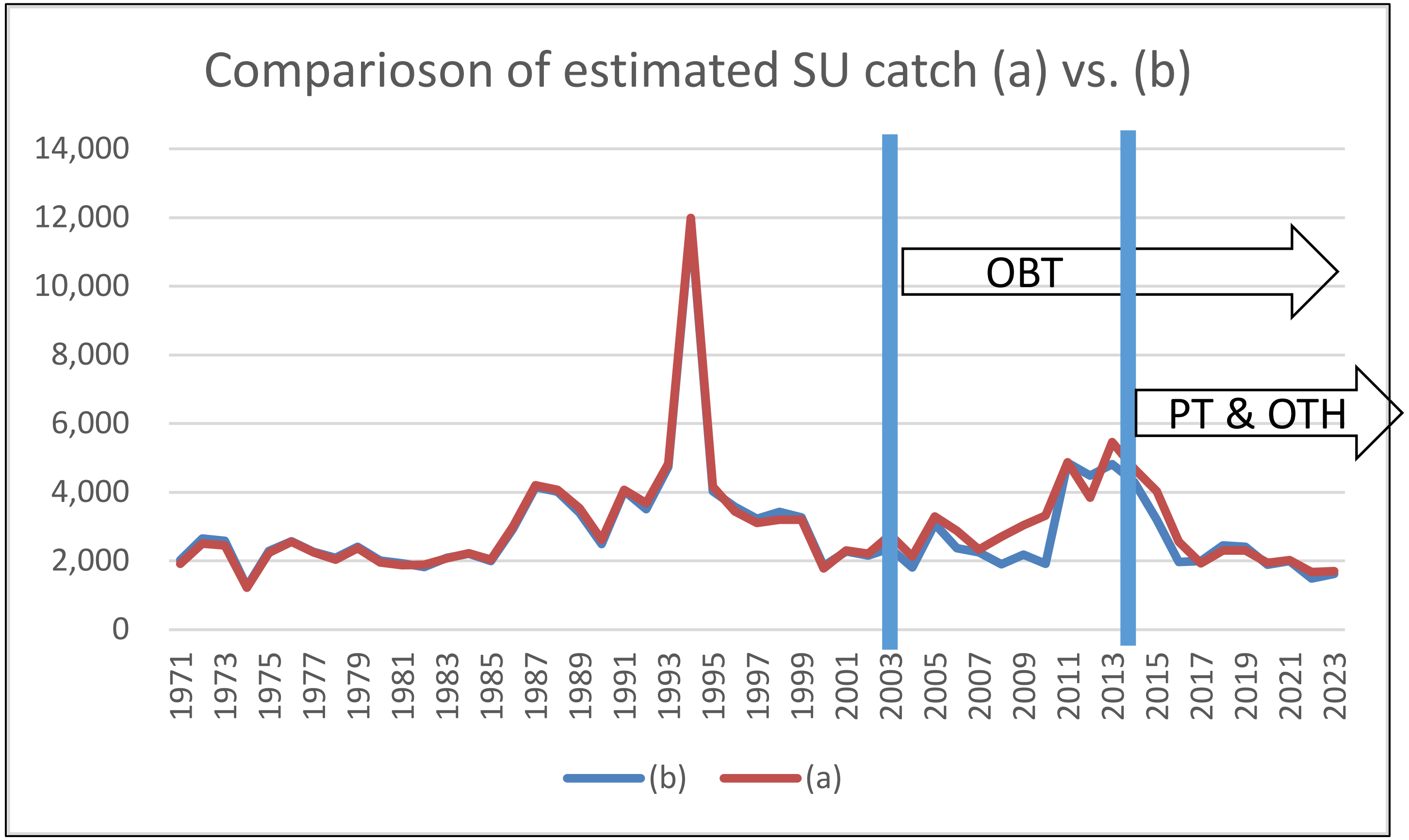
Annual SC for both methods are very **similar.**

(2) Missing data problems → took a long time (complicated)

We can use (1) for our case

But for finer scale works → (2) better

Comparison (a) vs. (b) ➔ almost same



Error (1994) to be explained later.

Survey data (OBT)

SC by set ➔ for example 0.76 means 76% (SU) in one set

hual id	Saurida elongata	Saurida isarankurai	Saurida micropectoralis	Saurida undosquamis	Synodontidae	Trachinocephalus myops	%total	Total catch (kg)
tscm200301047	0.24	0.00	0.00	0.76	0.00	0.00	1.0	1.570
tscm200301049	0.61	0.01	0.00	0.38	0.00	0.00	1.0	1.472
tscm200301058	0.00	0.73	0.00	0.27	0.00	0.00	1.0	0.258
tscm200301060	0.87	0.05	0.00	0.08	0.00	0.00	1.0	1.400
tscm200301062	0.23	0.07	0.00	0.69	0.00	0.01	1.0	4.529
tscm200301073	0.10	0.78	0.00	0.13	0.00	0.00	1.0	2.362
tscm200301075	0.60	0.00	0.00	0.40	0.00	0.00	1.0	1.638

Step to compute Annual Ave SC (SU)
(1) Prepare SC (SU) set by set (above)(survey data)
(2) Compute Ave by month & area
(3) Compute Ave by year

SU catch (PT & OTH) Port sampling
Original data (catch :upper & Effort: lower)

Merge C&E by gear then estimated SC by gear (technical) (EXCEL)

Catch

	A	B	C	D	E	F	G	H
1	code	Saurida elongata	Saurida isarankurai	Saurida micropectoralis	Saurida undosquamis	Trachinocephalus myops	other species kg.	Total catch (kg)
2	CM201401001	184.7752216		4.62763466	15.265211		33509.33193	33714
3	CM201401006	417.0584156					24456.94158	24874
4	CM201401007	358.8372662	145.5525606	420.4851752	803.4863399		19643.63866	21372
5	CM201402006	44.352		25.2	203.6356176		11928.81238	12202
6	CM201403009	174.4481151		23.54579864	795.1081789		21163.89791	22157
7	CM201404007	282.8955224		36.26865672	436.6198453		23627.21598	24383
8	CM201404011	587.1168916	218.2539683	0.929124479	127.9836241		27487.71639	28422
9	CM201405006	104.1061163		32.91428571	547.9172858		21572.06231	22257

Effort

	A	B	C	D	E	F	G	H	I
1	code	sampling date	month	year	boat name	gear	effort (day/trip)	effort (hr)	stat area
2	CM201401001	6	1	2014	โชคอนันต์ 22	PT	4	84	3
3	CM201401006	23	1	2014	พิชัยสมุทร 4	PT	14	308	3
4	CM201401007	24	1	2014	ประกอบสิน 18	PT	13	286	3
5	CM201402006	26	2	2014	จงเจริญชัย 18	PT	6	126	3
6	CM201403009	26	3	2014	จงเจริญชัย 17	PT	8	168	3
7	CM201404007	20	4	2014	จงเจริญชัย 19	PT	8	168	3
8	CM201404011	22	4	2014	เอกศักดิ์ชัย 5	PT	13	286	3

Ave SC by gear

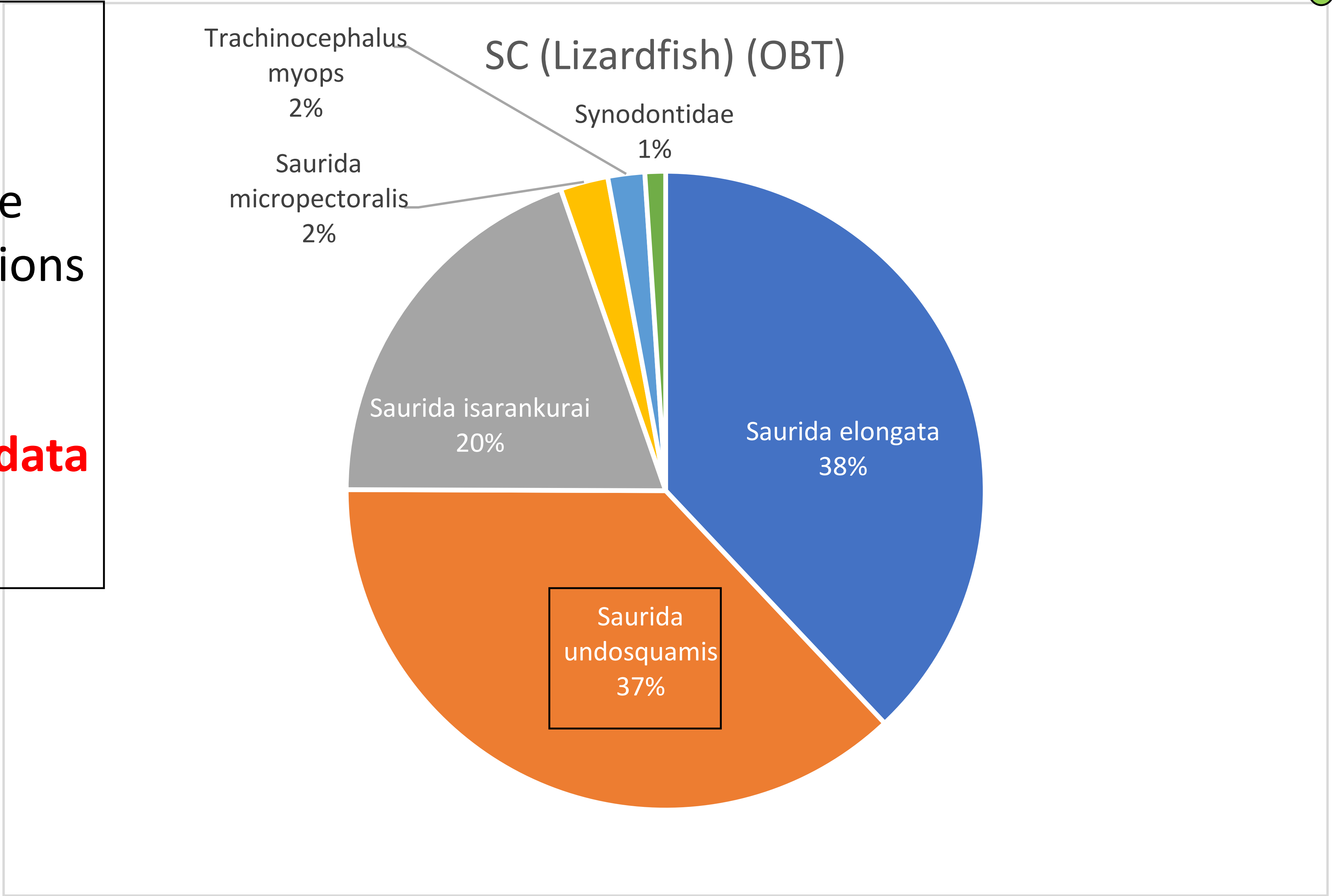
Good
SC (SU) same
(OBT vs. PT)

Reliable

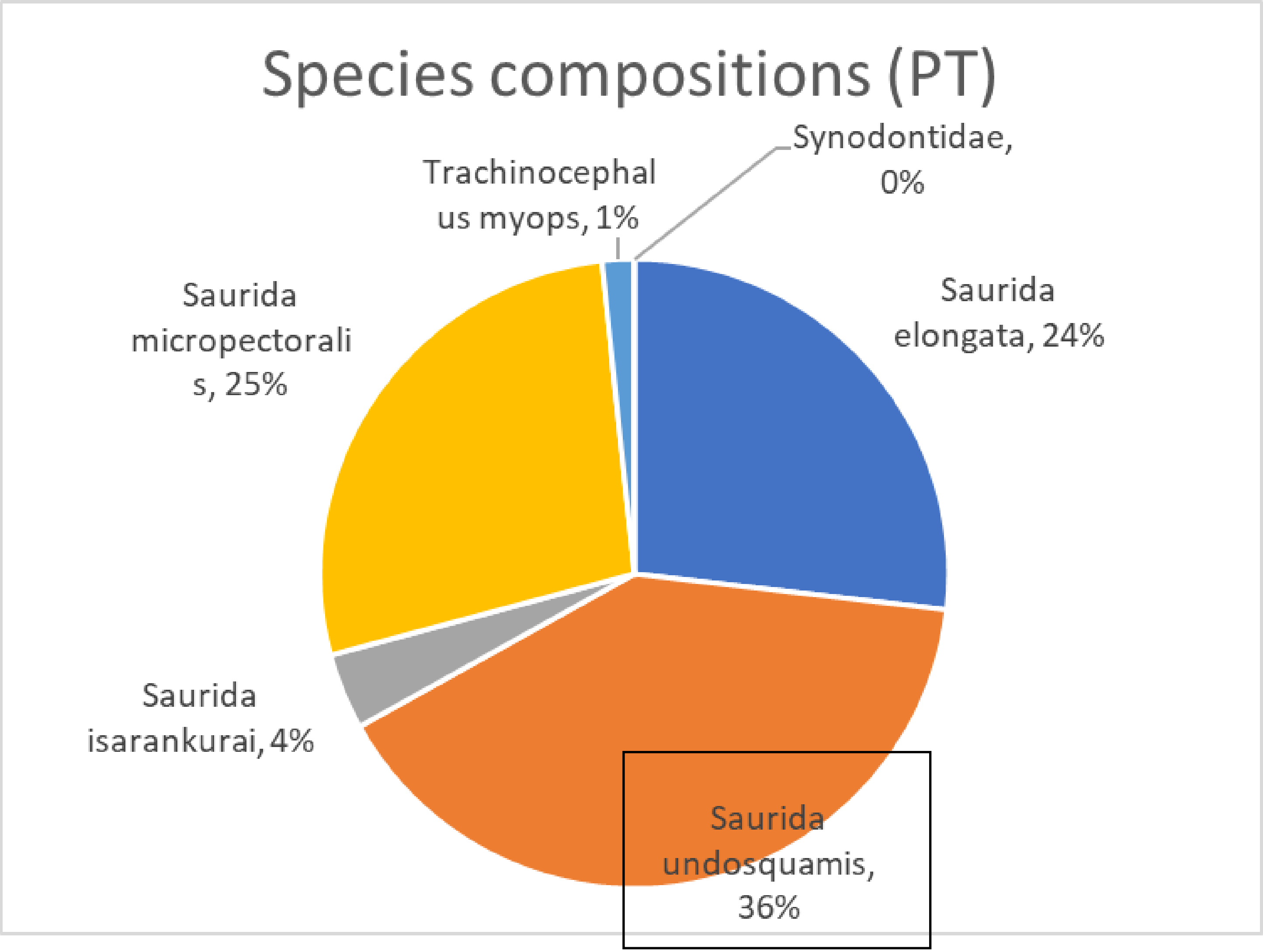
Others
Big
difference

Average species composition of Lizardfish catch (6 species) by gear (GOT)			
Gear	OBT	PT	Others
Source	Research survey	Port sampling	
	data	data	*Personal communication with Weerapol (DOF)*
Period	2003~2023 (24 years)	2014~2023 (10 years)	
Saurida elongata	38%	24%	
Saurida undosquamis	37%	36%	10% (*)
Saurida isarankurai	20%	4%	
Saurida micropectoralis	2%	25%	
Trachinocephalus myops	2%	1%	
Synodontidae	1%	0%	

Results
(OBT)
Annual average species compositions of Lizardfish
(6 species)
Based on **survey data**
(2003~2023)



Results
(PT)
Annual average
species compositions
of Lizardfish
(6 species)
Based on
Port sampling
(2014~2023)



Demersal WG

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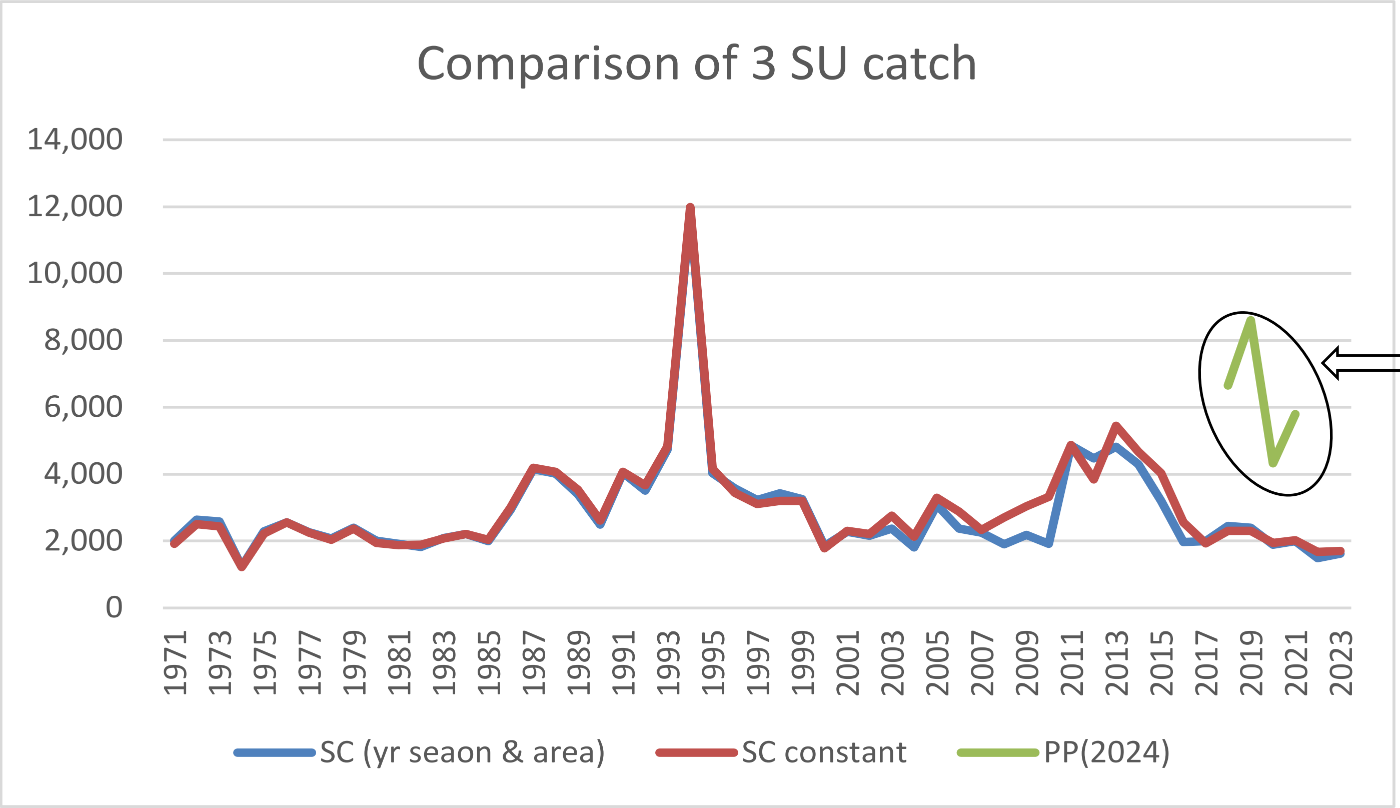
4. Catch & Effort

Before start..
One important issue

STAT data 1994 catch : SU high peak why ?



Catch estimated by TB method Bit overestimated

The peak (1994) (Lizardfish) was error (2025 WS2 data sets)

	A	B	C	D	E	F	G	H
1	lizardfish catch (tons) by gear in GOT							
2	year A.D.	Month	stat area	Otter board trawl	Pair trawl	Purse seine	Other gears	Grand Total
3	1971	NA	1	698	525		0	1223
4	1971	NA	2	2621	526		0	3147
117	1993	NA	NA				1	1
118	1994	NA	NA	34237	1356		0	35593
119	1995	1	1	355	20		0	375
120	1995	1	2	56	127		0	183
121	1995	1	3	196	45		0	241
1712	2023	12	4	88	31	1	9	129
1713	2023	12	5	28	8	4	17	57

How to correct?
Total (2024 WS1) =11091 ①
This (11091) is used as total (2025 WS2) ②
Then OBT catch
= ② (11091)- 1356(PT) =9735 ③

	A	B	C	D	E
1	ocean	area	year	species group	catch (mt)
2	Pacific	THA EEZ	1971	Saurida spp.	8140
18	Pacific	THA EEZ	1987	Saurida spp.	14264
19	Pacific	THA EEZ	1988	Saurida spp.	13898
20	Pacific	THA EEZ	1989	Saurida spp.	12541
21	Pacific	THA EEZ	1990	Saurida spp.	9091
22	Pacific	THA EEZ	1991	Saurida spp.	13189
23	Pacific	THA EEZ	1992	Saurida spp.	12017
24	Pacific	THA EEZ	1993	Saurida spp.	15279
25	Pacific	THA EEZ	1994	Saurida spp.	11090.7788
26	Pacific	THA EEZ	1995	Saurida spp.	15419
27	Pacific	THA EEZ	1996	Saurida spp.	12640
28	Pacific	THA EEZ	1997	Saurida spp.	11520
29	Pacific	THA EEZ	1998	Saurida spp.	13183
30	Pacific	THA EEZ	1999	Saurida spp.	12137

OBT (1994)
Too big
(Error)
WS2 (2025)

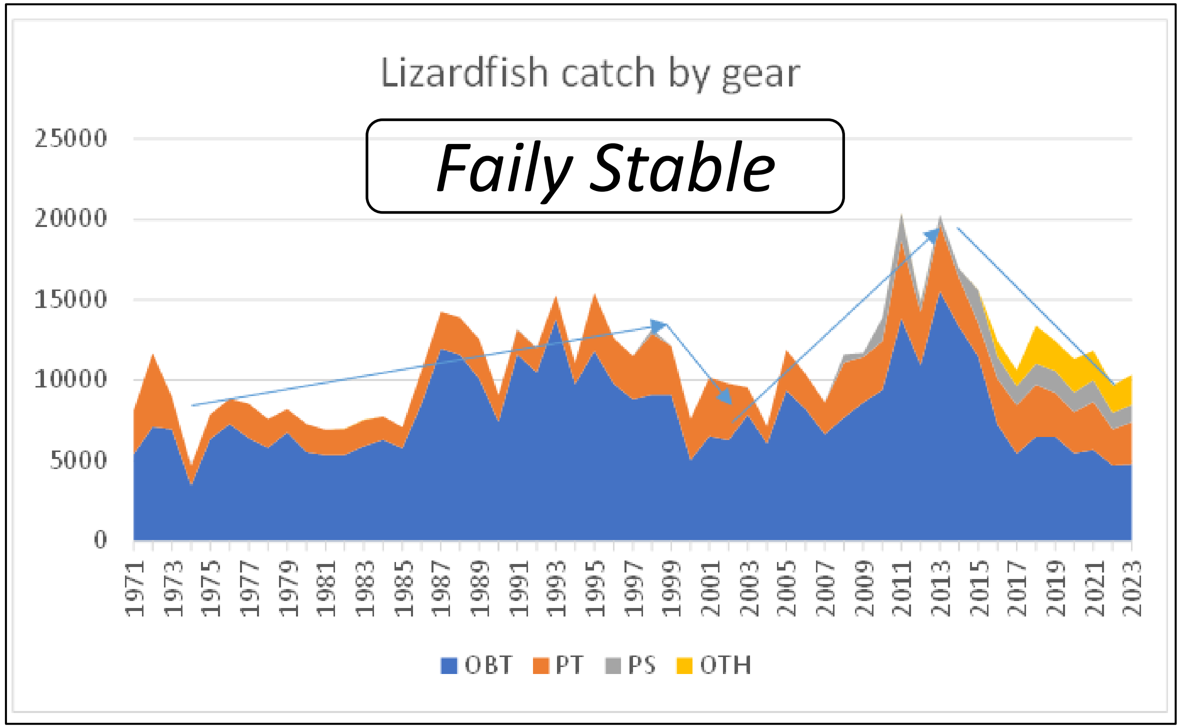
① WS1 (2024)
Total data

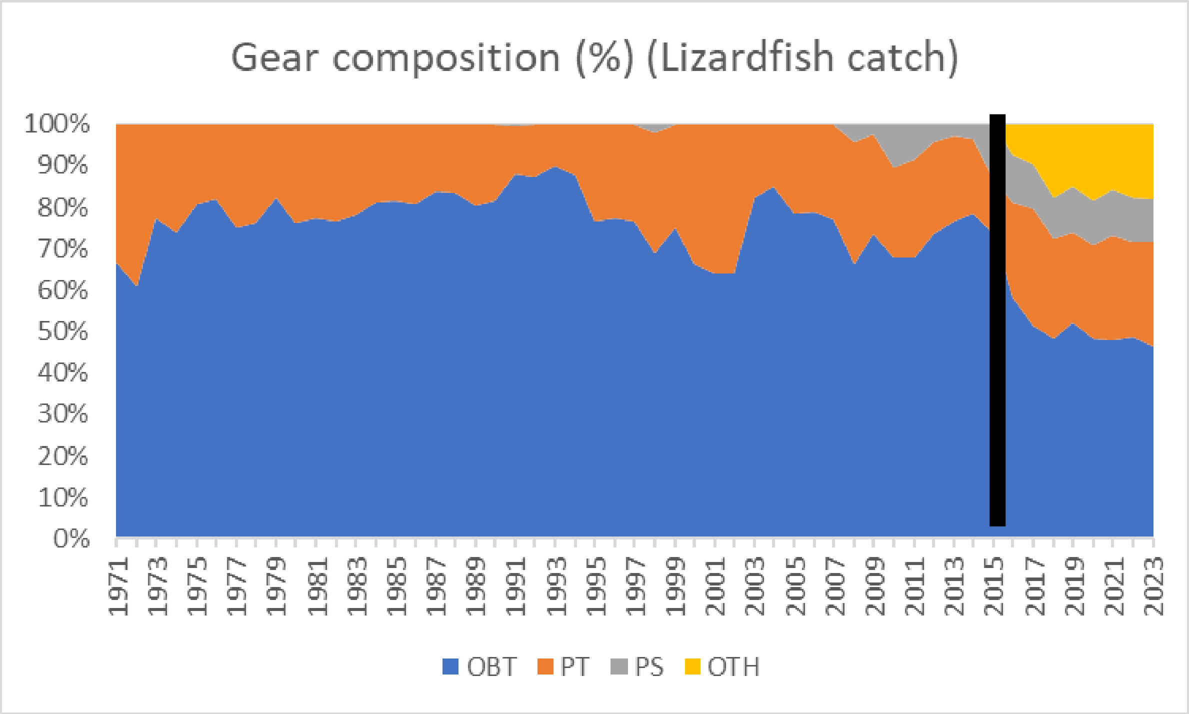
A	B	C	D	E	F	G	H
lizardfish catch (tons) by gear in GOT							
year A.D.	Month	stat area	Otter board trawl	Pair trawl	Purse seine	Other gears	Grand Total
1971	NA	1	698	525		0	1223
1971	NA	2	2621	526		0	3147
1971	NA	3	1056	889		0	1945
1993	NA	3	4534	294		0	4828
1993	NA	4	3975	376		0	4351
1993	NA	5	345	118		0	463
1993	NA	NA				1	1
1994	NA	NA	9735	1356		0	11091
1995	1	1	355	20		0	375
1995	1	2	56	127		0	183
1995	1	3	196	45		0	241
1995	1	4	290	20		0	310

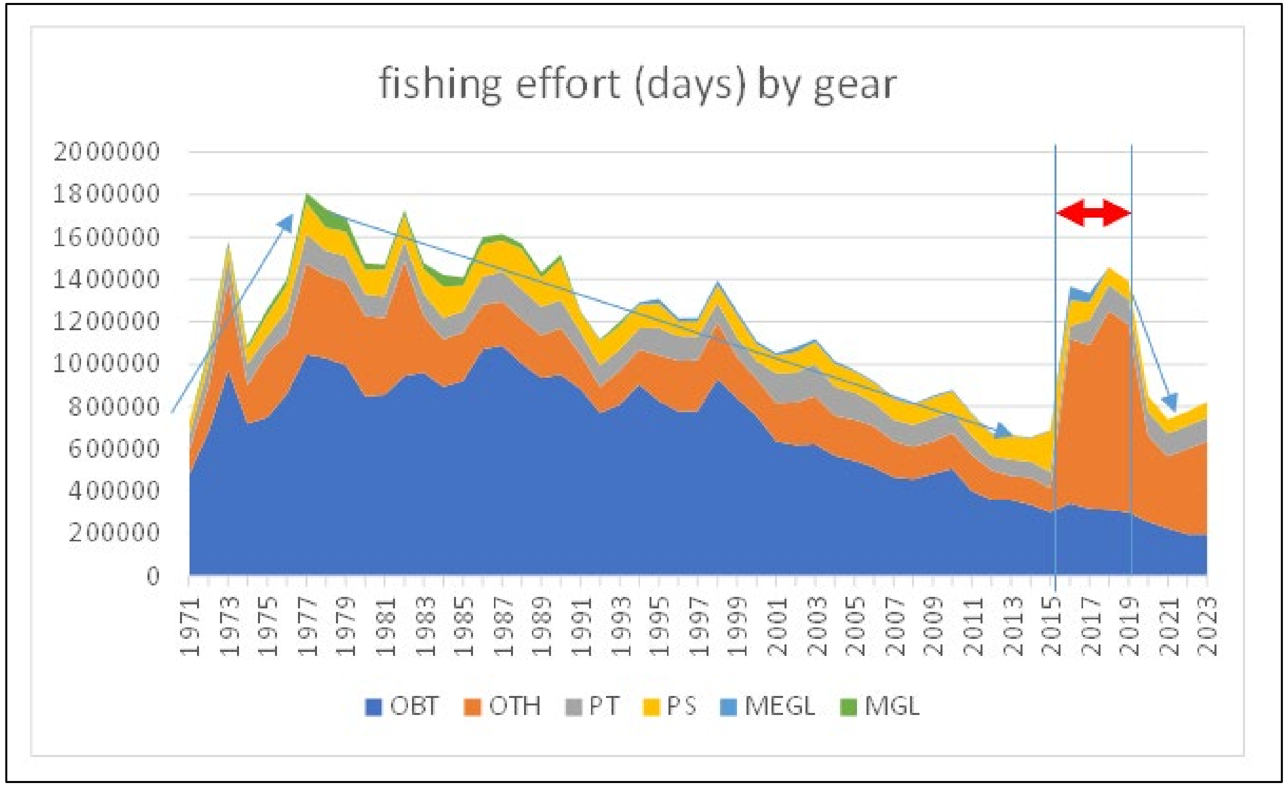
②

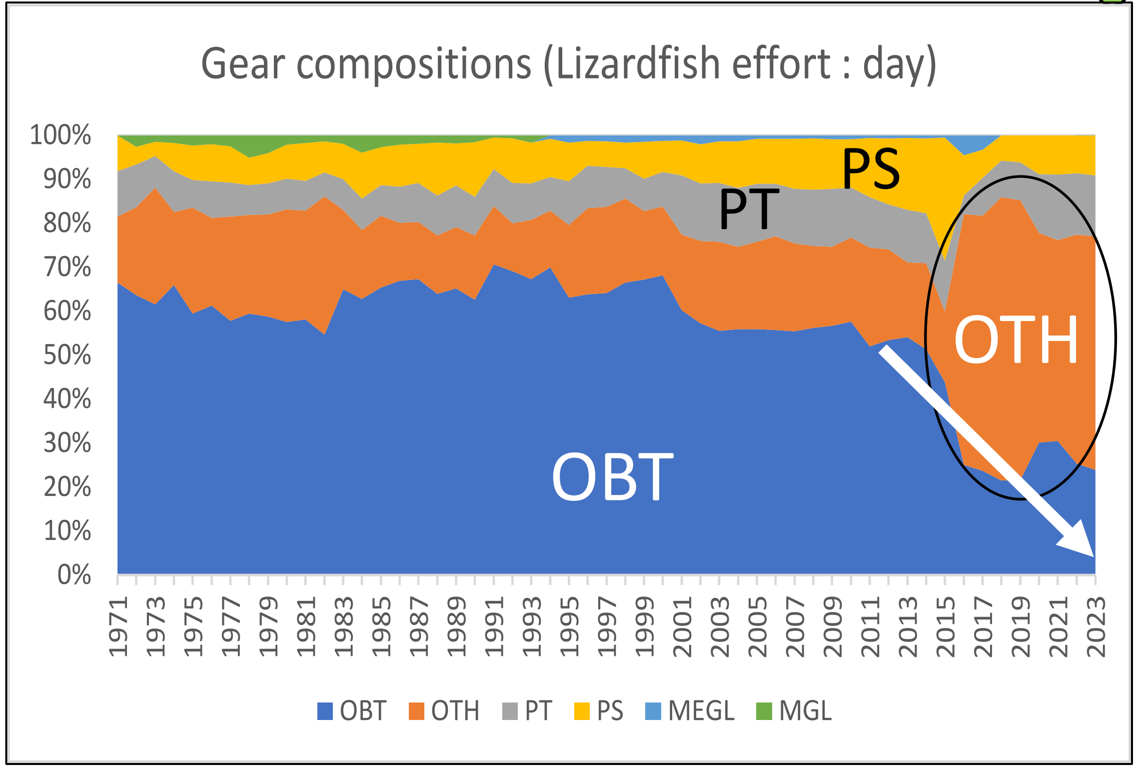
③

Lizardfish catch (6 species combined) by gear (Statistical Division)









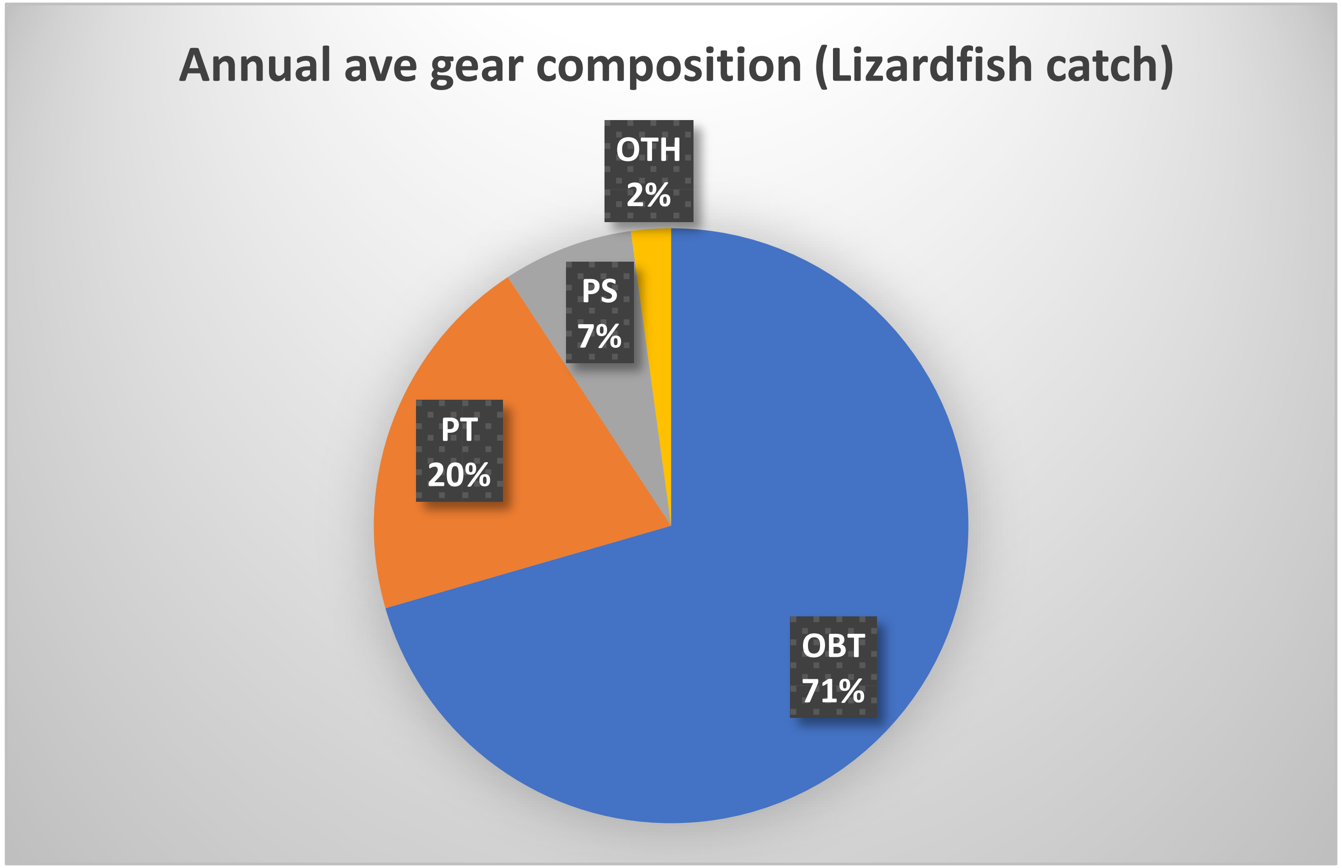
Other gears (2015-2019) are high (40% vs. normal 10% of the total effort), i.e., squid falling net (15%) + PS (10%) + beam trawl(10%) + anchovy falling net (5%)

➔ OBT sharply decreased (1996~2023)

➔ PT+PS decrease (a bit)

Annual average lizardfish catch by gear and gear compositions

<table>
<tr><th colspan="2">Gear</th><th>Ave catch (ton)</th><th>Gear composition of the catch</th></tr>
<tr><td colspan="2">Data sources</td><td colspan="2">Statistics Division (1971~2023)</td></tr>
<tr><td colspan="2">OBT</td><td>8,511</td><td>71%</td></tr>
<tr><td colspan="2">PT</td><td>2,440</td><td>20%</td></tr>
<tr><td colspan="2">PS</td><td>855</td><td>7%</td></tr>
<tr><td rowspan="5">OTH</td><td>squid falling net</td><td rowspan="5">261</td><td rowspan="5">2%</td></tr>
<tr><td>Gillnet fishery</td></tr>
<tr><td>squid falling net</td></tr>
<tr><td>beam trawl</td></tr>
<tr><td>anchovy falling net</td></tr>
</table>



Catch estimation for SU

Average species composition of Lizardfish catch (6 species) by gear (GOT)			
Gear	OBT	PT	Others
Source	Research survey	Port sampling	
	data	data	*Personal communication with Weerapol (DOF)*
Period	2003~2023 (24 years)	2014~2023 (10 years)	
Saurida elongata	38%	24%	
Saurida undosquamis	37%	36%	10% (*)
Saurida isarankurai	20%	4%	
Saurida micropectoralis	2%	25%	
Trachinocephalus myops	2%	1%	
Synodontidae	1%	0%	

To estimate annual SU catch Method (1) based on annual SC

SU catch by year (1971~2023)

= OBT catch*SC1(37%) + PT catch*SC2(36%) + OTH catch*SC3(10%)

SC : Annual average SU species composition

Catch : Annual lizardfish catch (Statistical Division) (1971~2023)

Annual average SC1~SC3 are based on…

SC1 : Demersal fish survey data (2003~2023)

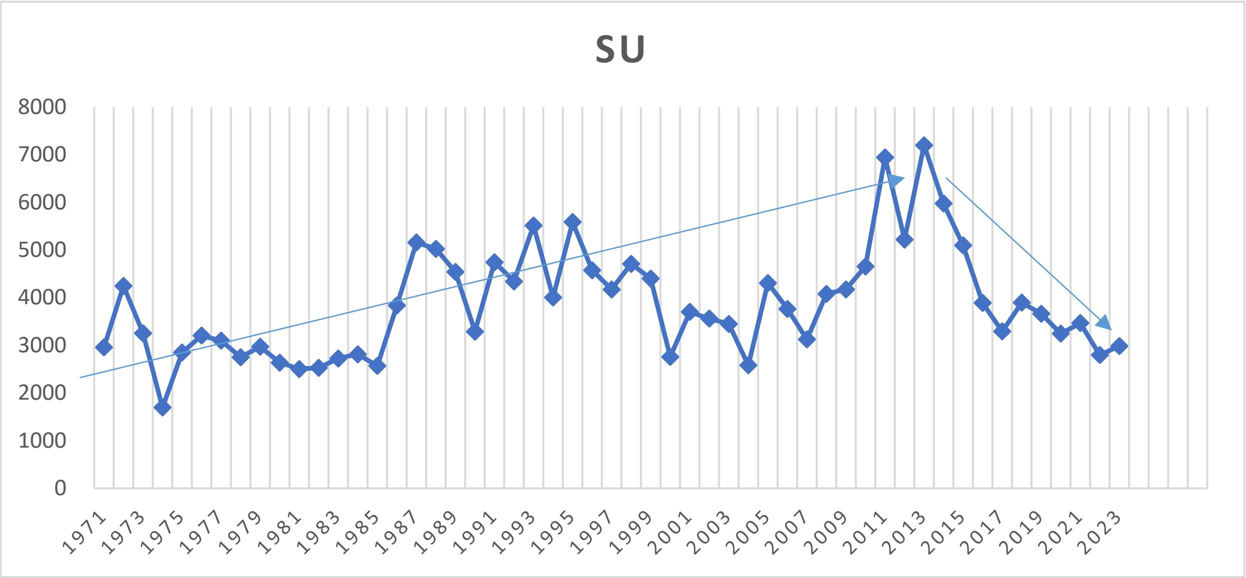
SC2 : Port sampling data (2014~2023)

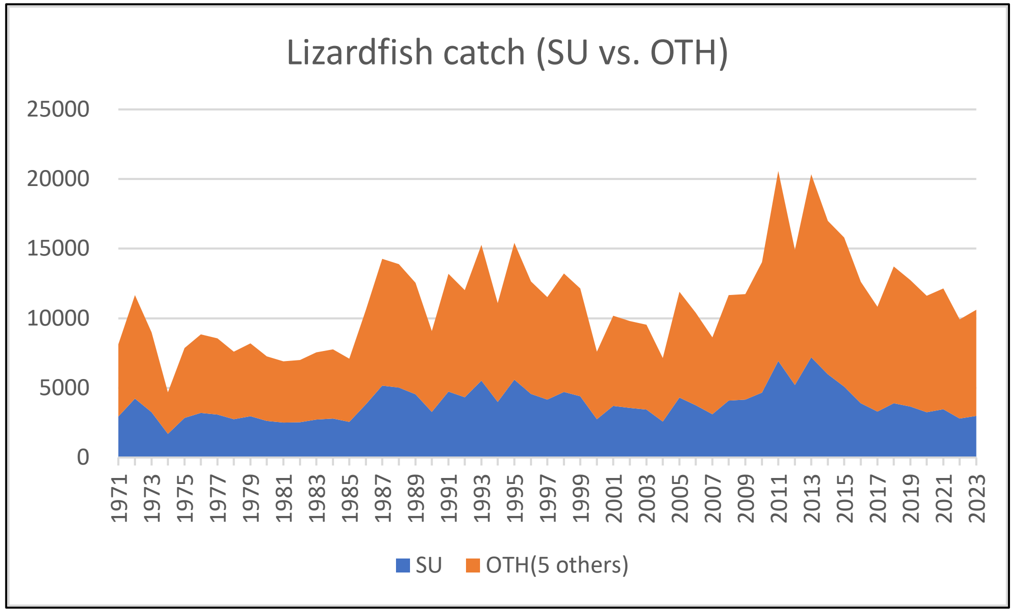
SC3 : DOF (Personal communication with DOF/Weerapol)

Results of SU catch estimation

General increase (3K to 7K tons)
(1971~2015)
then sharp decrease to 3K.
(2015~2023).

Average SU catch is 35% of the total lizardfish catch (6 species)





Year, mo & area average based estimation

May be more accurate

but

Very complicated missing & substitution scheme

Finaly annual catch are almost identical

So, no problem to use for STD_CPUE & JABBA

Demersal WG

1. Introduction
2. Data
3. Species composition
4. Catch & Effort
5. Selection of good CPUE
    - 5.1 Nominal CPUE
    - 5.2 CPUE standardization
    - 5.3 Selection of good CPUE
6. JABBA
    - 6.1 Outline
    - 6.2 Implementation
    - 6.3 SU(*Saurida undosquamis)* & comparisons with TB model
7. Practice & Homework
    - 7.1 JABBA
    - 7.2 CPUE standardization
    - 7.3 Data process
8. Discussion, Summary and Future plan

Start 10:45 AM

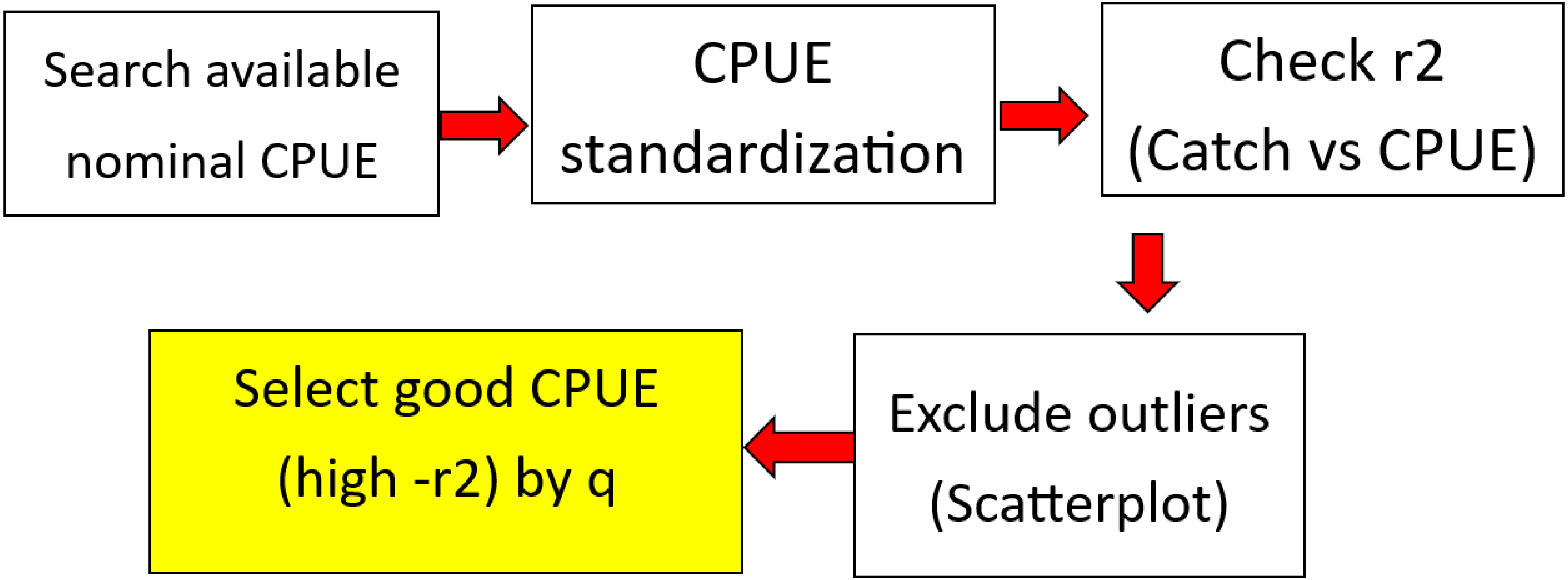
5. Selection of good CPUE for JABBA

5.1 nominal CPUE

5.2 CPUE standardization

5.3 Selection of good CPUE

Flowchart to select good CPUE for JABBA



5.1 Nominal CPUE

Compute available nominal CPUE for all gears referring to <u>data catalog</u>

Data catalog (53 years)

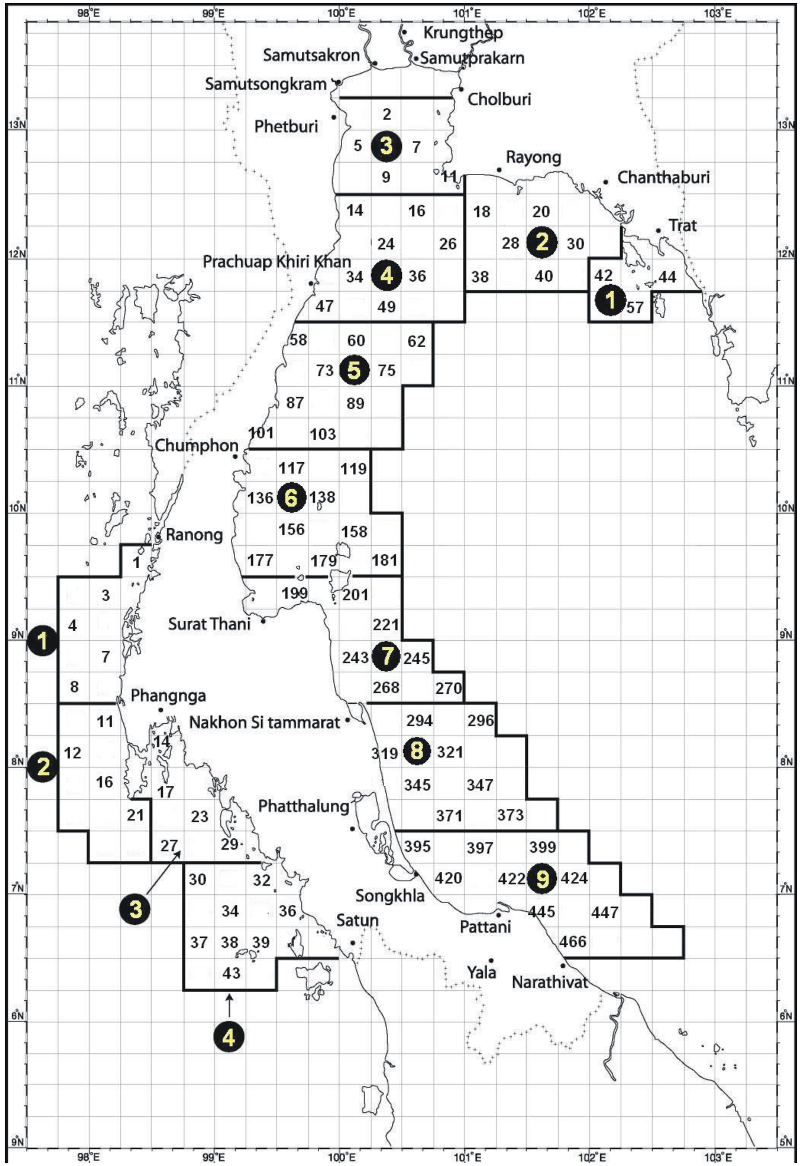
Demersal fish (Lizardfish & threadfin breams) (GOT) *Saurida undosquamis (SU)* (one of 6 Lizardfish species) is used for test trail.							
q catchability (see the text for details)		Source	Statistical division			Research (set by set data)	
						Port sampling	Demersal Survey by OBT
		area	1~5			1~5	1~9
		Catch	tons				
		Effort	See the text for details				
		Covariate (CPUE standardization)	Year and area		Year, MO and area		
Actual	Our case	Gear comp	OTB (71%)+PT (24%)+ OTH (5%)				
q1 (1960-1974)							
q2	q12 (n=24)	1971 → 1994	(1) (q1234) CPUE standardization (1971~2023)	(2) (q12) CPUE standardization (1971~1994)			
q3	q3 (n=21)	1995 → 2015			(3) (q34) CPUE standardization (1995~2023)		(5) (q34) CPUE standardization (2003~2023)
q4	q4 (n=8)	2016 → 2023				(4) (q4) CPUE standardization (2014~2023)	

Results
35 nominal CPUE

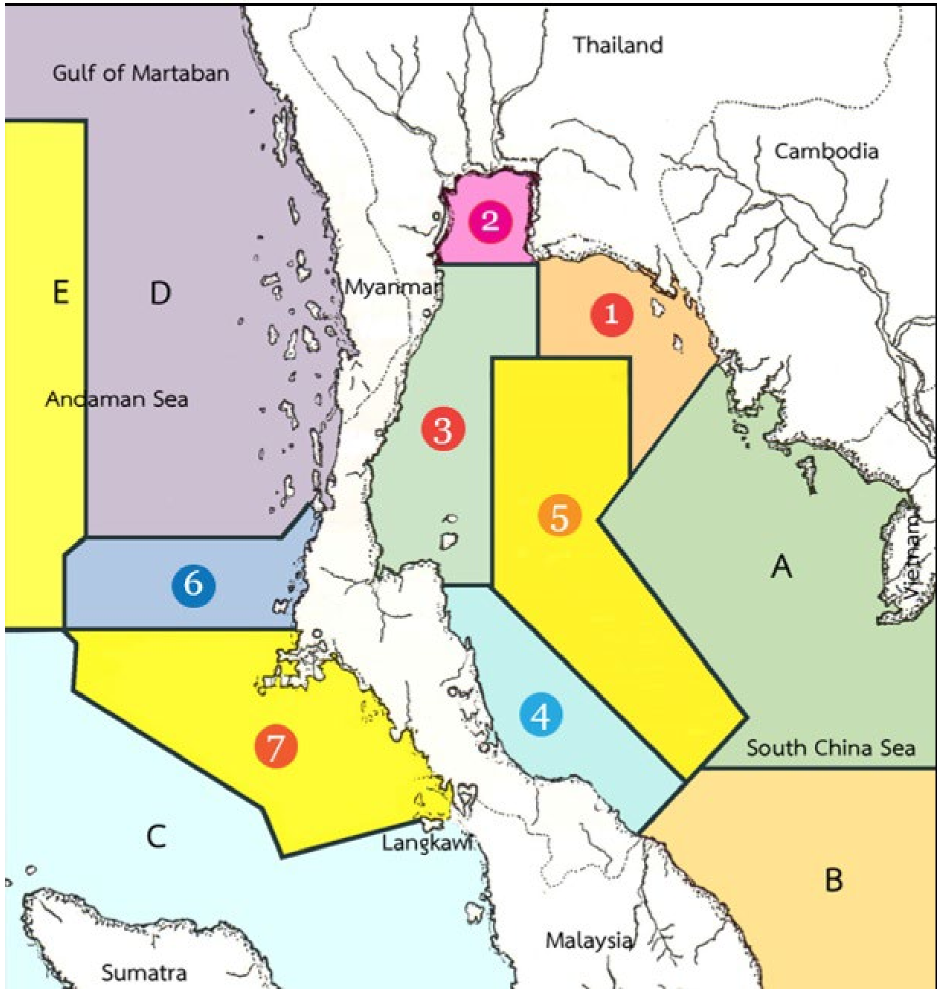
List of nominal CPUE to be standardized and examined to select good ones to be used for JABBA.

Source			Period	q	Gear	Sample size (n=) (*)	No	Effort unit (Kg per)	Covariate of CPUE standardization
Statistical Division		SU catch estimated by SC	(1) 1971~2023	12,3,4	PT	53	1	day	year and area
							2	hr	
					OBT		3	day	
							4	hr	
					OTH		5	day	
							6	hr	
					ALL		7	day	
							8	hr	
					PS		9	day	
							10	hr	
			(2) 1971~1994	12	PT	24	11	day	
							12	hr	
					OBT		13	day	
							14	hr	
					OTH		15	day	
							16	hr	
					ALL		17	day	
							18	hr	
			(3) 1995~2023	3,4	PS	29	19	day	year, month & area
							20	hr	
					PT		21	day	
							22	hr	
					OBT		23	day	
							24	hr	
					OTH		25	day	
							26	hr	
					ALL		27	day	
							28	hr	
Research	Port sampling	Original (set by set data)	(4) 2014~2023	4	OBT	10	29	day	
							30	hr	
					PT		31	day	
							32	hr	
					BT		33	day	
							34	hr	
	Survey		(5) 2003~2023	3,4	OBT	24	35	tow hr	Yr, Mo area, boat type and depth

Research



Statistics



Preparation of nominal CPUE data (just initial part)

(1) Demersal survey data (set by set data)
(2) Port sampling (set by set data)
(3) Statistical Division (monthly data)

We will exercise later or online (ZOOM) after WS2

STAT data

nominal CPUE.

Merge
(Catch & Effort)

Simple R codes
(Excel)

Anyway, you will practice by ZOOM

Effort (hour)

Remark:
Only comm

NA means r

year B.E.	year A.D.	Month	stat area	Mackerel encircling gill net	Mackerel gill net	Otter board trawl	Pair trawl	Purse seine	Other gears	Grand Total
2514	1971	NA	1			1550954	204842		0	1755796
2514	1971	NA	2			1850458	326231		0	2176689
2514	1971	NA	3			1383168	329380		0	1712548
2514	1971	NA	4			1357434	185892		0	1543326
2514	1971	NA	5			26547			0	26547
2515	1972	NA	1			2605110	209066		0	2814176
2515	1972	NA	2			2780287	691774		360454	3832515
2515	1972	NA	3			2003858	211971		84916	2300745
2515	1972	NA	4			2532347	58645		534719	3125711
2515	1972	NA	5			8791	107516		0	116307
2516	1973	NA	1			3255695	443474		166879	3866048
2516	1973	NA	2			3171328	456669		1231978	4859975
2516	1973	NA	3			3093520	307183		384074	3784777
2516	1973	NA	4			4131840	60727		1121183	5313750
2516	1973	NA	5			12145			0	12145
2517	1974	NA	1			1490468	318208	125854	78603	2013133
2517	1974	NA	2			2778932	527799	153666	584700	4045097
2517	1974	NA	3			2743135	233779	110115	308949	3395978
2517	1974	NA	4			3131297	61180	49237	767687	4009401
2517	1974	NA	5				33010		0	33010
2518	1975	NA	1			1593260	327648		90487	2011395
2518	1975	NA	2			3868901	546544		530671	4946116
2518	1975	NA	3			2375958	49733		229844	2655535
2518	1975	NA	4			2792048	47306		451501	3290855
2518	1975	NA	5			31716			0	31716
2519	1976	NA	1			1892903	403638		64413	2360954
2519	1976	NA	2			2887664	516310		508265	3912239
2519	1976	NA	3			3078793	191698		317850	3588341

short mackerel catch (ton) | lizardfish catch (ton) | threadfin bream catch (ton) | effort (day) | effort (hr) | ref

Results of compiled nominal CPUE OBT survey data kg/haul 5 Covariates

	A	B	C	D	E	F
1	year	mo	area	type	depth	CPUE
2	2003	1	4	steel	20	1.2
3	2003	1	4	steel	41	0.552
4	2003	1	5	steel	35	0.07
5	2003	1	5	steel	42	0.108
6	2003	1	5	steel	46	3.14
7	2003	1	5	steel	33	0.3
8	2003	1	5	steel	50	0.658

5.2 CPUE standardization

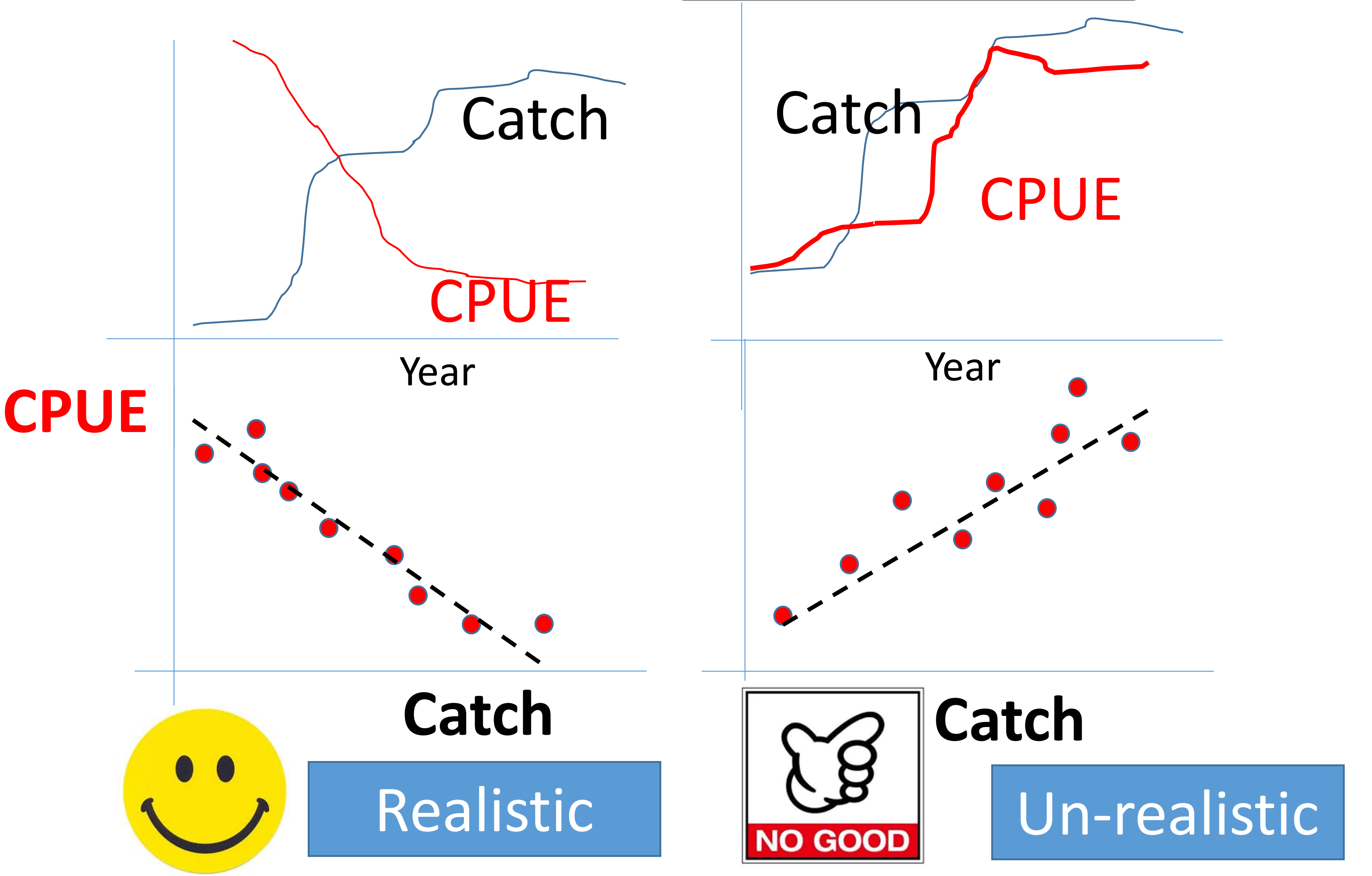
Main objectives for standardized (STD) CPUE

To search good (un-biased) standardized CPUE for JABBA

Bad STD_CPUE➔NG JABBA results
Long time (3 strategies)
JABBA results depend on quality of STD_CPUE

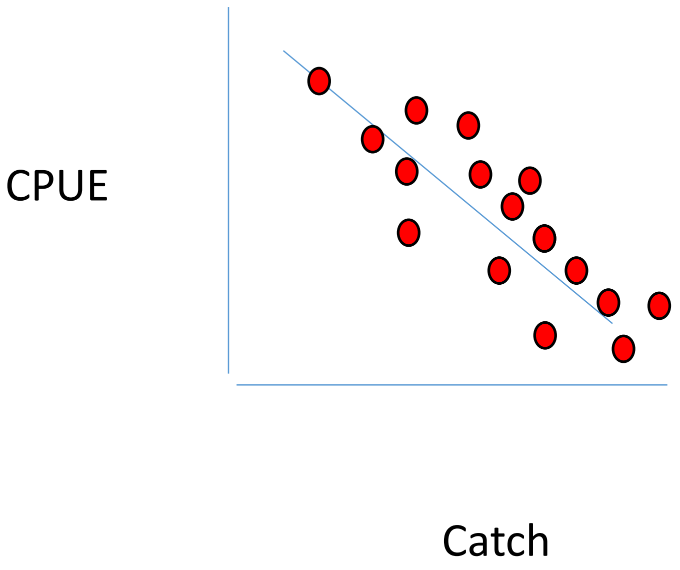
If good STD_CPUE➔ good JABBA results (short time).

: Catch vs. CPUE => should be inversely correlated (realistic)

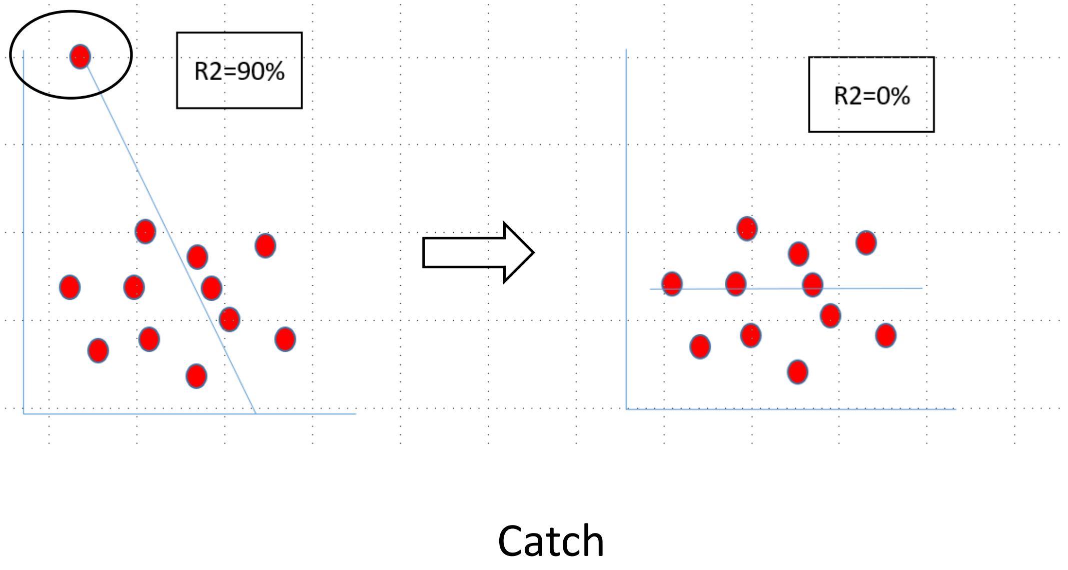


How to search good standardized (STD) CPUE?

Good STD_CPUE
high negative correlation (-r2)
against catch



Be careful for apparent good –r2
affected by outliers



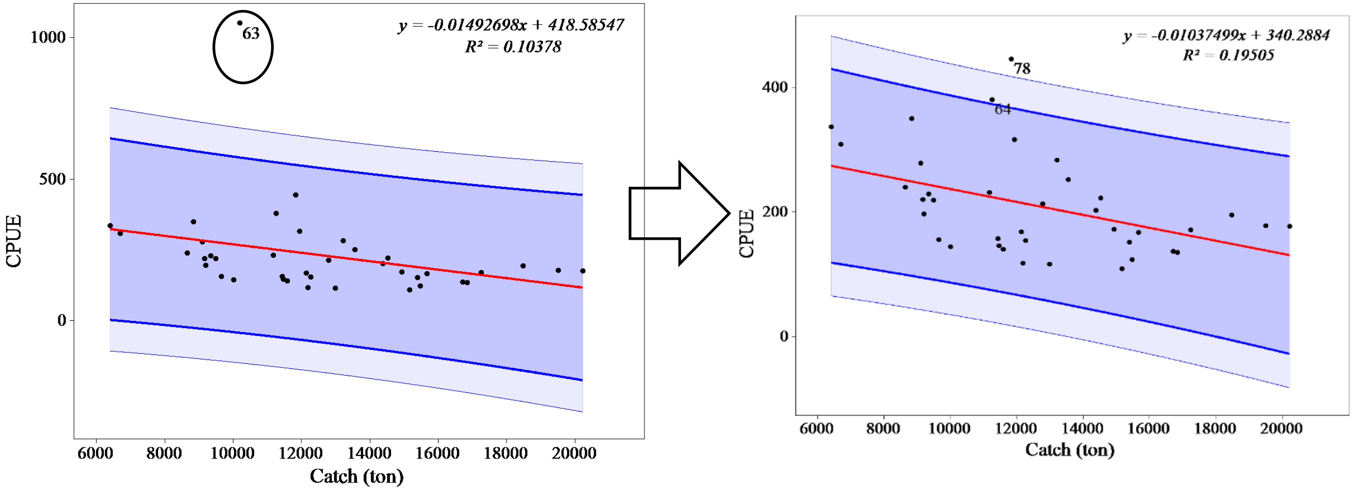
Detection bad CPUE (outliers) & good CPUE (2 ways)

(1) Scatterplot

Remove outliers

Select high –r2 ➔ Good CPUE

-11%➔-20%

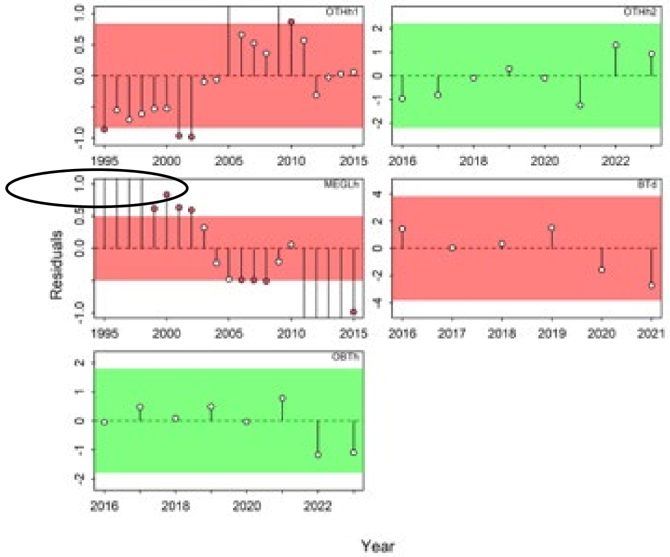


(2) JABBA

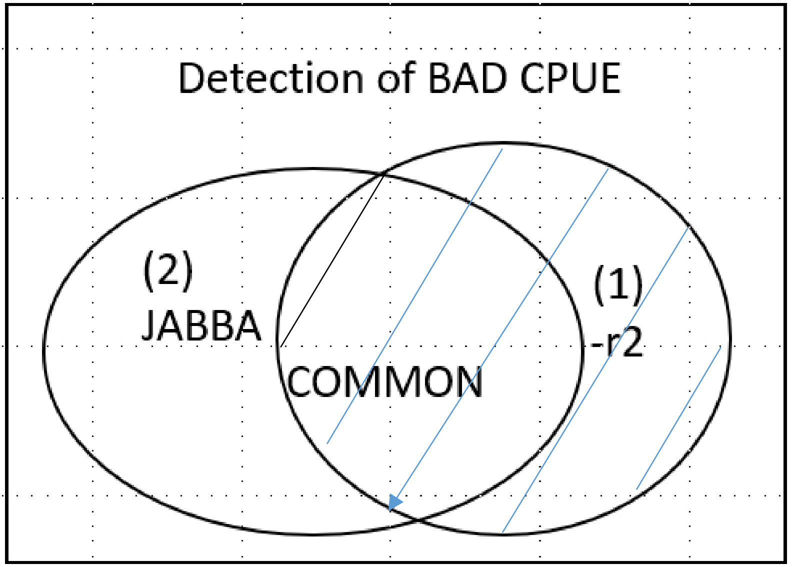
<u>Model based outliers</u>

Delete red points➔ green

Select Good CPUE (green)



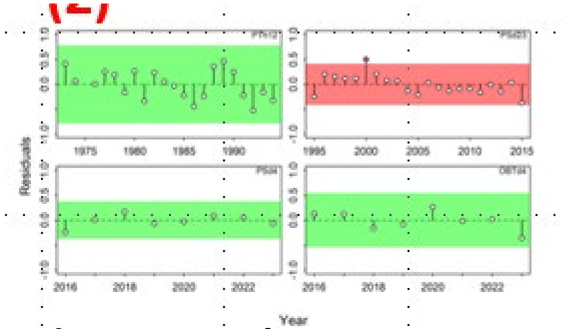
Relation of outliers between (1) & (2)



If BIG outliers are <u>excluded</u> before JABBA by (1) –r2,

➔ JABBA will produce less outliers (red points)

& Produce more Green



<u>Provide good results in a **short time**</u>.

Otherwise, takes a long time to search good results

BIG outliers ? How to define?

Small (minor) outliers **should not** be removed.

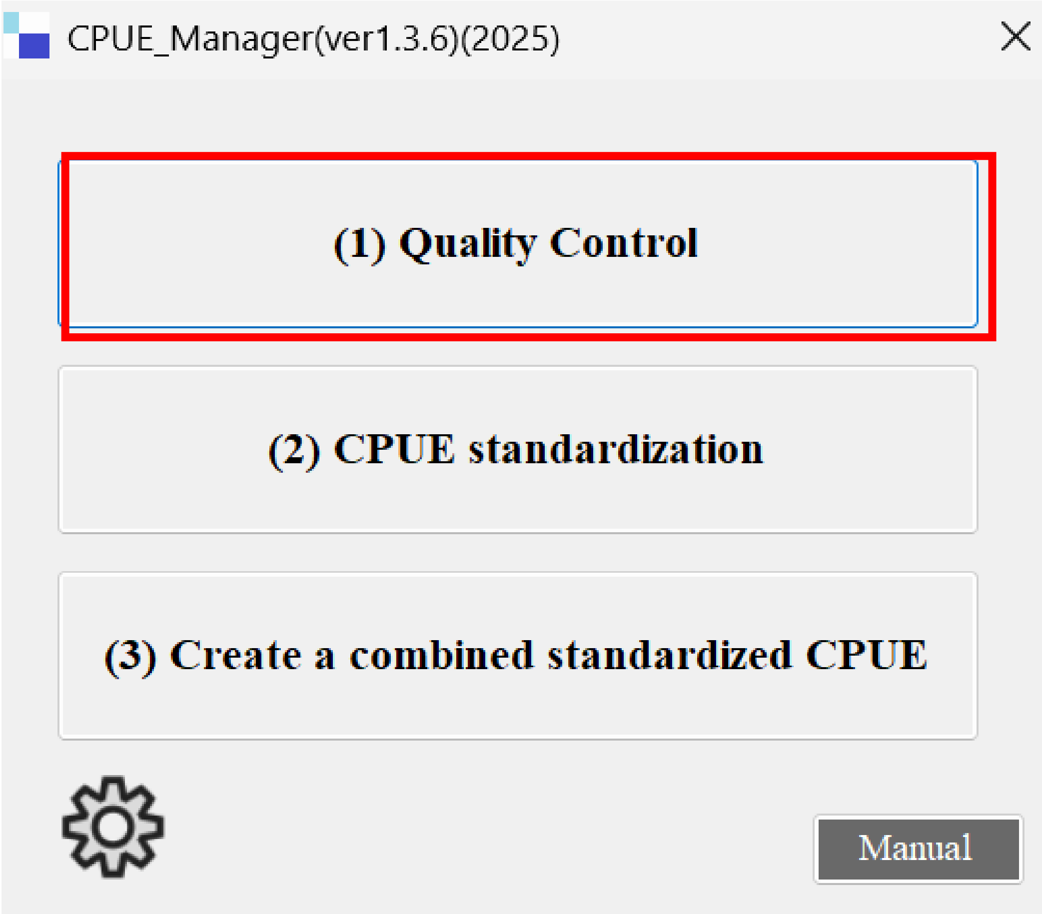
Need to **keep original** data as many as possible

Only significant (large) outliers should be removed

How to decide?

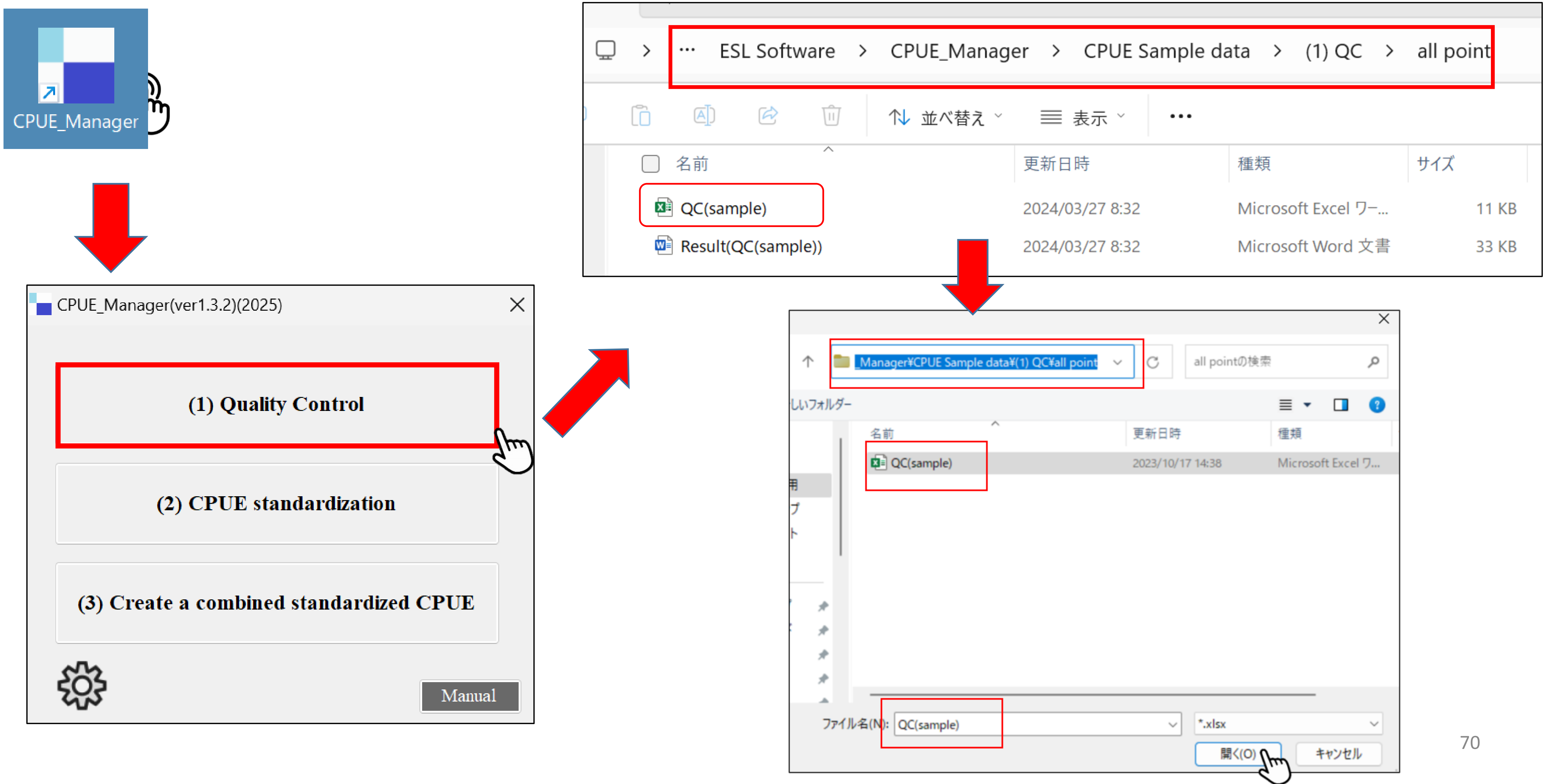
Visual inspection or numerical criteria (> ±4*SE)

CPUE_Manager
➔ QC make scatterplot detect outliers

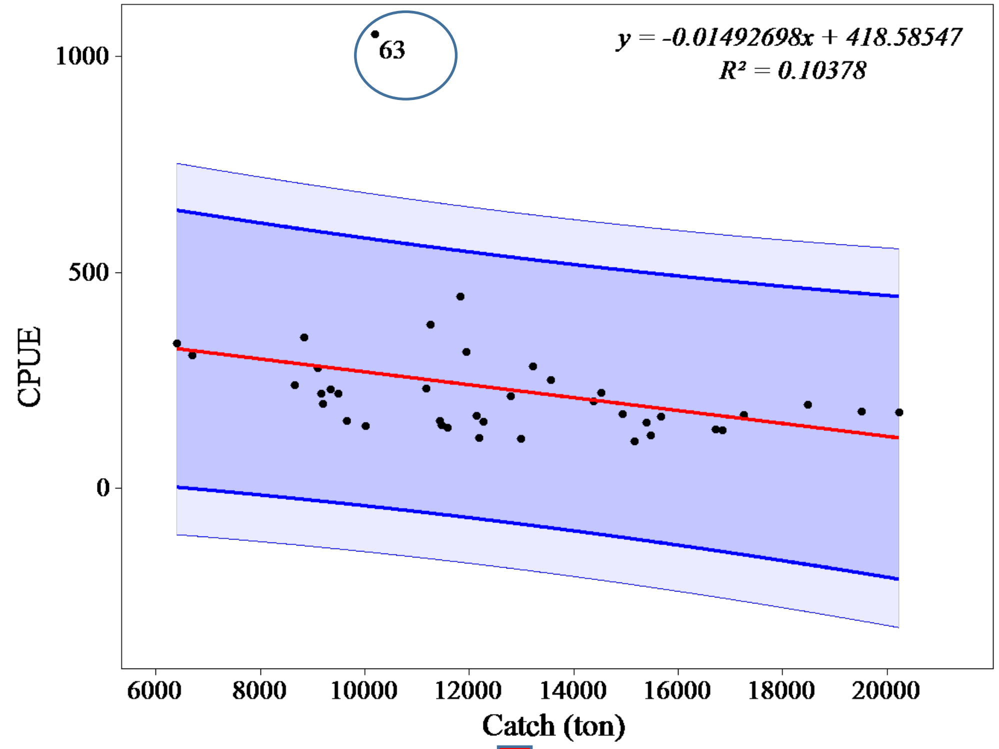


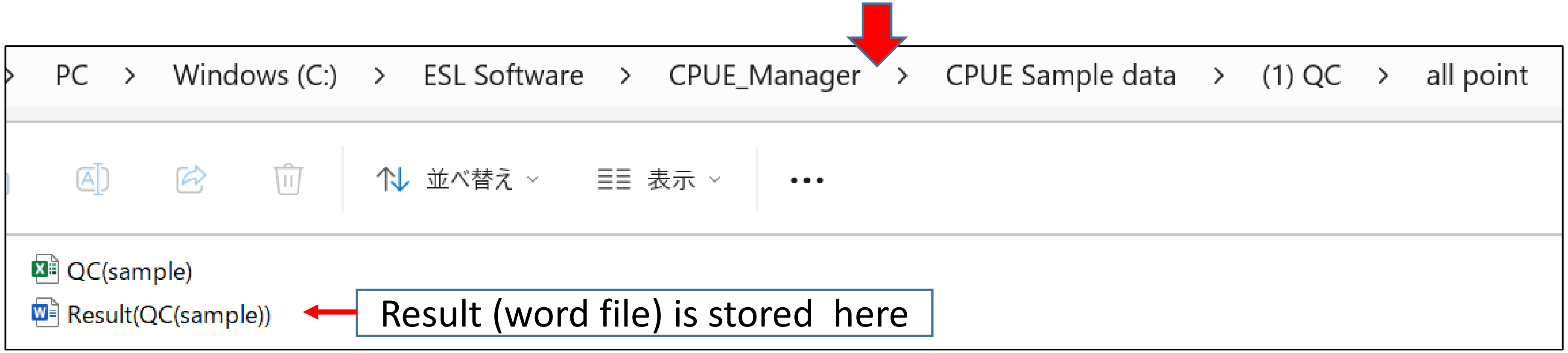
4. [1st menu] Data Quality Control (QC)

Practice using the sample data ➔ Import the QC(sample) excel file

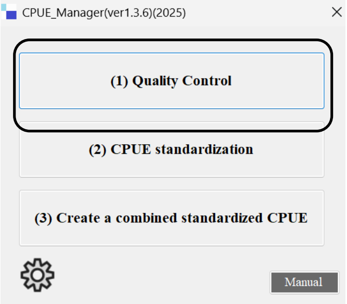


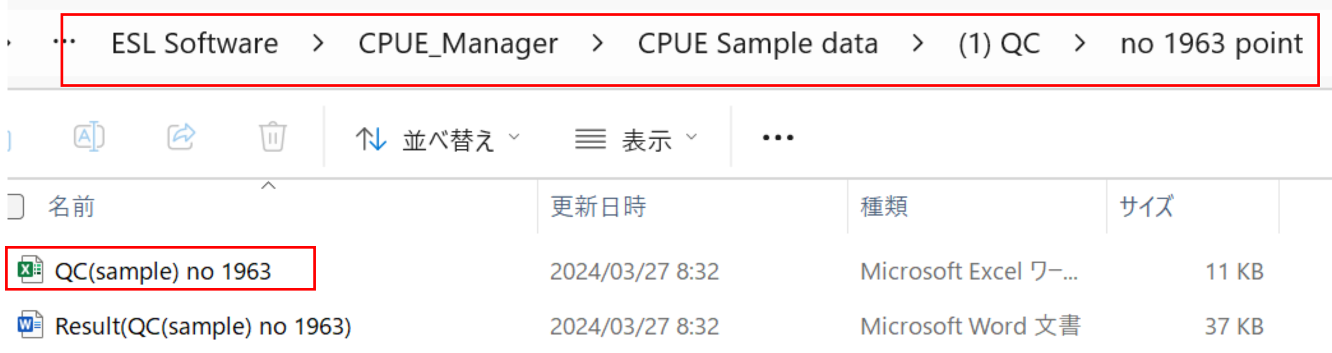
4. [1st menu] Data Quality Control (QC)
Practice using the sample data

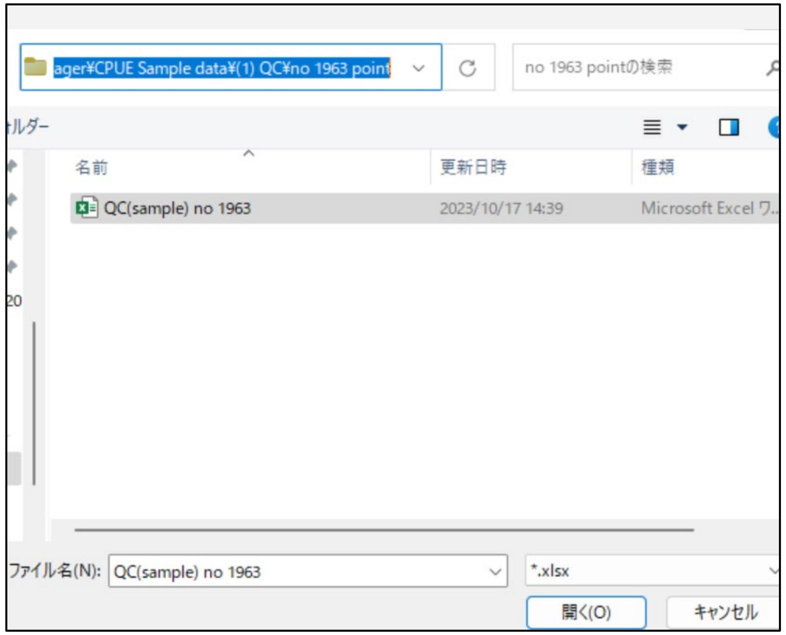




4. [1st menu] Data Quality Control (QC) :Practice using the sample data
Further QC without 1963





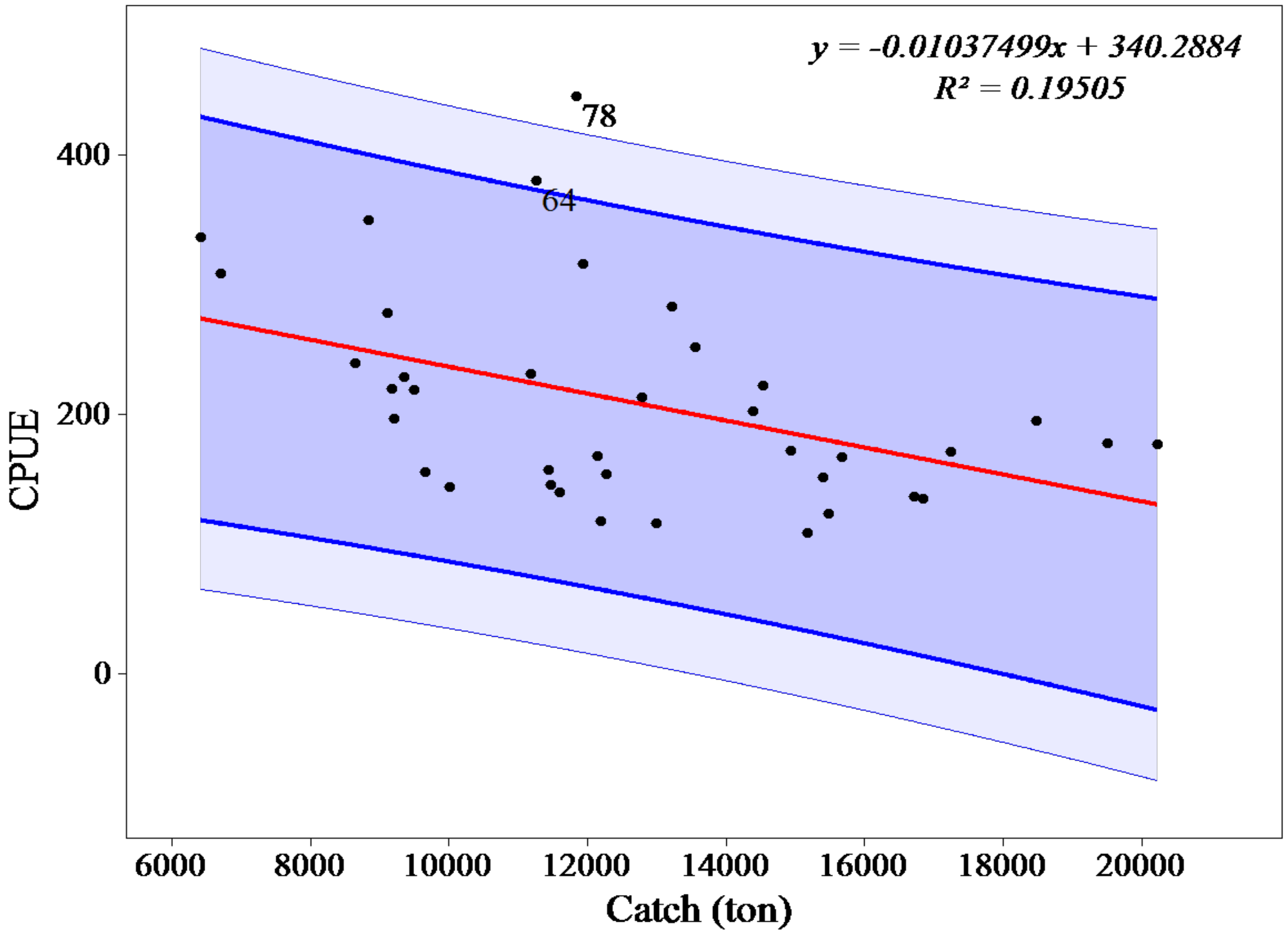


See the next slide for the new graph

4. [1st menu] Data Quality Control (QC)

Practice using the sample data ➔ Results

After removal of one outlier (1963)



RESULTS

Negative CORR relation

is improved, i.e.,

r2 increased (10% to 20%)

No need to remove

the 1978 point as close to

the 99% Confidence band.

Why we need standardized CPUE for ALL gears?

Major gears (large catch) important ➔ But not always good CPUE

minor gears ➔ sometimes good CPUE

In general, what is the <u>good CPUE</u>?

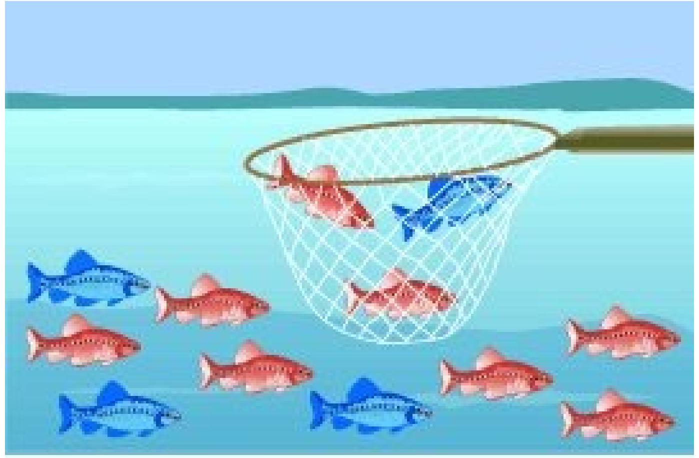
Good CPUE ➔ CPUE based on **simple random sampling**

(high -r2 with catch)

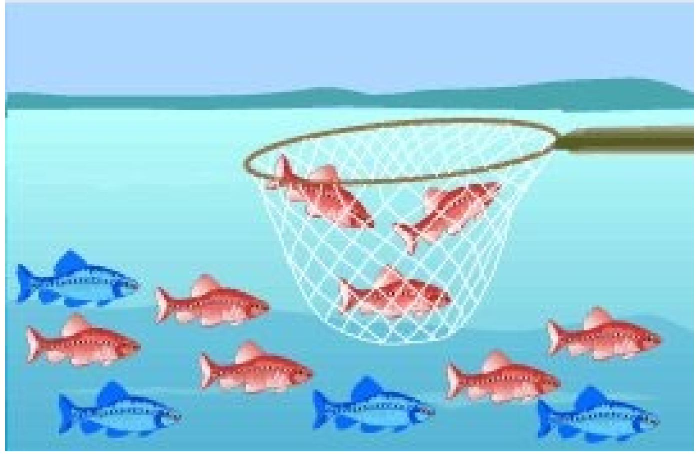
➔ **<u>Good reflection of abundance</u>**

What is simple random sampling ? Why so important?

https://www.youtube.com/watch?app=desktop&v=Zd2UpbvMP_8&ab_channel=ANAPH



Simple random sampling
➔ <u>Proportional</u> red & blue
Our case (SU vs Others)
Reflect population



Biased sampling
(target only red fish)
➔NO reflection of population

Why major gear not good for CPUE ?

Target → not SRS **(simple random sampling)** (bias) → NG

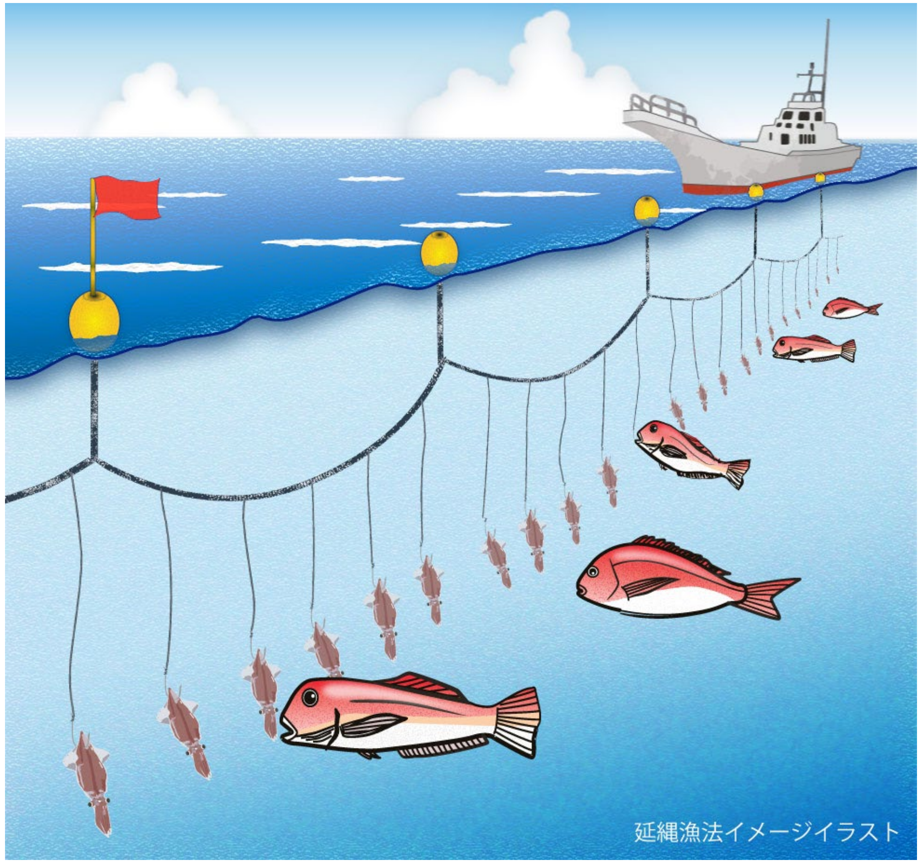
Minor gears may do more SRS

⇩

Because Not targeting thus more SRS

Some interesting story about tuna longline CPUE (IOTC)

- Tuna LL catch amount is very low (5%) (recent years)
  (piracy, reduction of boats as only old crew…)
- Before PS started(1980), catch was highest.
- <u>Some claimed, we should not use LL CPUE as catch is very low.</u>
- But we still use CPUE as the best CPUE because LL **(simple random sampling).**
- **<u>So, the catch amount does not matter</u>**.

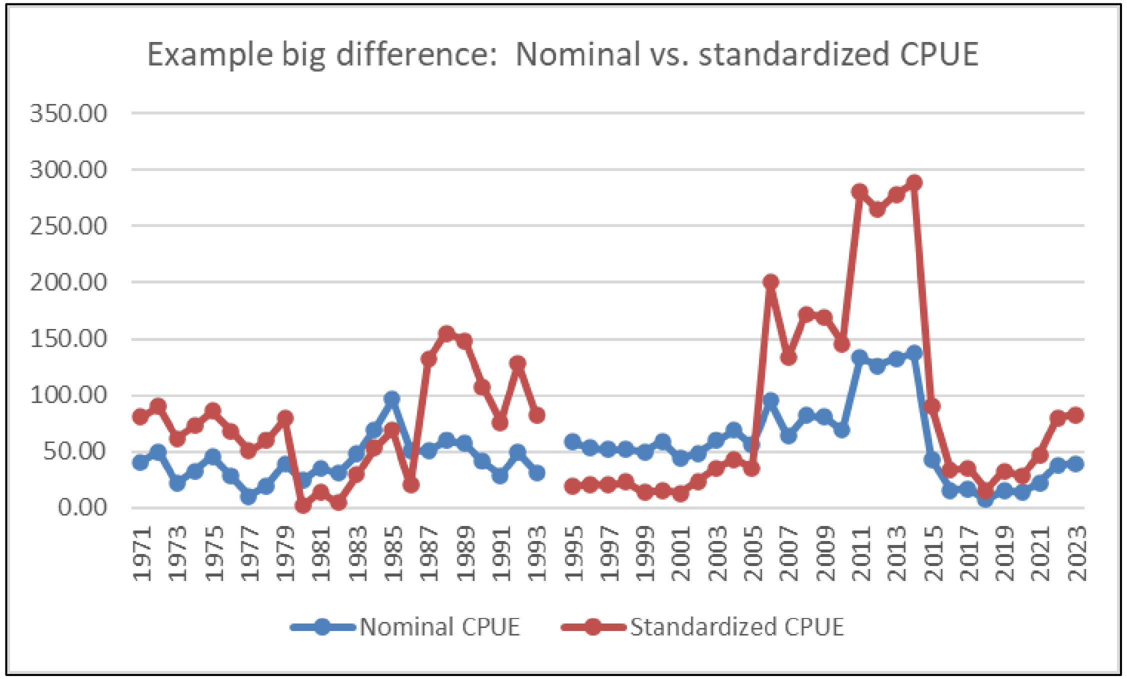


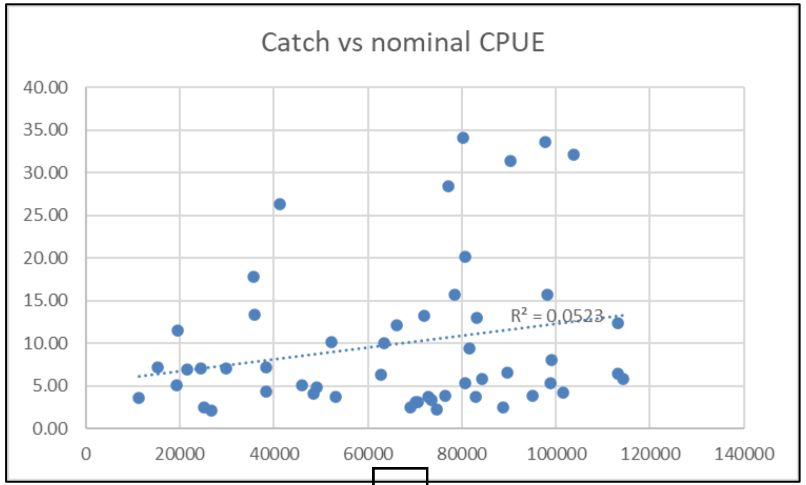
Why nominal CPUE is not used?

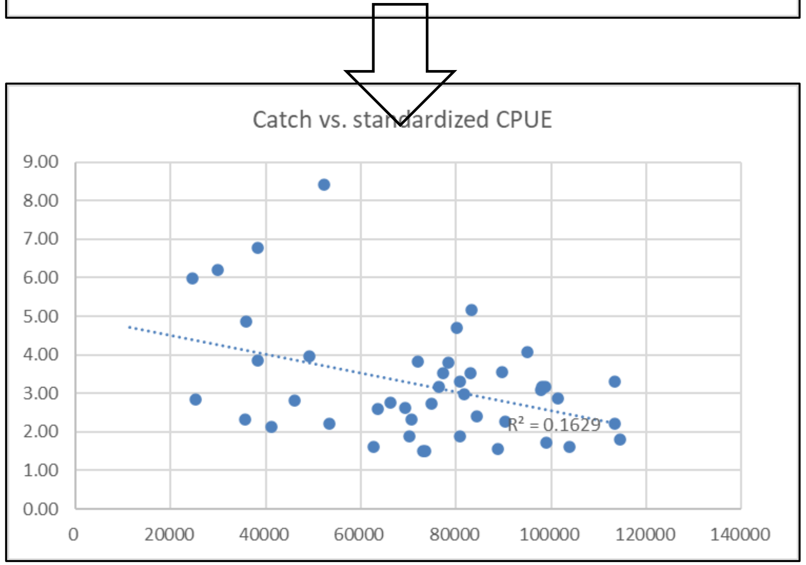
Because standardized CPUE is directly used for JABBA and affect JABBA results.

Nominal CPUE is different from standardized CPUE, thus should not be used.

(see some examples of differences)







CPUE Unit → also relates to Good standardized CPUE

Kg/hour, Kg/day and Kg/haul

basically proportional (linear relation) → produce similar STD_CPUE

But some times different quality → non linear relation

Different unit may produce BETTER STD_CPUE (sometimes)

For example, in the same gear

-r2 (Kg/hr)=-32% vs. –r2(Kg/day)=-10%

In this case, we use Kg/day

Lists
35
nominal CPUE

List of nominal CPUE to be standardized and examined to select good ones to be used for JABBA.

Source			Period	q	Gear	Sample size (n=) (*)	No	Effort unit (Kg per)	Covariate of CPUE standardization
Statistical Division		SU catch estimated by SC	(1) 1971~2023	12,3,4	PT	63	1	day	year and area
							2	hr	
					OBT		3	day	
							4	hr	
					OTH		5	day	
							6	hr	
					ALL		7	day	
							8	hr	
					PS		9	day	
							10	hr	
			(2) 1971~1994	12	PT	24	11	day	
							12	hr	
					OBT		13	day	
							14	hr	
					OTH		15	day	
							16	hr	
					ALL		17	day	
							18	hr	
			(3) 1995~2023	3,4	PS	29	19	day	year, month & area
							20	hr	
					PT		21	day	
							22	hr	
					OBT		23	day	
							24	hr	
					OTH		25	day	
							26	hr	
					ALL		27	day	
							28	hr	
Research	Port sampling	Original (set by set data)	(4) 2014~2023	4	OBT	10	29	day	
							30	hr	
					PT		31	day	
							32	hr	
					BT		33	day	
							34	hr	
	Survey		(5) 2003~2023	3,4	OBT	24	35	tow hr	Yr, Mo area, boat type and depth

(*) These sample sizes (n) is the maximum numbers. This is because, for some cases, outliers are deleted. In addition, to make JABBA fit well, some data are deleted thus some actual # is less than these sample sizes (n).

(**) OBT estimated by survey SC info, while all others by Port sampling SC info.

CPUE standardization

Menu-driven software series (No. 1)

CPUE_Manager (ver1.3.6) (2025) Manual

May, 2025

Tom NISHIDA (PhD) (Representative)

aco20320@par.odn.ne.jp

Kazuharu Iwasaki (Software Engineer)

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

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

Note: The current version is 1.3.6. Some software images in this Manual are from older versions,
But this is not a problem as they are the same.

2 GLM model for CPUE standardization

0 catch rate (%)	Model	Short name
0% ～ 30%	Log normal GLM	Log normal model
30% ～	Zero (0) inflated Delta 2 steps log normal GLM	Delta model

Formula of 2 models

[A] Log normal GLM

log (CPUE + Constant) =Intercept + Year + Season + Area + Season*Area

Categorical data + Other covariates (Max 3) + Error ~ N(0, σ^2)

*See next page about Constant (0.1*average of nominal CPUE)*

[C] Delta 2 steps log normal model

1st step (delta model using logit model)

E [log{q/(1-q)}] =intercept + Year + Season + Area + Season*Area

Categorical data + Other covariates (Max) ,where q(ratio of zero-CPUE)~Binominal (θ)

2nd step (log normal model for non 0 CPUE)

log(CPUE)=Intercept + Year + Season + Area + Season*Area

Categorical data + Other covariates (Max 3) + Error ~ N(0, σ^2)

MONTH → Season by Monsoon for CPUE standardization (Not systematic Q1~Q4) → more meaningful

Change month to season by monsoon

Jan-Feb & Nov ~ Dec	NE (NE monsoon)
Mar ~ April	IM (Inter Monsoon)
May ~Oct	SW (SW monsoon)

However, 3 season too rough → results → not sensitive → NG for ANOVA

Month → more sensitive → good reflection for ANOVA

Thus, if finer season available with enough n= , we should use

Example OBT (kg/day) (Input & Output)

day → Input (Nominal CPUE) →

	A	B	C	D
1	year	Month	Area	CPUE
2	2014	1	5	14
3	2014	2	5	61.75087
4	2014	2	5	64.28571
5	2014	3	5	4.102693
6	2014	3	5	22.78438
7	2014	3	5	28.8

Result(all)(d)(GLM)

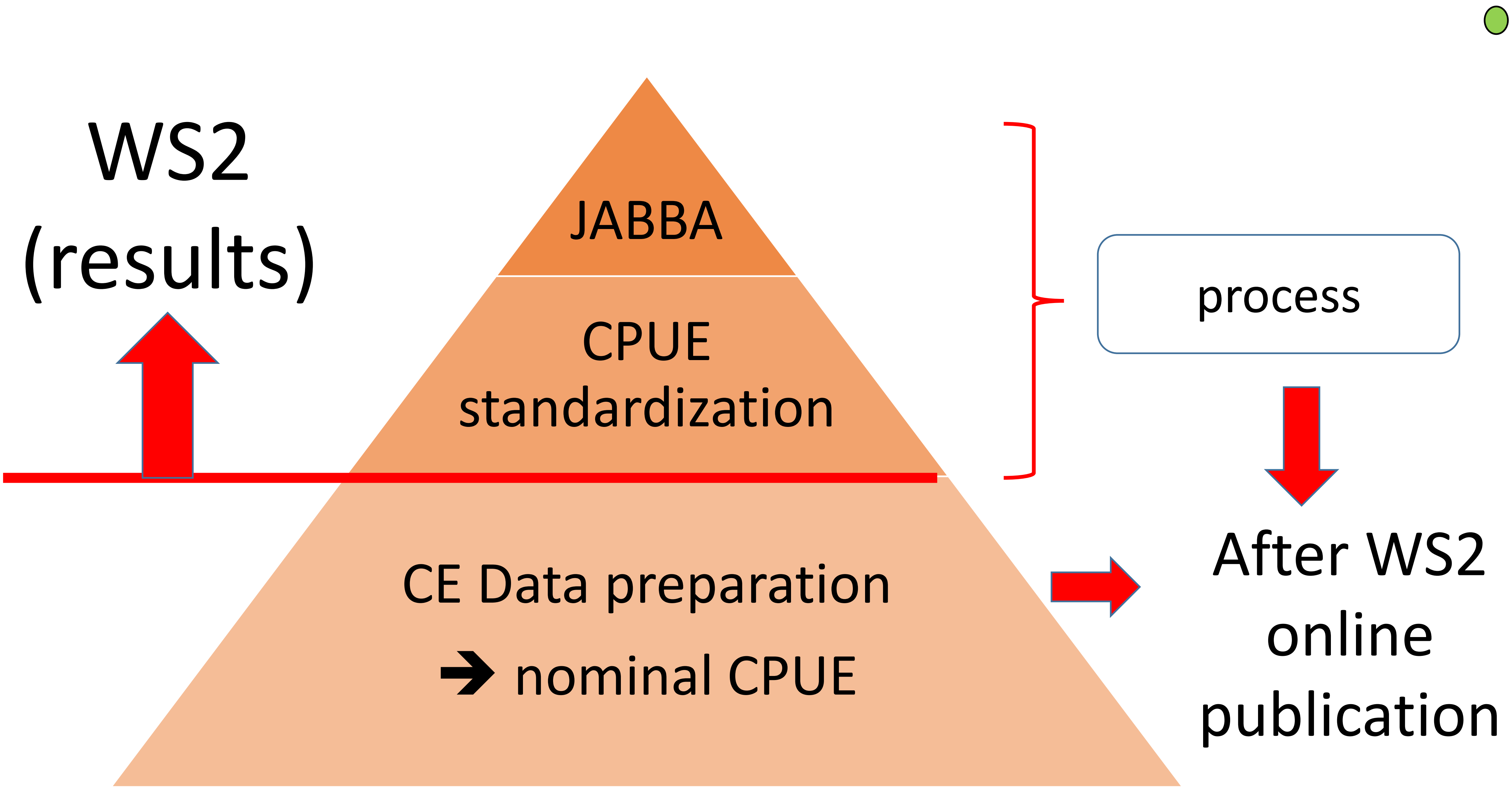
Result(data)(d)(GLM)

Result(sample size)(d)(GLM)

3 outputs (report, sample size & standardized CPUE)

Important note

- For this time, [MENU] made the nomina CPUE data from the original data
- You will practice.
- Data process take 50~60% of time (important)
- There are a lot of judgment, decision & QC how to process the data
- You need experiences


WS2
(results)
JABBA
CPUE
standardization
process
CE Data preparation
➔ nominal CPUE
After WS2
online
publication

5.3 Selection of good CPUE for JABBA

Results of r2 (catch vs STD_CPUE)
3 STD_CPUE (Green markers) selected for JABBA

Grey : Negative r2
Green selected

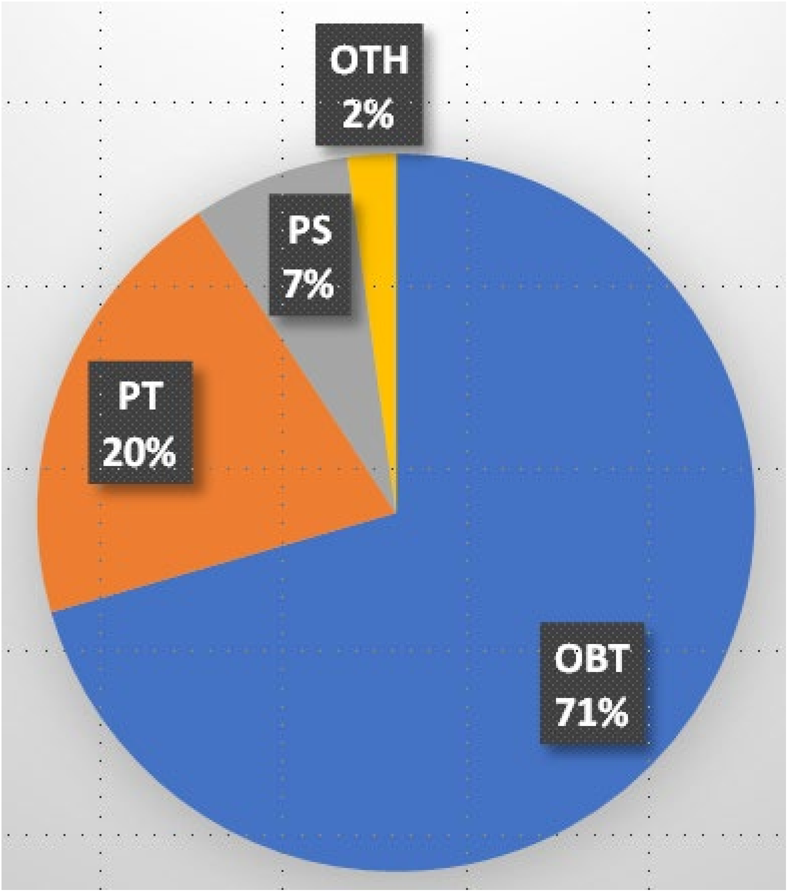
Source			Period	q	Gear	Sample size (n=) (*)	No	Effort unit (Kg per)	Covariate of CPUE standardization	Model	r2 (%)
Statistical Division		SU catch estimated by SC	(1) 1971~2023	12,3,4	PT	63	1	day	year and area	Log normal	5
							2	hr		Log normal	0
					OBT		3	day		Log normal	27
							4	hr		Log normal	32
					OTH		5	day		Delta	-18 (q4)
							6	hr		Delta	-3 (q4)
					ALL		7	day		Log normal	46
							8	hr		Log normal	28
					PS		9	day		Delta	-38 (q34)
							10	hr		Log normal	-51 (few)
			(2) 1971~1994	12	PT	24	11	day		Log normal	-6
							12	hr		Log normal	-7
					OBT		13	day		Log normal	40
							14	hr		Log normal	37
					OTH		15	day		Delta	NA
							16	hr		Delta	NA
					ALL		17	day		Log normal	9
							18	hr		Log normal	5
			(2) 1995~2023	3,4	PS	29	19	day	year, month & area	Delta	-4
							20	hr		Delta	-6
					PT		21	day		Log normal	2
							22	hr		Log normal	14
					OBT		23	day		Delta	20
							24	hr		Delta	24
					OTH		25	day		Log normal	-15 (q4)
							26	hr		Log normal	-4 (q4)
					ALL		27	day		Log normal	64
							28	hr		Log normal	37
Research	Port sampling	Original (set by set data)	(3) 2014~2023	4	OBT	10	29	day		Log normal	-65
							30	hr		Log normal	-64
					PT		31	day		Log normal	-30
							32	hr		Log normal	-30
					BT		33	day		Delta	-1
							34	hr		Delta	-2
	Survey		(4) 2003~2023	3,4	OBT	24	35	tow hr	Yr, Mo area, boat type and depth	Log normal	0

(*
sc

(*

Selected STD_CPUE(3)

PS(day) (q34),
PT(hr)(q12)
OBT(day)(q4)



2 Major gears (OBT+PT) & 1 minor (PS)

➔ less targeting effect (SRS)

All OK

except

(*)

PS (day) data (1971~1994) could not be used due to not plausible data.

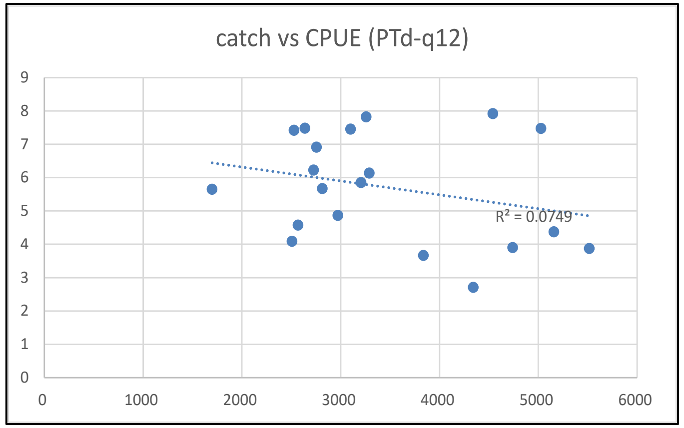
Thus, CPUE are not available.

Demersal fish (Lizardfish & threadfin breams) (GOT)
Saurida undosquamis (SU) **(one of 6 Lizardfish species) is used for test trail.**

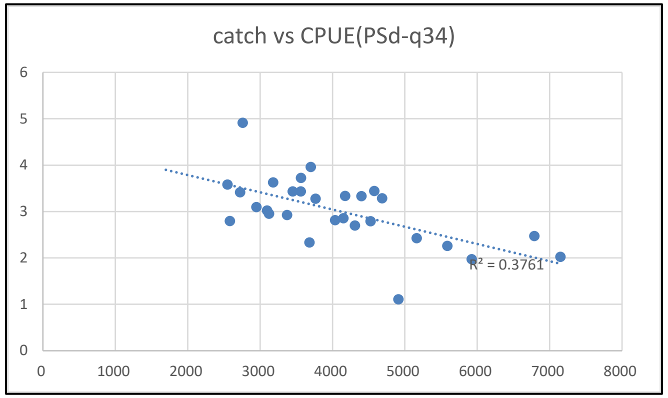
q catchability (see the text for details)		Source	Statistical division			Research (set by set data) Port sampling	Research (set by set data) Demersal Survey by OBT
		area	1~5			1~5	1~9
		Catch	tons				
		Effort	See the text for details				
		Covariate (CPUE standardization)	Year and area		Year, MO and area		
Actual	Our case	Gear comp	OTB (71%)+PT (24%)+ OTH (5%)				
q1 (1960-1974)	q12 (n=24)	1971	(*)	(2) (q12) PT(hr) (r2=-7%) SELECTED			
q2		1994					
q3	q3 (n=21)	1995	(1) (q34) PS (day) (r2=-38%) SELECTED (*)		(3) (q34) NOT SELECTED		(5) (q34) NOT SELECTED
		2015					
q4	q4 (n=8)	2016				(4) (q4) OBT(day)(-65%) SELECTED	
		2023					

(*) data (1971~1994) (q12) was not used due to unrealistic.

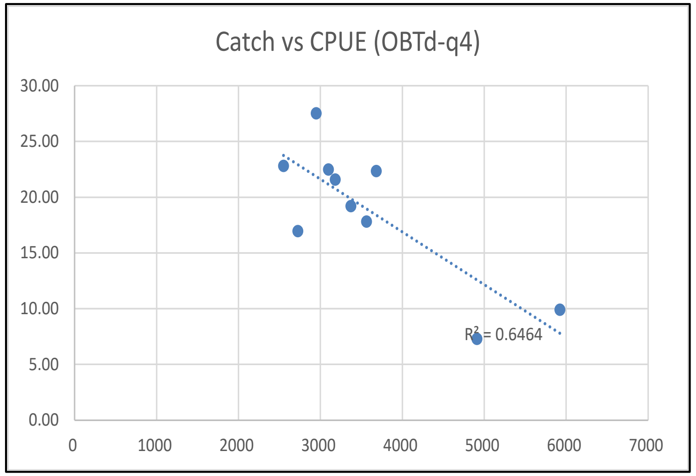
fleet1
q12
PT-day
(n=24)

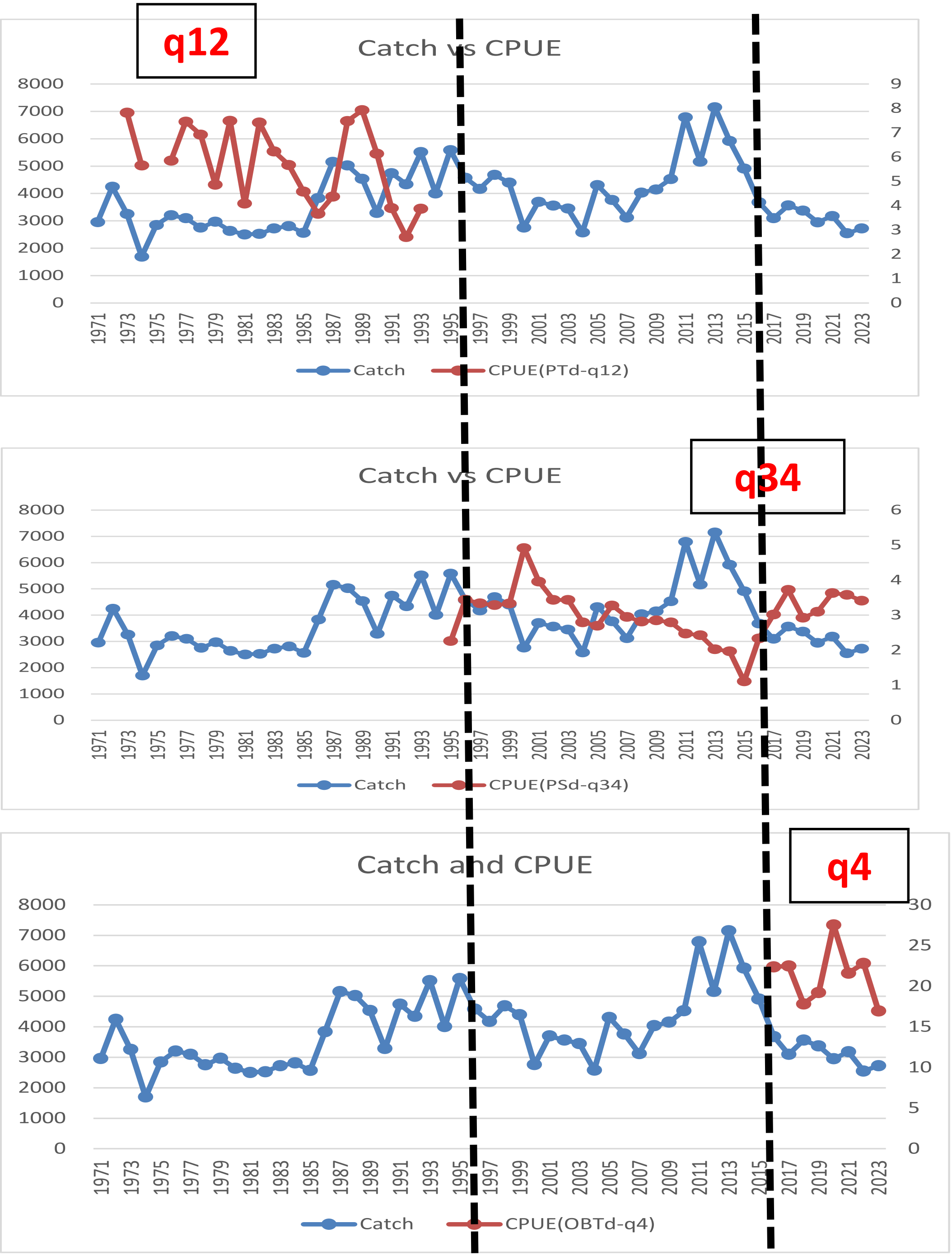


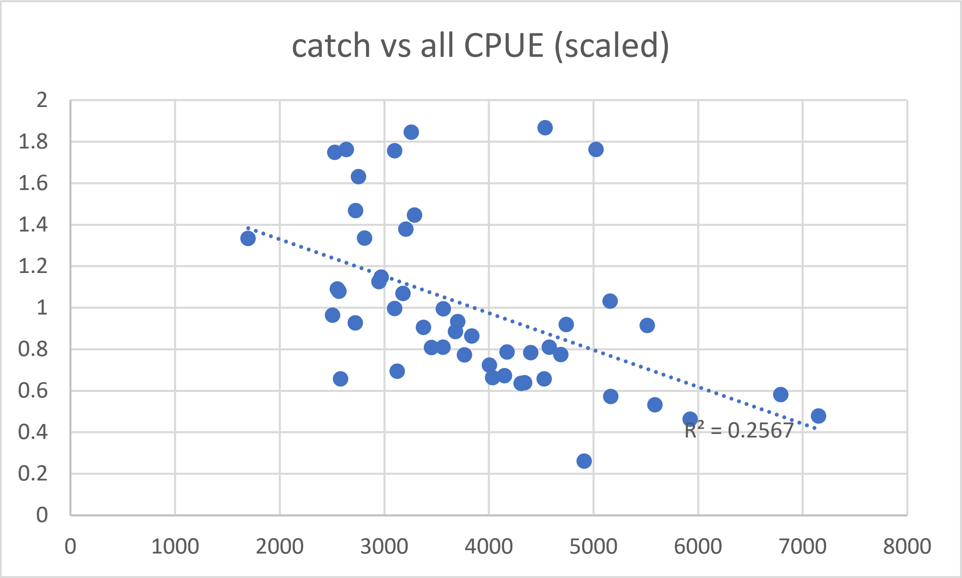
fleet2
q34
PS-day
n=29

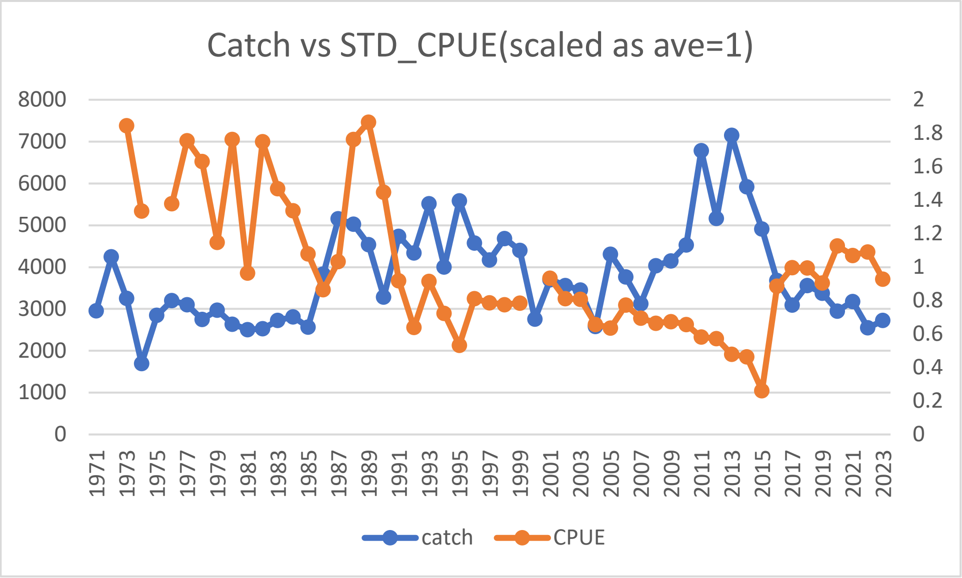


Fleet3
q4
OBT-day
n=8









3 selected individual CPUE had high –r2 and the combined one is also high r2=-26%.
Unlike the one for SM, SU has steadily good negative correction.

The global situation shows very good relation between catch and STD_CPUE.

Note on selected standardized CPUE

- Same 3 STD_CPUE can be used next 3~5 years
  if no big changes in fisheries affecting STD_CPUE.

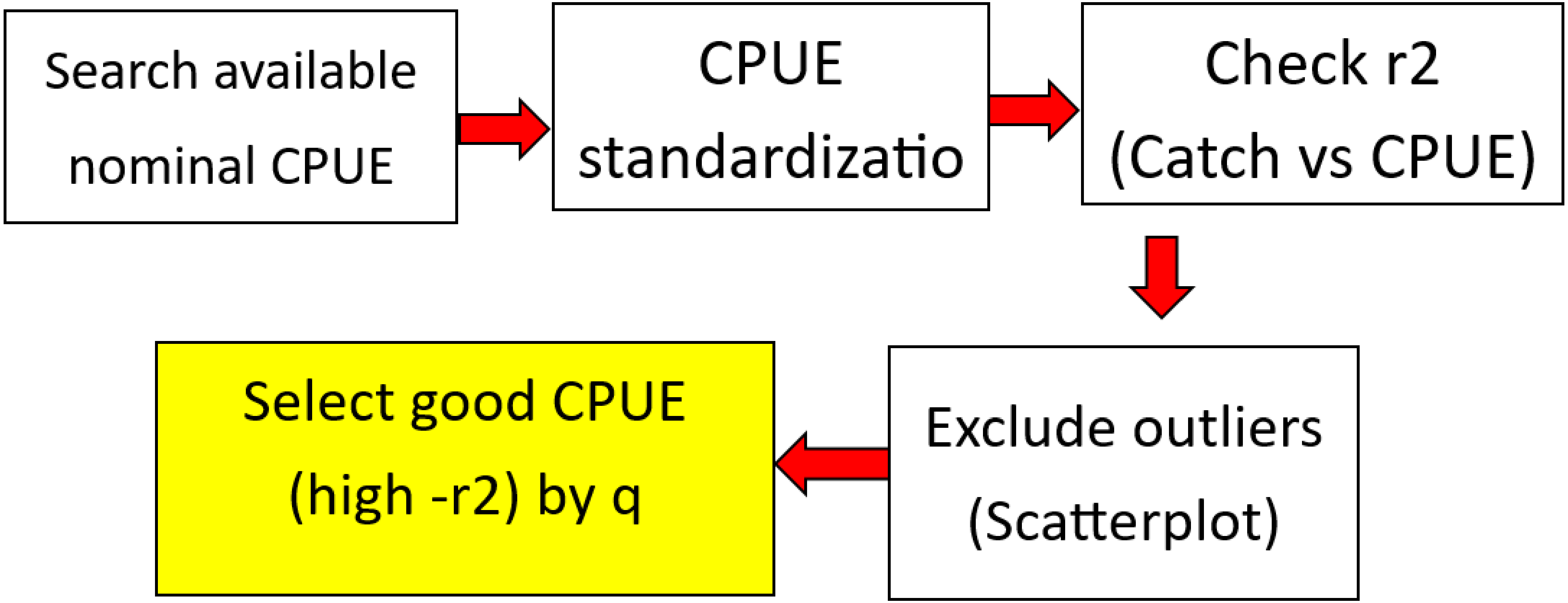
- 3~5 years later and/or if there are some big changes on fisheries, we need to update and find the good STD_CPUE again.

Note on selected standardized CPUE

- Please note that it will takes a long time to produce good CPUE with careful data process and CPUE standardization.

- Thus, we need practice together this time (small exercise) or in the future (On-line by Zoom).

Flowchart to select good CPUE for JABBA



Demersal WG

1. Introduction
2. Data
3. Species composition
4. Catch & Effort
5. Selection of good CPUE
    - 5.1 Nominal CPUE
    - 5.2 CPUE standardization
    - 5.3 Selection of good CPUE
6. JABBA
    - 6.1 Outline
    - 6.2 Implementation
    - 6.3 SU(*Saurida undosquamis)* & comparisons with TB model
7. Practice & Homework
    - 7.1 JABBA
    - 7.2 CPUE standardization
    - 7.3 Data process
8. Discussion, Summary and Future plan

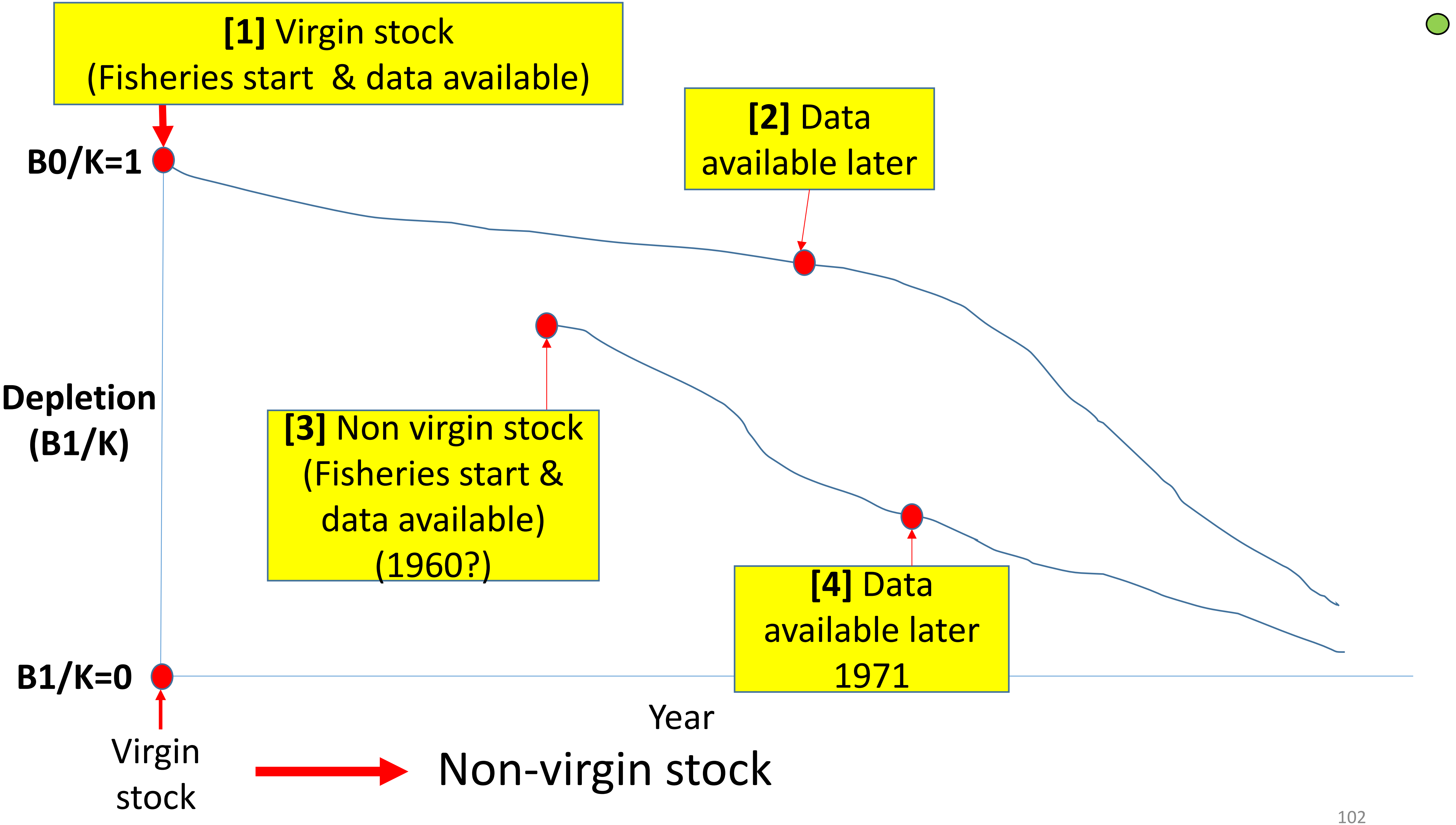
6. JABBA

Contents (JABBA)

6.1 Implementation

4 cases

What & why are 4 cases?


[1] Virgin stock
(Fisheries start & data available)
B0/K=1
[2] Data
available later
Depletion
(B1/K)
[3] Non virgin stock
(Fisheries start &
data available)
(1960?)
[4] Data
available later
1971
B1/K=0
Year
Virgin
stock
Non-virgin stock

Implementation case [1]~[4]

Case [1] ➔ direct (normal) approach

Vs.

Case [2]~[4] ➔ Scenario approach

Case [2]~[4]
Why scenario approach ? Why not normal approach?
Butterworth & Wang

Direct (normal) estimation approach : Case [1]

➔ Virgin stock & data available

(Need long, stable & reliable data)

➔ Tuna & BILL fish data (RFMO) 1950~ OK

RFMO Regional Fisheries Management Organization

Why scenario approach ? Why not direct approach?
Nishida + Butterworth + Wang

- If fisheries start after virgin stock ➔ B1/K cannot be estimated
- Problem [2]~[4] normal approach

NG : Prior=posterior

Need Scenario (robust) approach

Good for non virgin & data available later

Initial Seeding values (B1/K) Depletion	Estimated B1/K (almost same) NG	
	Schaefer	Fox
0.2	0.21	0.20
0.4	0.39	0.39
0.6	0.59	0.58
0.8	0.80	0.82

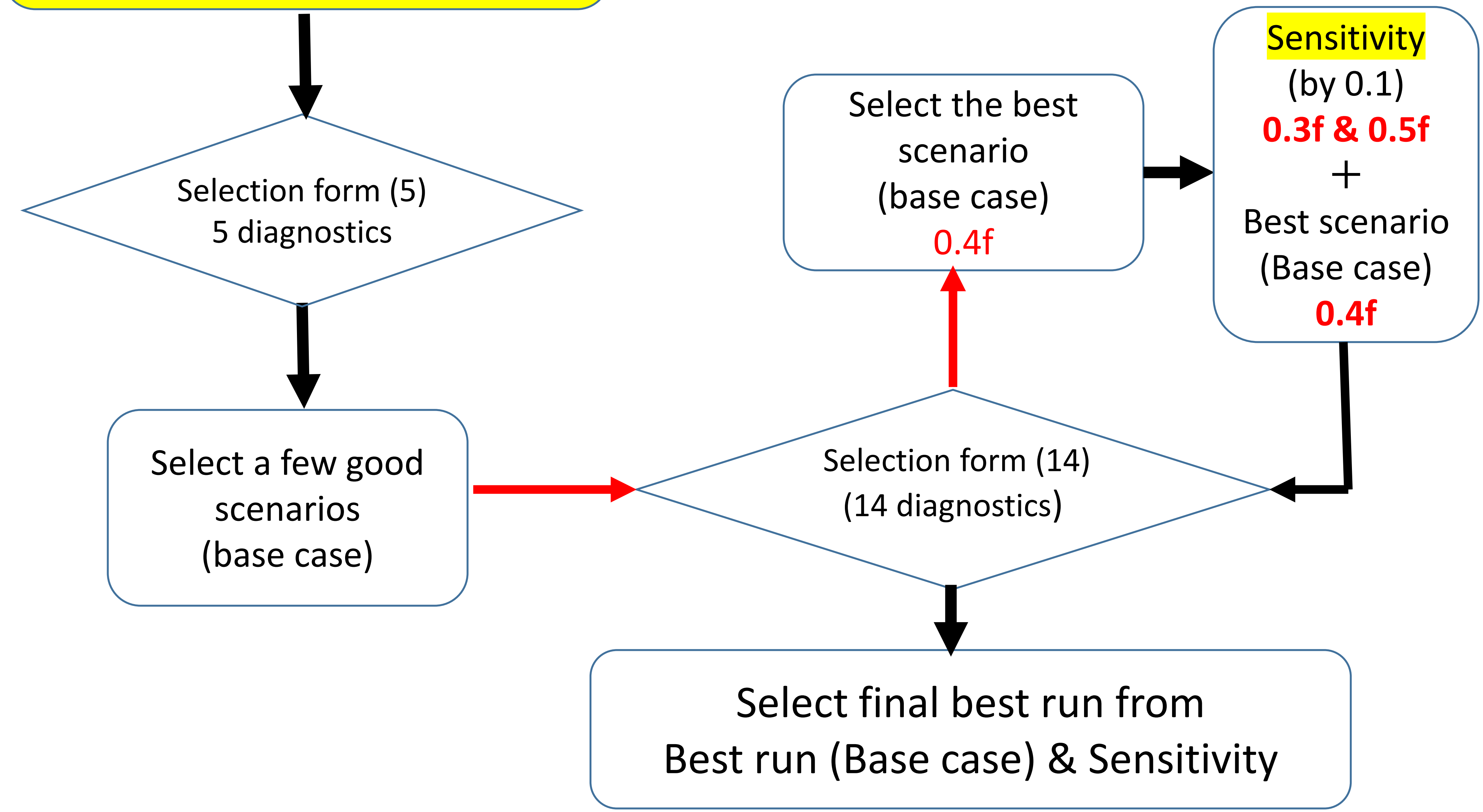
Prior=posterior

6.2 How to implement cases [2]~[4]?

Let’s try our SU data

We follow the flowchart (next page)

Implementation
JABBA runs Case 2~4 (Scenario approach)

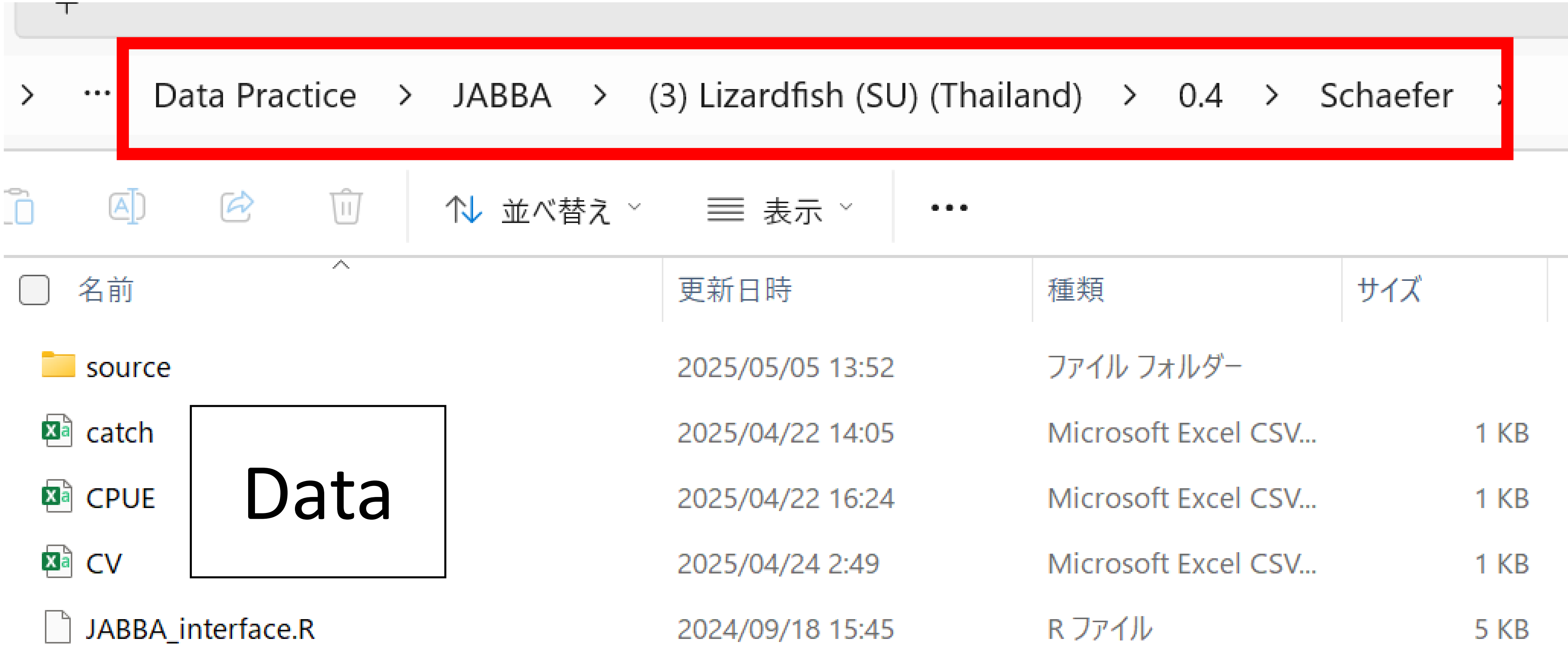


We normally use 0.2 0.4 0.6 0.8（default）

But 0.2 is too conservative and no need to include

We will start from 0.4 0.6 0.8

0.4s folder is prepared for you



Let’s see inside of the data
Normally you need to make data by yourself
but [MENU] made it for you

(1)Catch
(2)CPUE
(3)CV

Catch (1971~2023)

year	SU catch
1971	2958
1972	4248
1973	3257
1974	1698
1975	2849
1976	3205
1977	3100
1978	2754
1979	2971
1980	2638
1981	2506
1982	2527
1983	2726
1984	2812
1985	2568
1986	3837
1987	5158
1988	5026
1989	4539
1990	3289
1991	4741
1992	4341
1993	5515
1994	4006
1995	5587
1996	4579
1997	4174
1998	4687
1999	4400
2000	2760
2001	3701
2002	3563
2003	3452
2004	2582
2005	4309
2006	3766
2007	3125
2008	4036
2009	4150
2010	4528
2011	6790
2012	5165
2013	7152
2014	5924
2015	4911
2016	3682
2017	3098
2018	3564
2019	3374
2020	2950
2021	3180
2022	2550
2023	2724

CPUE(4 fleets)

	A	B	C	D	E
1	year	PT_h_12	PS_d_3	PS_d_4	OBT_d_4
2	1971				
3	1972				
4	1973	7.83			
5	1974	5.66			
6	1975				
7	1976	5.85			
8	1977	7.45			
9	1978	6.92			
10	1979	4.87			
11	1980	7.48			
12	1981	4.09			
13	1982	7.42			
14	1983	6.23			
15	1984	5.67			
16	1985	4.58			
17	1986	3.67			
18	1987	4.38			
19	1988	7.48			
20	1989	7.92			
21	1990	6.14			
22	1991	3.9			
23	1992	2.71			
24	1993	3.88			
25	1994	3.07			
26	1995		[illegible]		
27	1996		3.44		
28	1997		3.34		
29	1998		3.29		
30	1999		3.33		
31	2000		4.91		
32	2001		3.96		
33	2002		3.44		
34	2003		3.43		
35	2004		2.79		
36	2005		2.7		
37	2006		3.28		
38	2007		2.95		
39	2008		2.82		
40	2009		2.86		
41	2010		2.79		
42	2011		2.47		
43	2012		2.43		
44	2013		2.03		
45	2014		1.97		
46	2015		1.11		
47	2016			2.33	22.36
48	2017			3.02	22.5
49	2018			3.72	17.82
50	2019			2.93	19.21
51	2020			3.1	27.54
52	2021			3.63	21.6
53	2022			3.58	22.81
54	2023			3.41	16.96

q12

q3

q4

OBT (day) (q4)

	A	B	C	D	E
1	year	PT_h_12	PS_d_3	PS_d_4	OBT_d_4
2	1971				
3	1972				
4	1973	7.83			
5	1974	5.66			
6	1975				
7	1976	5.85			

Q34(PS_day_34)
Split
into q3 & q4

CV

For CPUE

Default

0.2

(same as ASPIC)

A	B	C	D	E
yr	PTh12	PSd3	PSd4	OBTd4
1971				
1972				
1973	0.2			
1974	0.2			
1975				
1976	0.2			
1977	0.2			
1978	0.2			
1979	0.2			
1980	0.2			
1981	0.2			
1982	0.2			
1983	0.2			
1984	0.2			
1985	0.2			
1986	0.2			
1987	0.2			
1988	0.2			
1989	0.2			
1990	0.2			
1991	0.2			
1992	0.2			
1993	0.2			
1994	0.2			
1995		0.2		
1996		0.2		
1997		0.2		
1998		0.2		
1999		0.2		
2000		0.2		
2001		0.2		
2002		0.2		
2003		0.2		
2004		0.2		
2005		0.2		
2006		0.2		
2007		0.2		
2008		0.2		
2009		0.2		
2010		0.2		
2011		0.2		
2012		0.2		
2013		0.2		
2014		0.2		
2015		0.2		
2016			0.2	0.2
2017			0.2	0.2
2018			0.2	0.2
2019			0.2	0.2
2020			0.2	0.2
2021			0.2	0.2
2022			0.2	0.2
2023			0.2	0.2

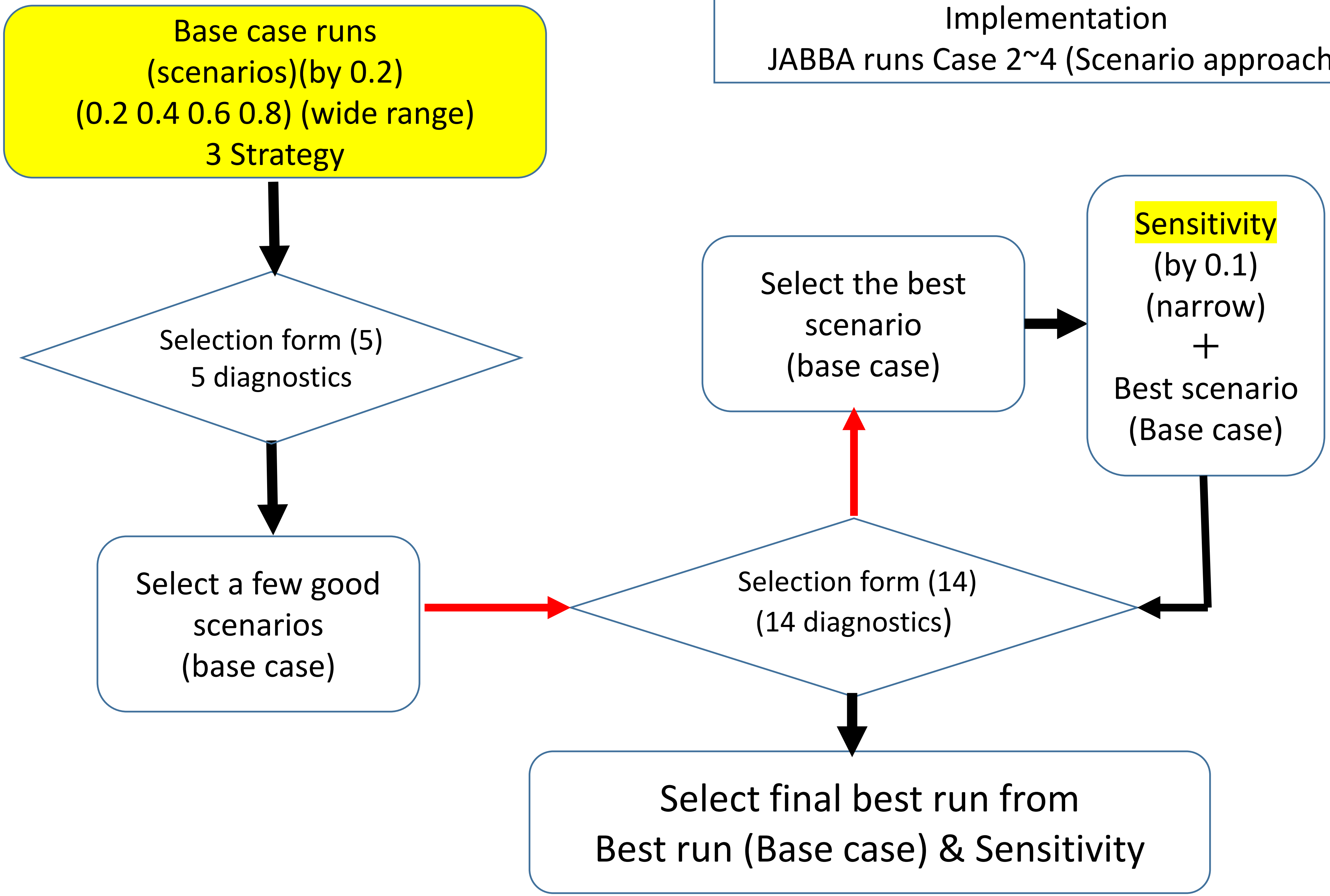
q12

q3

q4

We will start from 1st Strategy
use Individual CPUE

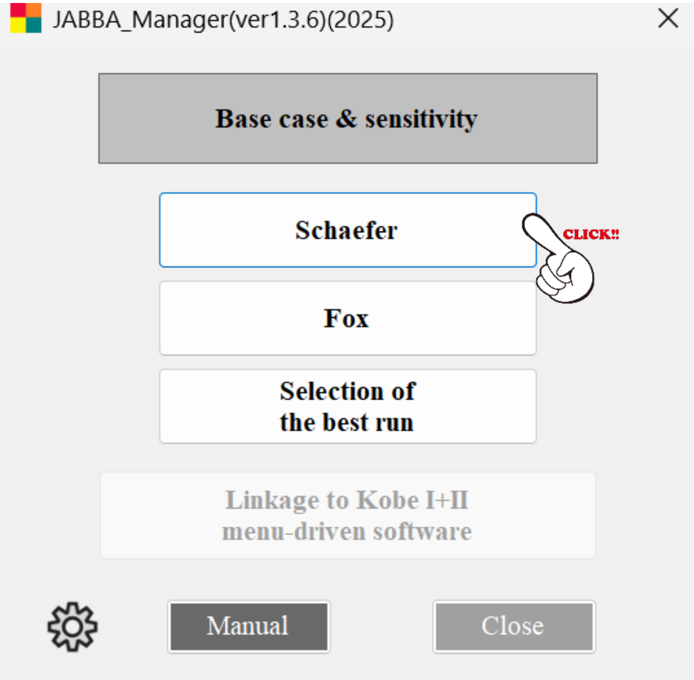
Implementation
JABBA runs Case 2~4 (Scenario approach)

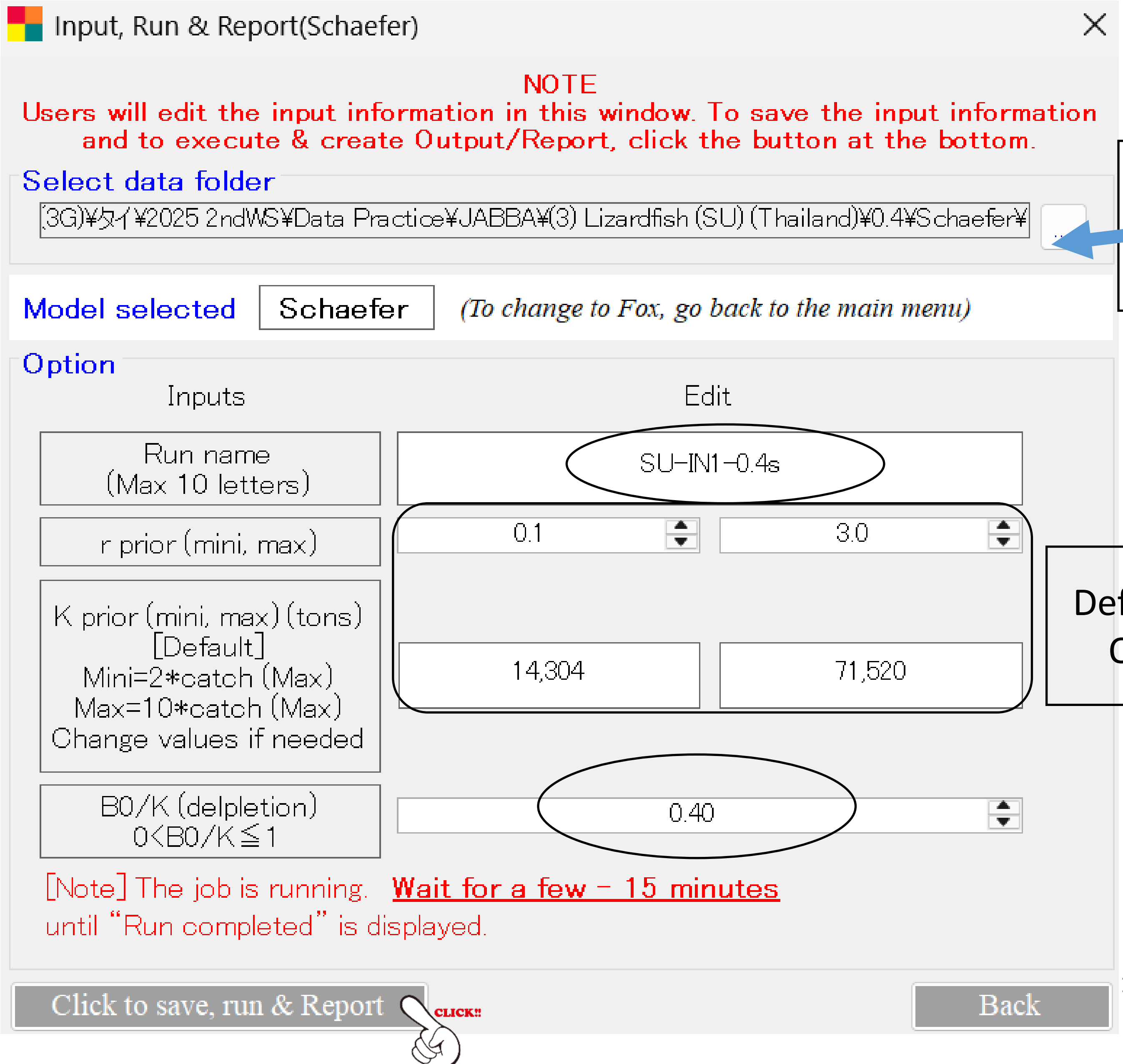


Let’s start from SU-IN1-0.4s

								series #	1	2	3	4	5	6
								Scenario #						
								depletion	0.4	0.4	0.6	0.6	0.8	0.8
								Model s(Schaefer) f(Fox)	s	f	s	f	s	f
Source	Period		q	n=	Gear	Kg per	r2 (%)	run ID	SU-IN1-0.4s	SU-IN2-0.4f	SU-IN3-0.6s	SU-IN4-0.6f	SU-IN5-0.8s	SU-IN8-0.6f
Statistical Division	1971~1994		q12	24	PT	hr	-7	Stamatis 1 (Individual)						
Statistical Division	1971~2023	1995~2015	q3	21	PS	day	-38	Stamatis 1 (Individual)						
Statistical Division	1971~2023	2016~2023	q4	8	PS	day	-38	Stamatis 1 (Individual)						
Port sampling	1995~2023		q4	29	PT	day	-65	Stamatis 1 (Individual)						
Diagnoses & Results								(1) Kobe plot						
								(2) CPUE						
								(3) Retro						
								(4) Convergence						
								(5) Retro-Hind						
								Results						
Note														

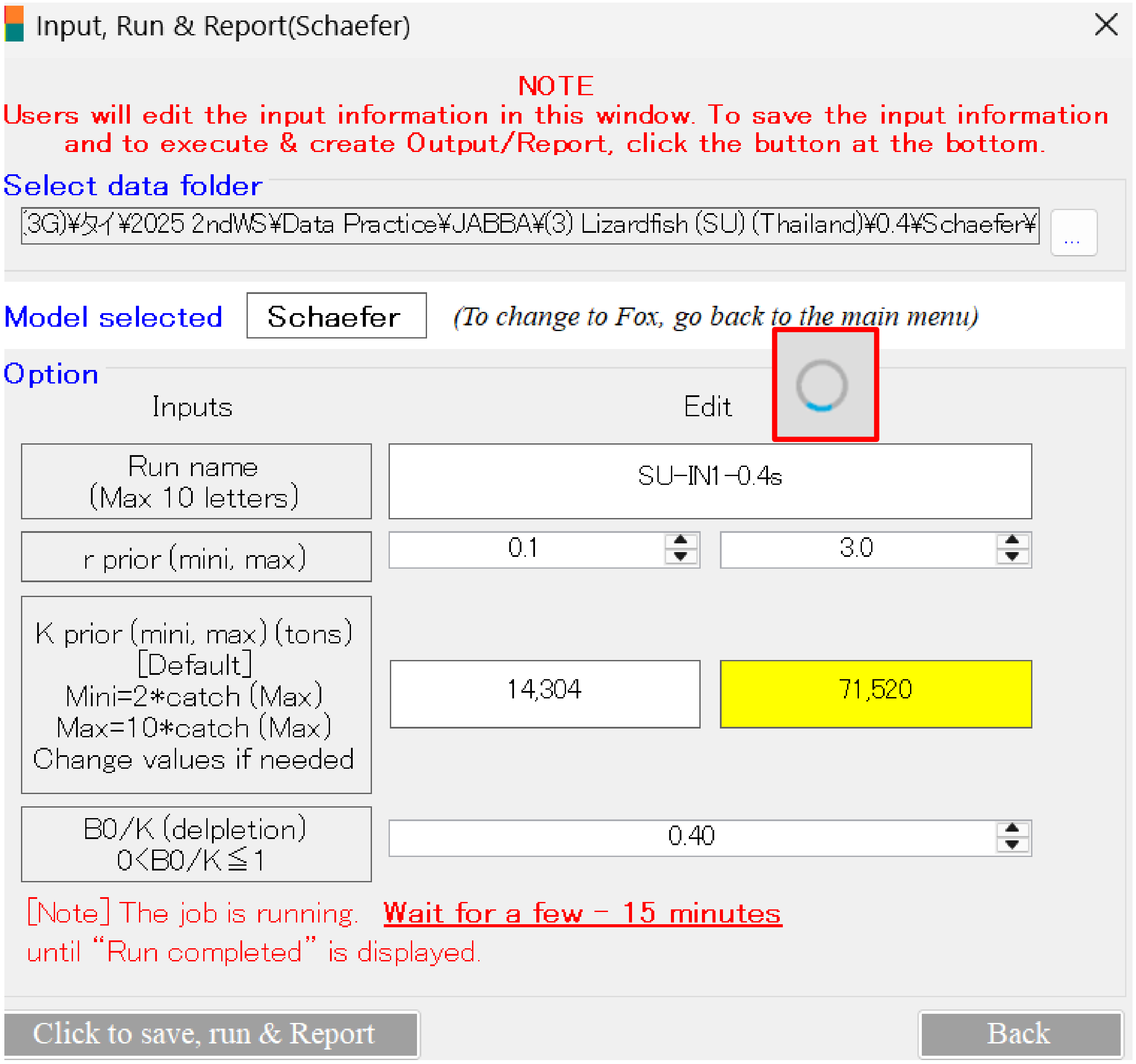
ID SU-IN1-0.4s IN1 ➔ Individual #1

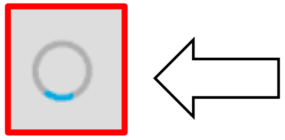




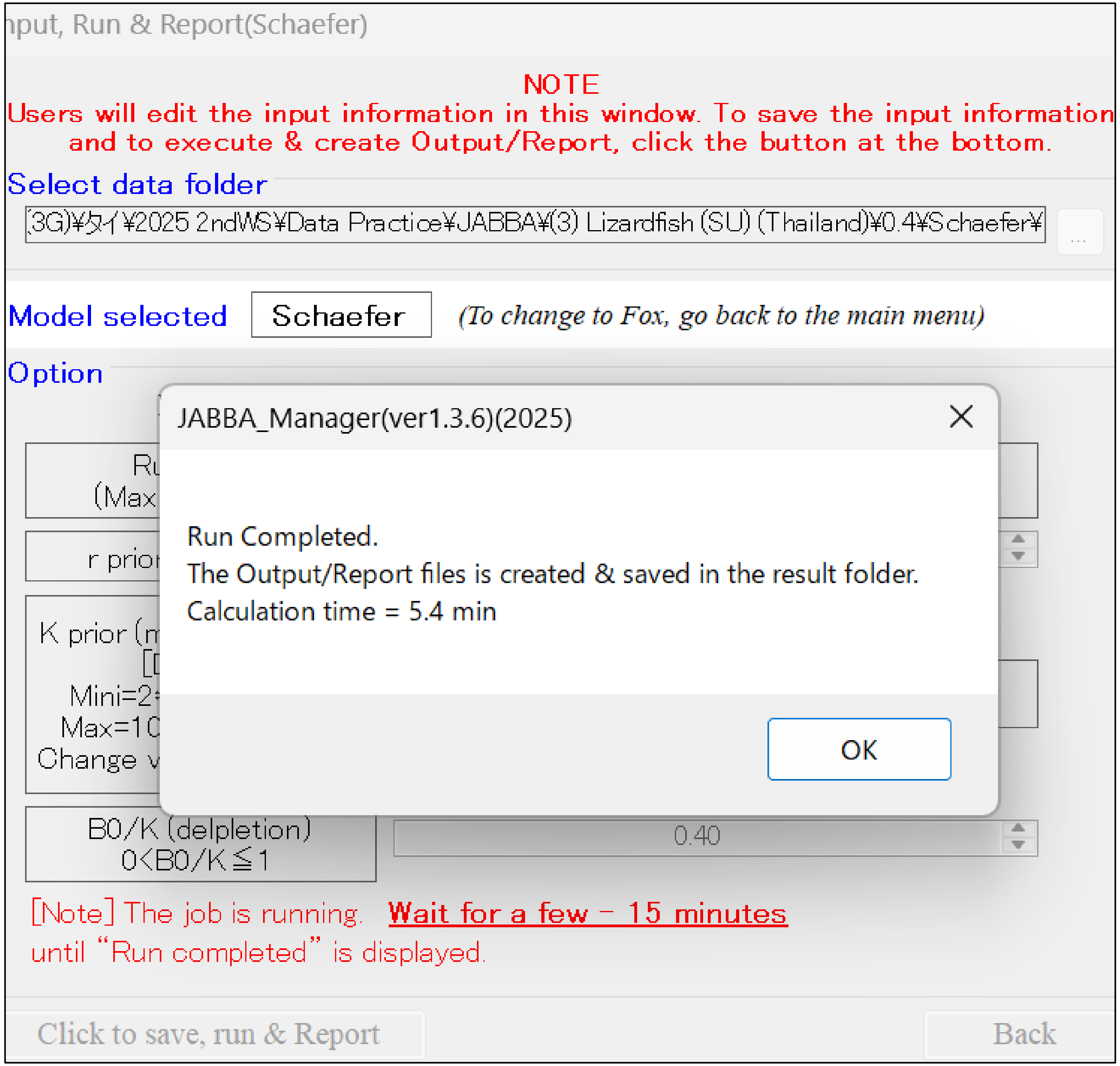
Import your data

Default OK



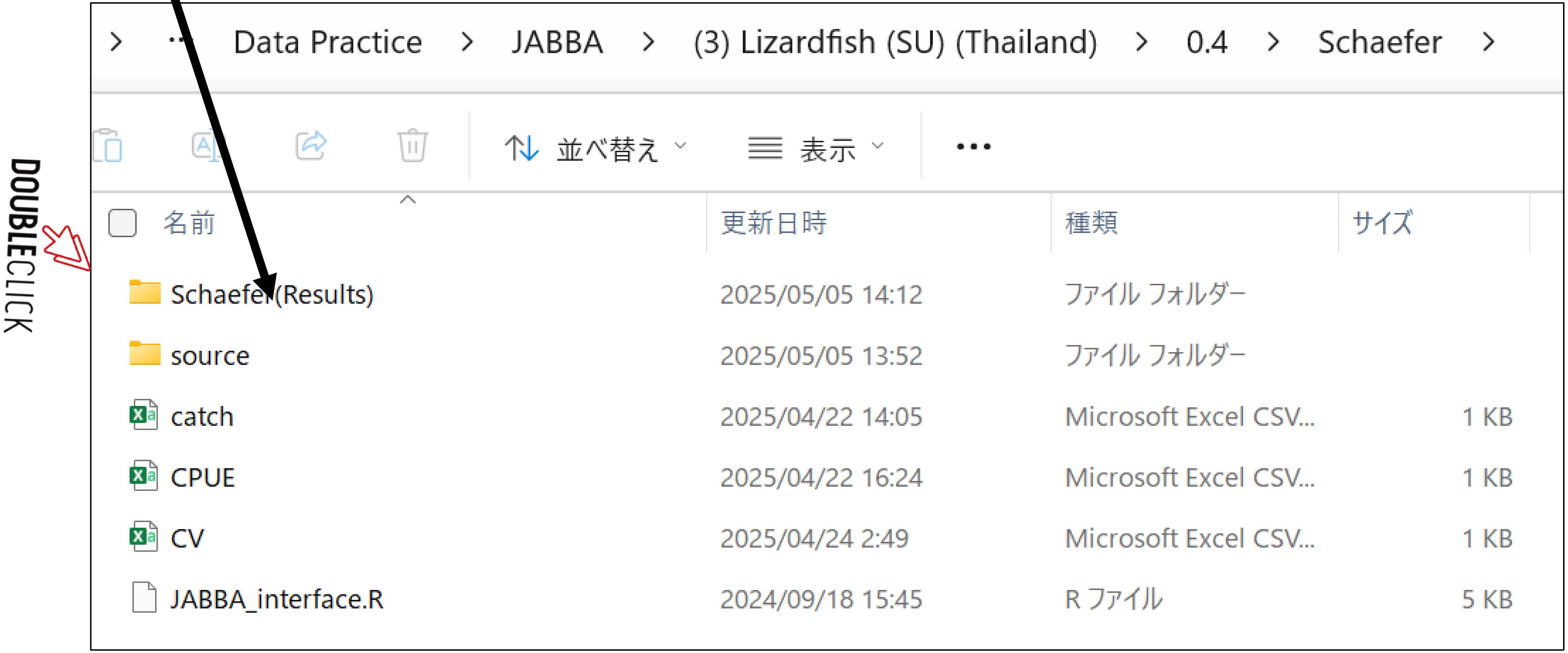


Wait for 5-15 minutes
Up to you PC performance

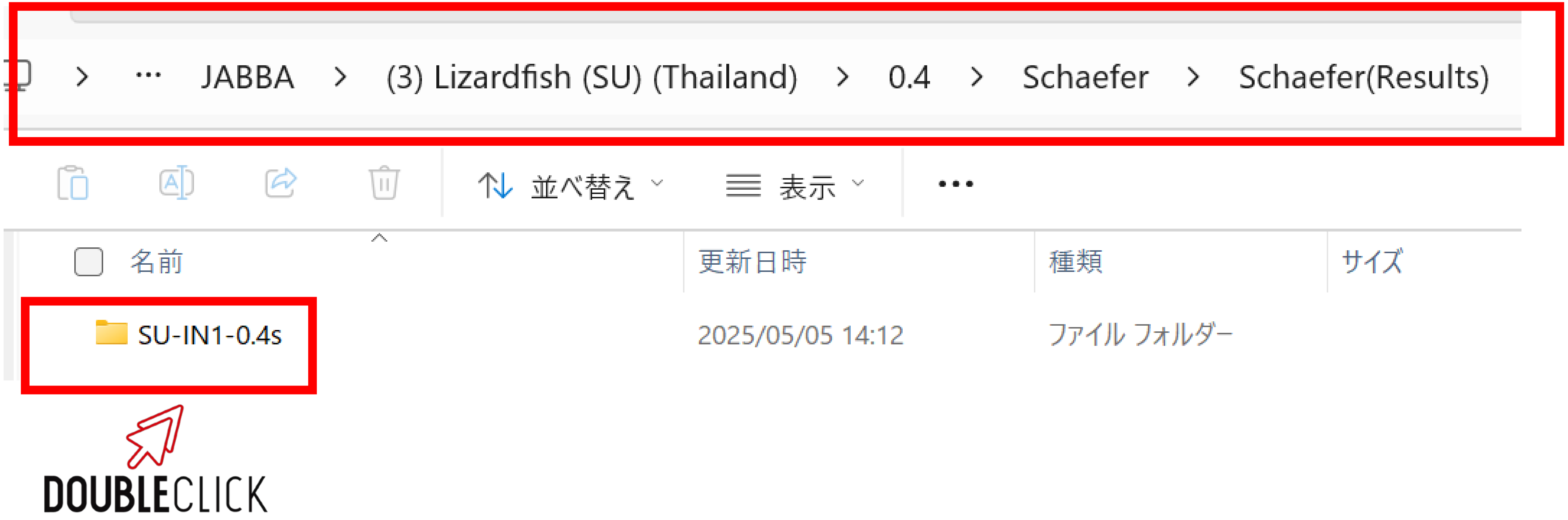


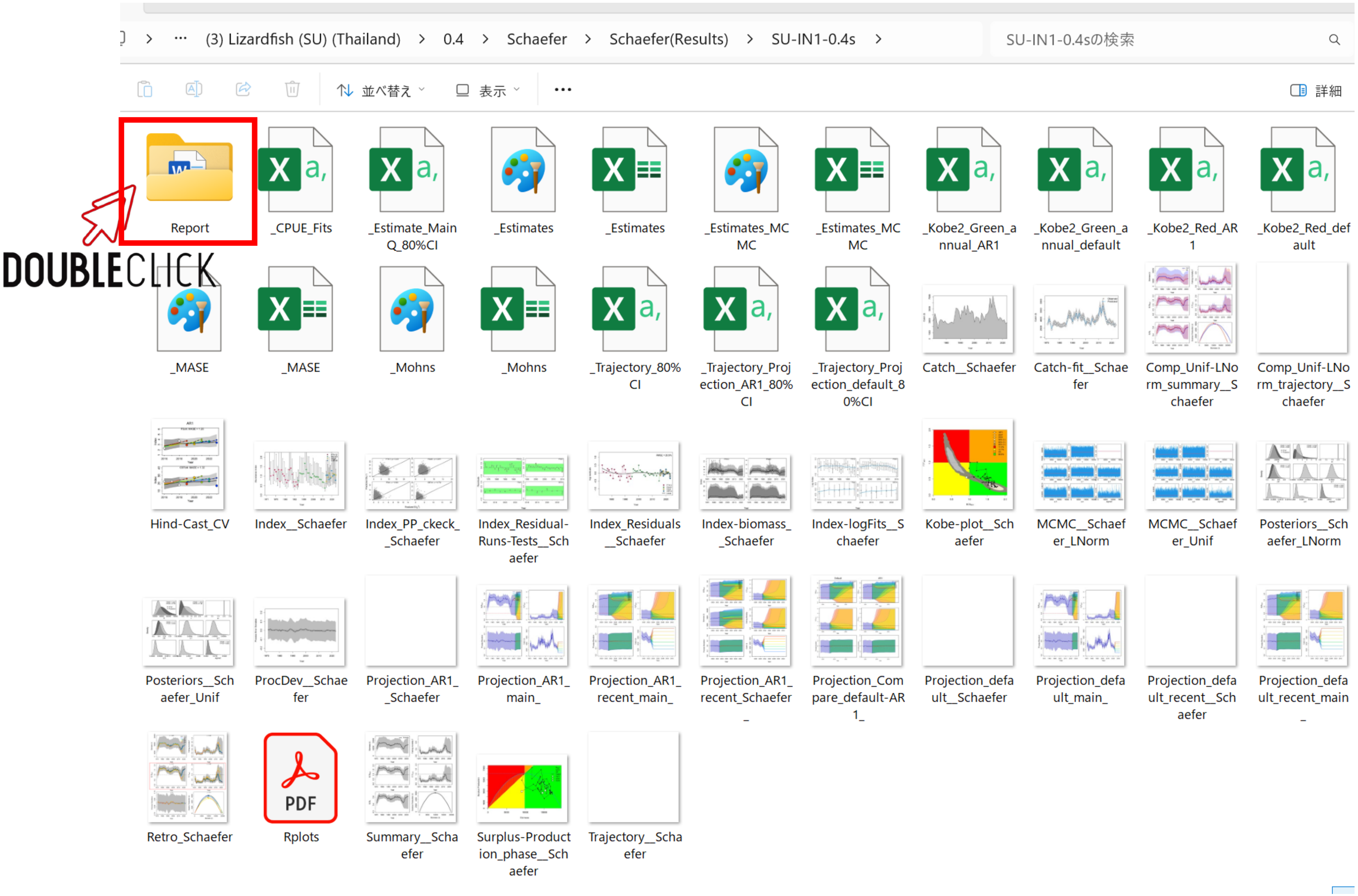
nput, Run & Report(Schaefer)
NOTE
Users will edit the input information in this window. To save the input information and to execute & create Output/Report, click the button at the bottom.
Select data folder
3G)¥タイ¥2025 2ndWS¥Data Practice¥JABBA¥(3) Lizardfish (SU) (Thailand)¥0.4¥Schaefer¥
Model selected
Schaefer
(To change to Fox, go back to the main menu)
Option
JABBA_Manager(ver1.3.6)(2025)
Run Completed.
The Output/Report files is created & saved in the result folder.
Calculation time = 5.4 min
OK
B0/K (delpletion)
0<B0/K≦1
0.40
[Note] The job is running. Wait for a few – 15 minutes
until "Run completed" is displayed.
Click to save, run & Report
Back

Results

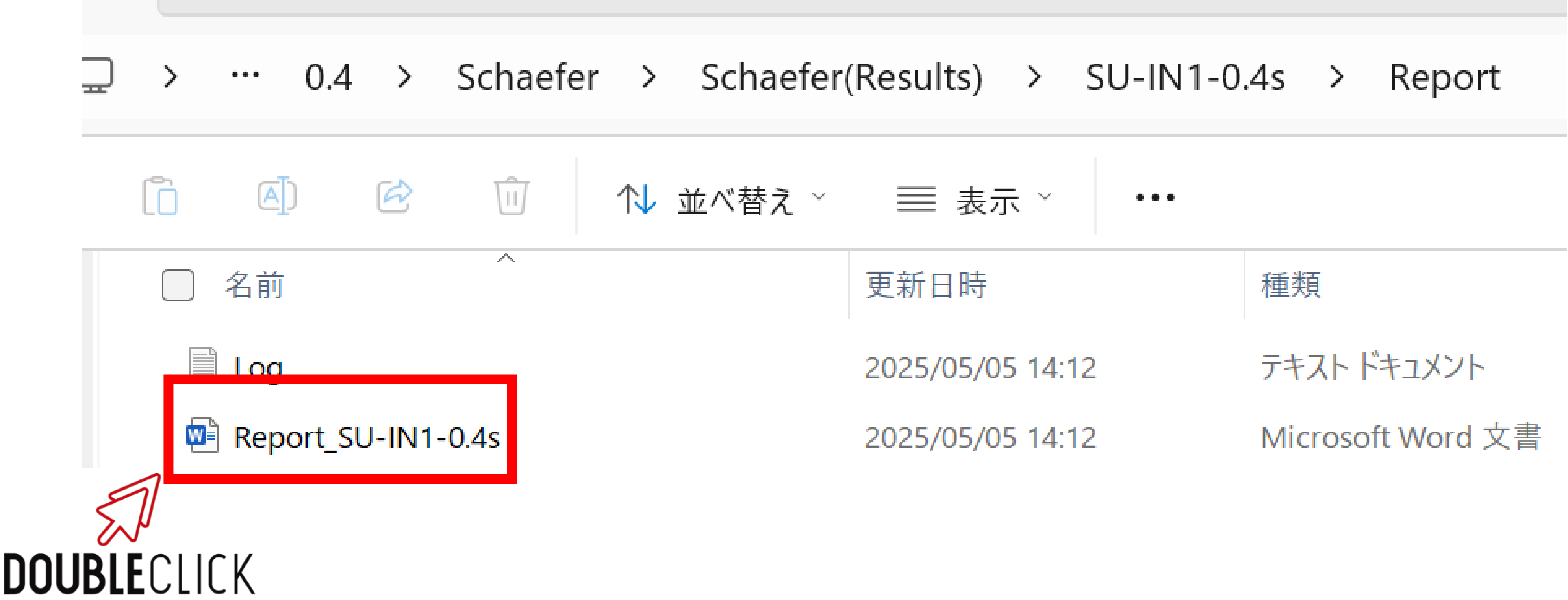


DOUBLECLICK
> ··· Data Practice > JABBA > (3) Lizardfish (SU) (Thailand) > 0.4 > Schaefer >
並べ替え
表示
名前
更新日時
種類
サイズ
Schaefer(Results) 2025/05/05 14:12 ファイル フォルダー
source 2025/05/05 13:52 ファイル フォルダー
catch 2025/04/22 14:05 Microsoft Excel CSV... 1 KB
CPUE 2025/04/22 16:24 Microsoft Excel CSV... 1 KB
CV 2025/04/24 2:49 Microsoft Excel CSV... 1 KB
JABBA_interface.R 2024/09/18 15:45 R ファイル 5 KB


… JABBA > (3) Lizardfish (SU) (Thailand) > 0.4 > Schaefer > Schaefer(Results)
並べ替え
表示
名前
更新日時
種類
サイズ
SU-IN1-0.4s
2025/05/05 14:12
ファイル フォルダー
DOUBLECLICK


(3) Lizardfish (SU) (Thailand) > 0.4 > Schaefer > Schaefer(Results) > SU-IN1-0.4s >
SU-IN1-0.4sの検索
並べ替え
表示
詳細
DOUBLECLICK
Report
_CPUE_Fits
_Estimate_MainQ_80%CI
_Estimates
_Estimates
_Estimates_MCMC
_Estimates_MCMC
_Kobe2_Green_annual_AR1
_Kobe2_Green_annual_default
_Kobe2_Red_AR1
_Kobe2_Red_default
_MASE
_MASE
_Mohns
_Mohns
_Trajectory_80%CI
_Trajectory_Projection_AR1_80%CI
_Trajectory_Projection_default_80%CI
Catch__Schaefer
Catch-fit__Schaefer
Comp_Unif-LNorm_summary__Schaefer
Comp_Unif-LNorm_trajectory__Schaefer
Hind-Cast_CV
Index__Schaefer
Index_PP_ckeck__Schaefer
Index_Residual-Runs-Tests__Schaefer
Index_Residuals__Schaefer
Index-biomass__Schaefer
Index-logFits__Schaefer
Kobe-plot__Schaefer
MCMC__Schaefer_LNorm
MCMC__Schaefer_Unif
Posteriors__Schaefer_LNorm
Posteriors__Schaefer_Unif
ProcDev__Schaefer
Projection_AR1__Schaefer
Projection_AR1_main_
Projection_AR1_recent_main_
Projection_AR1_recent_Schaefer_
Projection_Compare_default-AR1_
Projection_default_Schaefer
Projection_default_main_
Projection_default_recent__Schaefer
Projection_default_recent_main_
Retro_Schaefer
Rplots
Summary__Schaefer
Surplus-Production_phase__Schaefer
Trajectory__Schaefer

Finally, you find the Report word file (20 pages).
You will use **page 3-4** for evaluation by 5 diagnostics



Report_SU-IN1-0.4s (Schaefer)

Contents

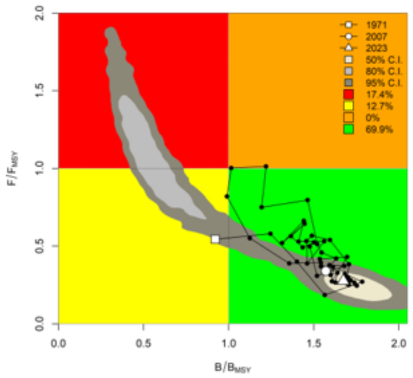
Note: Sometimes there are blank figures and/or tables due to space limitations. In such a case, please copy and paste from the original output files located one before this Report folder). If there are no outputs, please leave it empty.

Page 3
(most important)

Summary of results & diagnoses (1/2) (Key diagnoses)

KOBE PLOT

(#18) (page 18) Kobe plot



CONVERGENCE

(#20) (p.5) Convergence (MCMC)
(> 0.05) (higher better)
Yellow markers
(not converged)

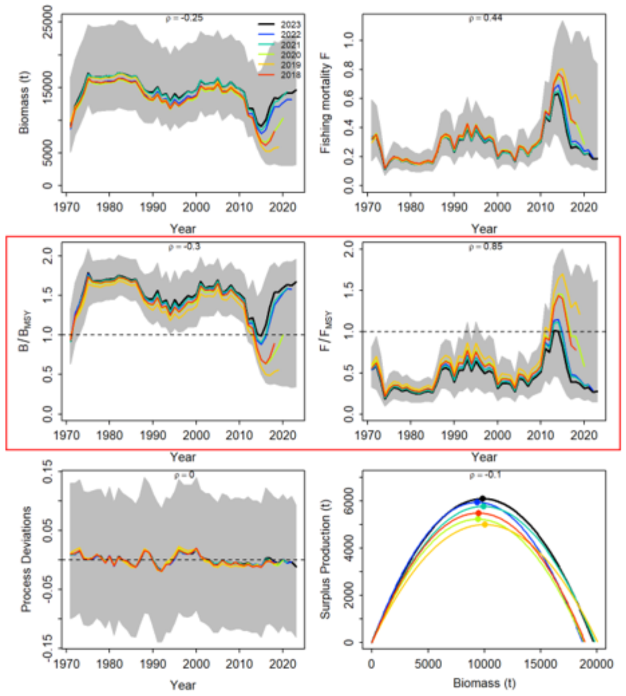
	Geweke.p	Heidel.p
K	0.12	0.06
r	0.25	0.25

RETROSPECTIVE ANALYSES

(#42) (p.12) Retrospective analyses
for 2 most important parameters (B & F)
Mohan ρ (-0.15 < ρ < 0.2) ➔ Converged
(value closer to 0.025 is better)
Yellow marker (not converged)

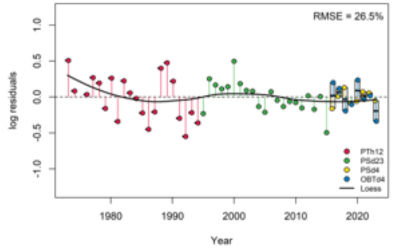
Mohan ρ	B	F
2023	-0.07	0.07
2022	0.01	0.00
2021	-0.25	0.33
2020	-0.55	1.22
2019	-0.38	0.58
Average	-0.25	0.44

(#40) (p.14) Retrospective patterns

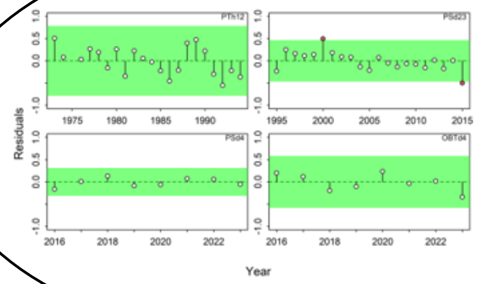


CPUE FITNESS

(#10) (page 8) CPUE fitness (1)
(lower RMSE better)



(#13) (page 7) CPUE fitness (2)
Red band: No randomness
Red points: outliers



Never
get this
4 greens
Miracle

Because
4 CPUE
GOOD

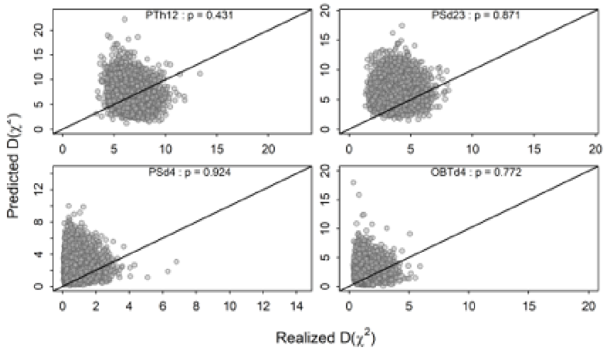
Page 4 (most important)

Summary of results & diagnoses (2/2)

Model fits

(#12) (page 11)
Posterior Predictive Check (PPC).
p should be
0.2<p<0.8
and closer to 0.5
is better fit.
(Users: compute Ave. & write below)

Ave. p=___



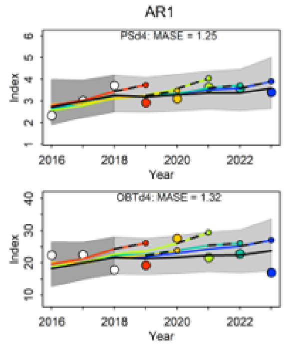
Hindcast analyses

(#41) (page 15) Hindcast
(predictive skill)
If predicted color points > 95% CI
➔NG for prediction

(#43) (page 14)
MASE
(Predictive skill)
(< 1)
(smaller better)

Yellow markers (> 1)
Not acceptable

Index	MASE
PTh12	NA
PSd23	NA
PSd4	1.25
OBTd4	1.32
Average	1.30



Estimated parameter values

(#21)
(page 16)

Parameter	Meaning	Mean	Lower (95%)	Upper (95%)
K	Carrying capacity (t)	19,711	13,715	28,994
r	Pop. growth rate	1.24	0.64	2.04
B0/K	Depletion (EST)	0.46	0.32	0.66
sigma.proc	Estimable process VAR	0.05	0.03	0.09
m	Shape parameter	2	2	2
Fmsy	F at MSY	0.62	0.32	1.02
TBmsy	TB at MSY (t)	9,856	6,857	14,497
MSY	MSY (t)	5,904	4,369	9,232
Catch(2023)	Current catch	2,724		
bmsyk	Limit Ref. Point (TB/TBmsy)	0.50	0.50	0.50
TB(1971)/ K	Depletion (OBS)(start)	0.46	0.32	0.67
TB(2023)/ K	Depletion (OBS)(last)	0.84	0.18	0.98
TB/TBmsy	TB ratio	1.67	0.35	1.96
F/Fmsy	F ratio	0.28	0.15	1.63

From page 5~19
Detail explanation of results

Last page 20
For next step
Selection form (to be explained later)

<table>
<tr><td colspan="7" rowspan="4"></td><td>Series #</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Scenario #</td><td colspan="6">IN1</td></tr>
<tr><td>depletion</td><td>0.4</td><td>0.4</td><td>0.6</td><td>0.6</td><td>0.8</td><td>0.8</td></tr>
<tr><td>Model
s(Schaefer) f(Fox)</td><td>s</td><td>f</td><td>s</td><td>f</td><td>s</td><td>f</td></tr>
<tr><td>Source</td><td colspan="2">Period</td><td>q</td><td>n=</td><td>Gear</td><td>Kg per</td><td>r2 (%)</td><td>run ID</td><td>SU-IN1-0.4s</td><td>SU-IN2-0.4f</td><td>SU-IN3-0.6s</td><td>SU-IN4-0.6f</td><td>SU-IN5-0.8s</td><td>SU-IN6-0.8f</td></tr>
<tr><td rowspan="3">Statistical Division</td><td>1971~1994</td><td></td><td>q12</td><td>24</td><td>PT</td><td>hr</td><td>-7</td><td rowspan="4">strategy 1
INdividual (IN)</td><td colspan="6"></td></tr>
<tr><td rowspan="2">1971~2023</td><td>1995~2015</td><td>q3</td><td>21</td><td rowspan="2">PS</td><td rowspan="2">day</td><td rowspan="2">-38</td><td colspan="6"></td></tr>
<tr><td>2016~2023</td><td>q4</td><td>8</td><td colspan="6"></td></tr>
<tr><td>Port sampling</td><td>1995~2023</td><td></td><td>q4</td><td>29</td><td>PT</td><td>day</td><td>-65</td><td colspan="6"></td></tr>
<tr><td colspan="7" rowspan="6">Diagnoses & Results</td><td>(1) Kobe plot</td><td>ng</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>(2) CPUE</td><td>ok</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>(3) Retro</td><td>ok</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>(4) Convergence</td><td>ok</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>(5) Retro-Hind</td><td>ok</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Results</td><td>ng</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="8">Note</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

You can make it by yourself

Then we will check all others

You are now working

Results of all runs.
0.6s is the best run

Series #	1	2	3	4	5	6
Scenario #	IN1					
depletion	0.4	0.4	0.6	0.6	0.8	0.8
Model s(Schaefer) f(Fox)	s	f	s	f	s	f
run ID	SU-IN1-0.4s	SU-IN2-0.4f	SU-IN3-0.6s	SU-IN4-0.6f	SU-IN5-0.8s	SU-IN6-0.8f

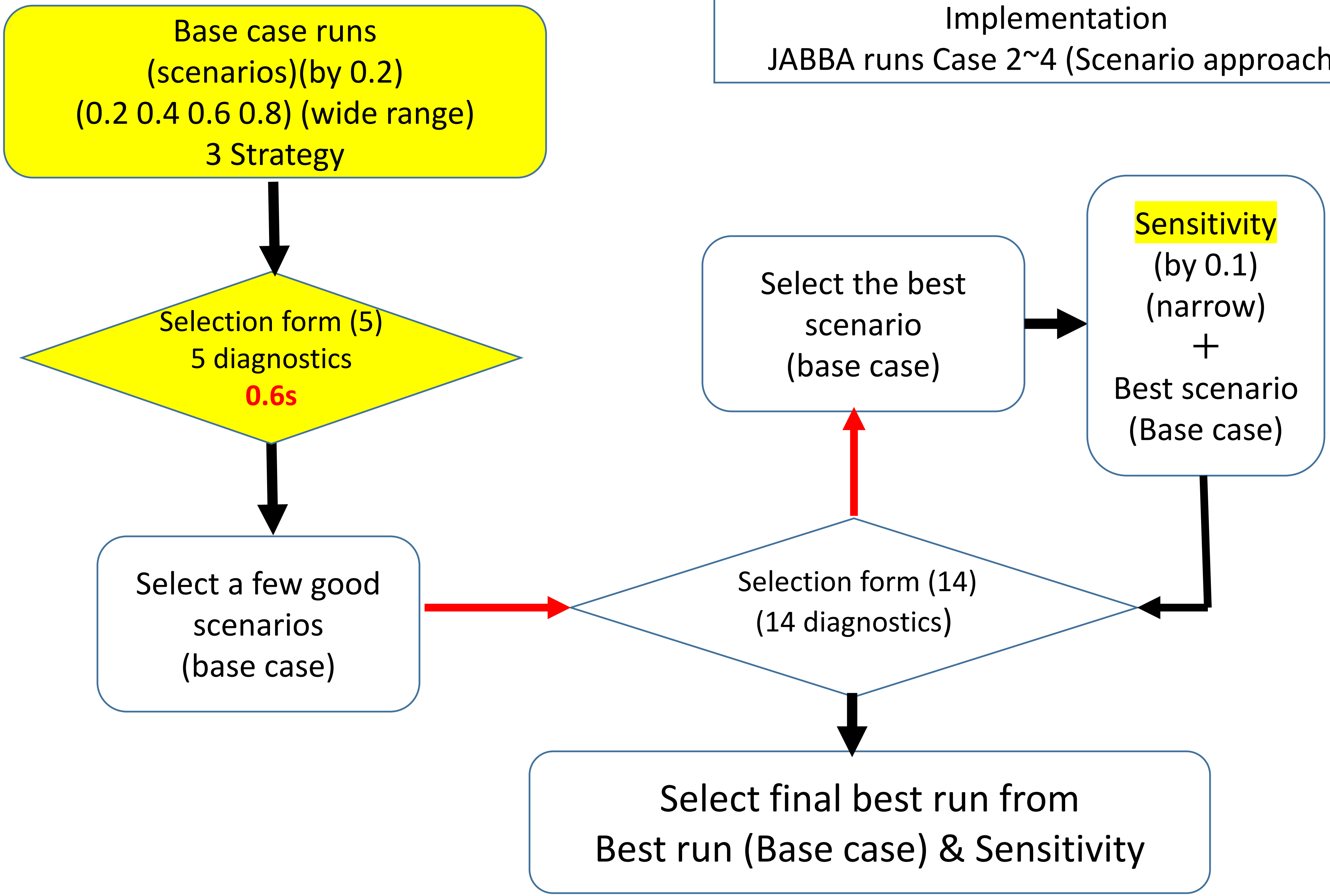
You can make your convenient run ID (code)

Source	Period		q	n=	Gear	Kg per	r2 (%)	run ID
Statistical Division	1971~1994		q12	24	PT	hr	-7	strategy 1 INdividual (IN)
	1971~2023	1995~2015	q3	21	PS	day	-38	
		2016~2023	q4	8				
Port sampling	1995~2023		q4	29	PT	day	-65	

Diagnoses & Results

	1	2	3	4	5	6
(1) Kobe plot	ng	ok	ok	ok	ok	ok
(2) CPUE	ok	ok	ok	ok	ng	ok
(3) Retro	ok	ng	ok	ng	ok	ng
(4) Convergence	ok	ok	ok	ok	ok	ok
(5) Retro-Hind	ok	ok	ok	ok	ok	ok
Results	ng	ng	ok	ng	ng	ng
Note		CPUE (f2) red		CPUE (f2) red	CPUE (f2) red	CPUE (f2) red

Implementation
JABBA runs Case 2~4 (Scenario approach)

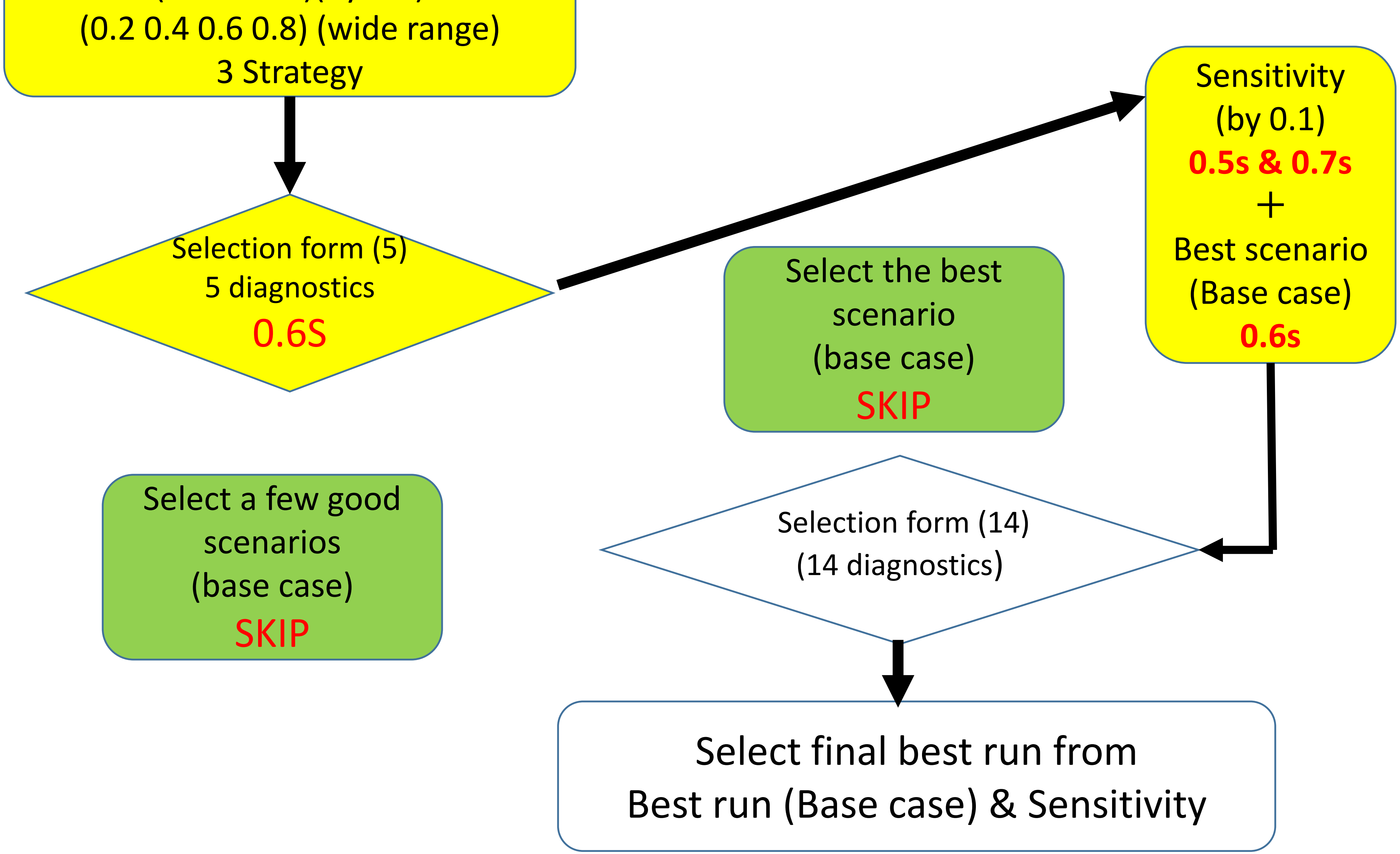


As we have only one good run in base case, we don't need to select the best one by Selection form (14)

As 0.6s is the best,
we will try 0.5s and 0.7s as sensitivity runs.
ID(example)
SU-final-0.5s
SU-IN3-0.6s (Original)
SU-final-0.6s

To do this, you need set up 2 new folders
(0.5s & 0.7s) and run

Implementation
JABBA runs Case 2~4 (Scenario approach)

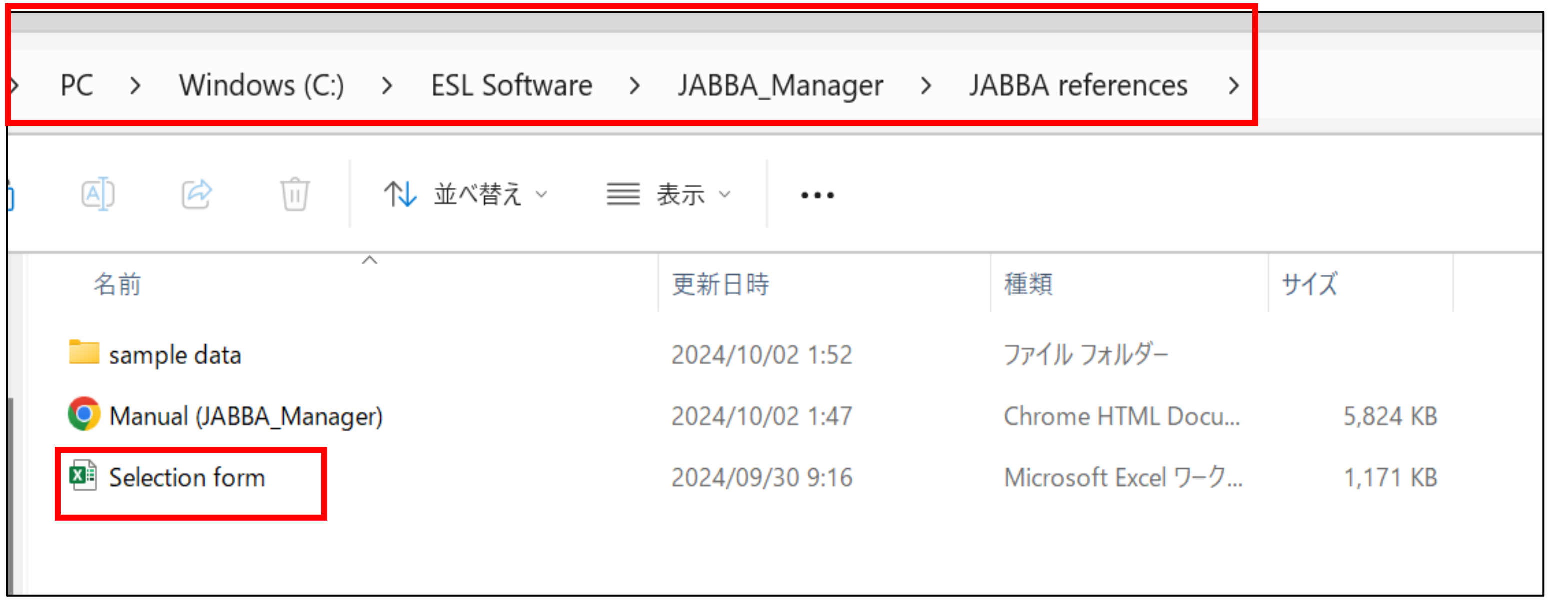


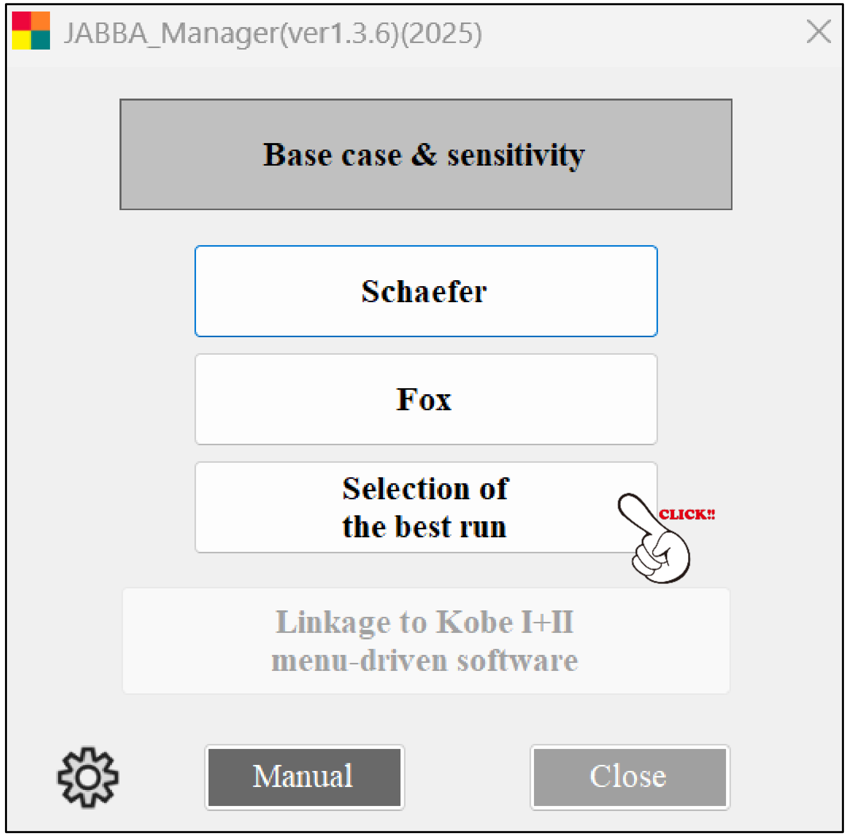
Then you will use Selection form (14)
to select the best run

How to get the Selection form? (2 ways)

(1) From the 3rd menu (right).

(2) For practices, users also can get it from ESL software, (see below) which is <u>not linked</u> to the software.





There are 2 examples

case [1]   Selection of the best model (Schaefer or FOX)

Case [2]~[4] (our case) selection of the best scenario

We follow this example and make our Selection form (14)

We will now see details of Selection form (14)

you will see first then practice by your self

Selection of the best scenario run using 14 diagnostics

(Use "Summary of results & diagnostics", page 3~4, Report) Example : Bluetooth Lizardfish (for details, see Manual)

Please see Manual for details on diagnostics.	Evaluation	1. Convergence (MCMC)				2. Model Fit					3. Retrospective analyses		4. Hindcast analyses		
		Heidelberger & Welch p test				2.1 CPUE residuals		2.2 RMSE	2.3 Posterior Predictive Check (PPC)						
	Methods	Geweke.p (larger value better)		Heidel.p (larger value better)		95% CI band		RMSE	Average p values (compute yourself)	Visual inspection	Mohan's ρ (-0.15~2.0)	Visual inspection	MASE (# of yellow: non significant=NG predicted skill) (for B & F)	MASE (Average value)	Visual inspection
	Criteria	K	r	K	r	Red band Auto-correlation? No is better	total # of outliers less # is better	Less % better fit	Use the 5th sheet to compute. Closer to 0.5 is better	Ball shapes located in center are better (how many #?)	# of yellow markers (B & F ratio) less better	All trends should be similar patterns.	Less # better	should be < 1 & smaller better	# OBS points beyond the 95% CI band
	Output # (page#)	# 20 (p.3)				# 13 (p.3)		# 10 (p.3)	# 12 (p.4)		# 42 (p.3)	# 40 (p.3)	# 43 (p.4)		# 41 (p.4)
	diagnostics #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Refer to sheet # how to do								(4)		(5)		(6)		
Users can adjust # of scenarios to compare	0.5s	0.11	0.32	0.12	0.89	OK	2	25.6%	0.772	2ok	8	same	2	1.17	0
	0.6s	0.47	0.96	0.80	0.40	OK	2	24.7%	0.791	2ok	6	same	1	1.10	0
	0.7s	0.35	0.52	0.1	0.67	OK	1	24.4%	0.796	2ok	6	same	2	1.24	0
	Best scenario?	0.6s	0.6s	0.6s	0.5s	same	0.7s	0.7s	0.5s	same	0.6s & 0.7s	same	0.6s	0.6s	same
Comments & decision	(1)	6 best diagnoses for 0.6s, 3 for 0.7s, 2 for 0.5s and 4 for same.													
	(2)	0.6s is much better than others (0.5s & 0.7s).													
	(3)	In conclusoin, 0.6s is selected as the final best scenario.													

Start 1:15 PM

Evaluation	1. Convergence (MCMC)			
	Heidelberger & Welch p test			
Methods	Geweke.p (larger value better)		Heidel.p (larger value better)	
Criteria	K	r	K	r
Output # (page#)	# 20 (p.3)			
diagnostics #	1	2	3	4
Refer to sheet # how to do				
0.5s	0.11	0.32	0.12	0.89
0.6s	0.47	0.96	0.80	0.40
0.7s	0.35	0.52	0.1	0.67

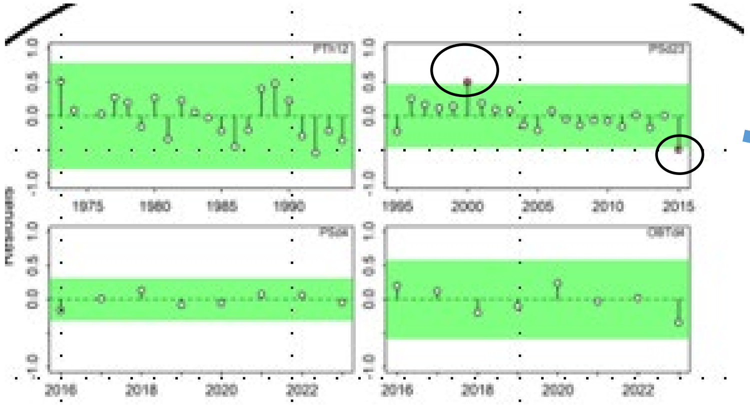
CONVERGENCE

(#20) (p.5) Convergence (MCMC)
(> 0.05) (higher better)
Yellow markers
(not converged)

	Geweke.p	Heidel.p
K	0.11	0.12
r	0.32	0.89

Copy & pastesb these values

Total NO
of red band
=0



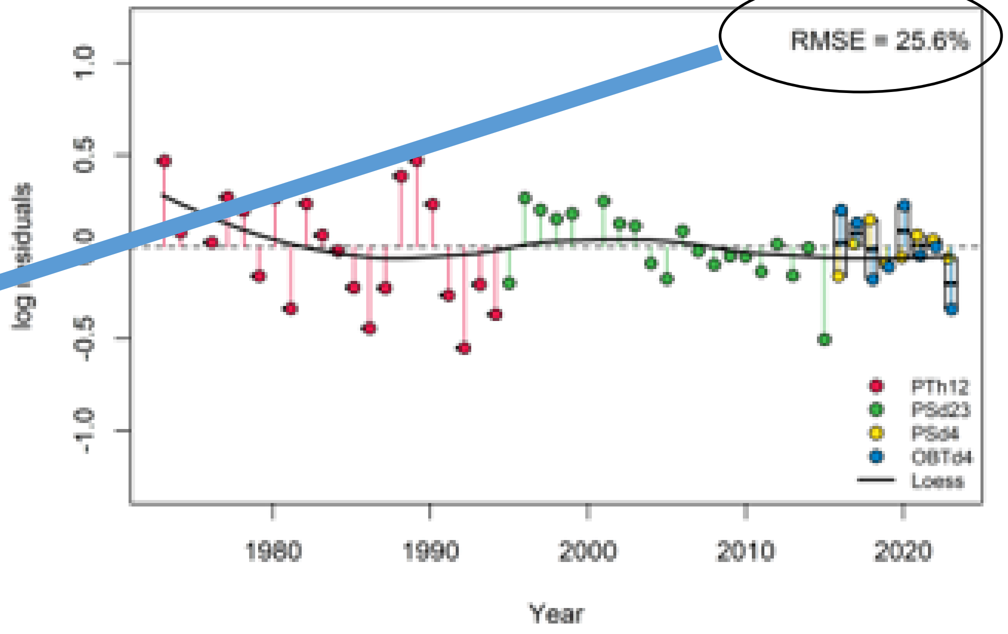
2.1 CPUE residuals	
95% CI band	
No of Red band Auto-correlation? No is better	total # of outliers less # is better
# 13 (p.3)	
5	6
0	2
0	2
0	1
same	0.7s

Total # of
outliers
2

CPUE FITNESS

(#10) (page 8) CPUE fitness (1)
(lower RMSE better)

2. Model
2.2 RMSE
RMSE
Less % better fit
10 (p.3)
7
25.6%
24.7%
24.4%
0.7s



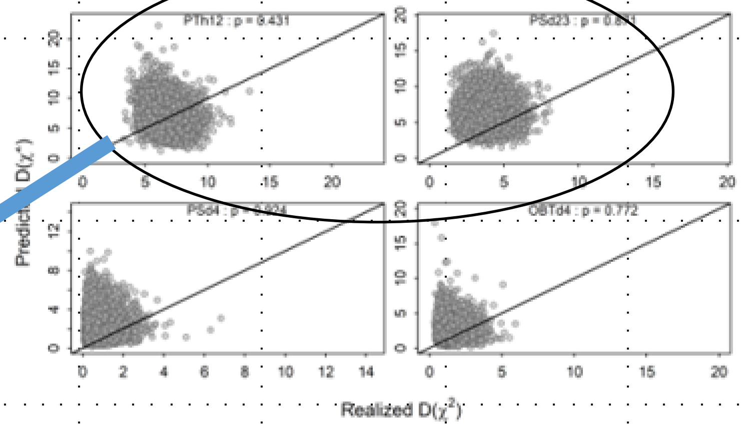
For this computation Use sheet (4)

See next page

el Fit	
2.3 Posterior Predictive Check (PPC)	
Average p values (compute yourself)	Visual inspection
Use the 5th sheet to compute. Closer to 0.5 is better	Ball shapes located in center are better (how many #?)
# 12 (p.4)	
8	9
(4)	
0.772	2ok
0.791	2ok
0.796	2ok
0.5s	same

Summary of results

MODEL FITS
(#12) (page 11) Posterior Predictive Check (PPC). p should be 0.2<p<0.8 and closer to 0.5 is better fit. *(Users: compute Ave.*



diagnostics.						Less # is better	less # is better	better fit	Closer to 0.5 is better	are better (how many #?)	(B & F ratio) less better	similar patterns.		smaller better
	Output # (page#)	# 20 (p.3)				# 13 (p.3)		# 10 (p.3)	# 12 (p.4)		# 42 (p.3)	# 40 (p.3)	# 43 (p.4)	
	diagnostics #	1	2	3	4	5	6	7	8	9	10	11	12	13
	Refer to sheet # how to do								(4)		(5)		(6)	
Sensitivity	0.5s										1			
base case	0.6s													
Sensitivity	0.7s													
decision														
Comments & decision	(1)													
	(2)													
	(3)													

(Note) Referred by "Good practices for surplus production models" by Kokkalis et al (2024)

(3)Selection form(14)(scenario) (4) #12

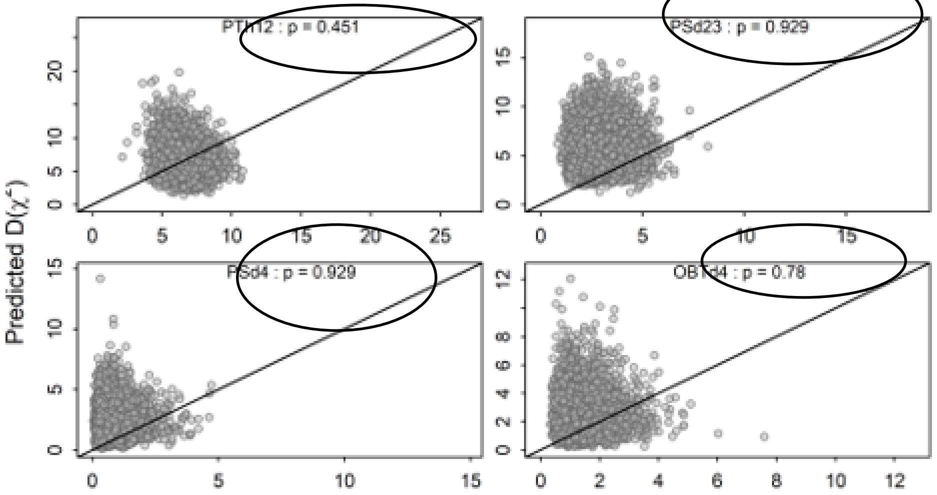
This is an example of Swforfish (SW

Model

	p value (PPC)	
	Schaefer	Fox
fleet 1	0.980	0.990
fleet 2	0.612	0.670
fleet 3	0.971	0.960
fleet 4		
fleet 5		
fleet 6		
average	0.854	0.873

Scenario

	p value (PPC)		
scenario #			
depletion	0.5s	0.6s	0.7s
fleet 1	0.451	0.500	0.519
fleet 2	0.929	0.948	0.947
fleet 3	0.929	0.916	0.915
fleet 4	0.780	0.799	0.79
fleet 5			
fleet 6			
average	0.772	0.791	0.793



Enter these numbers then average is computed automatically

Then copy & paste to the previous Page.

(4
0.772
0.791
0.796
0.5s

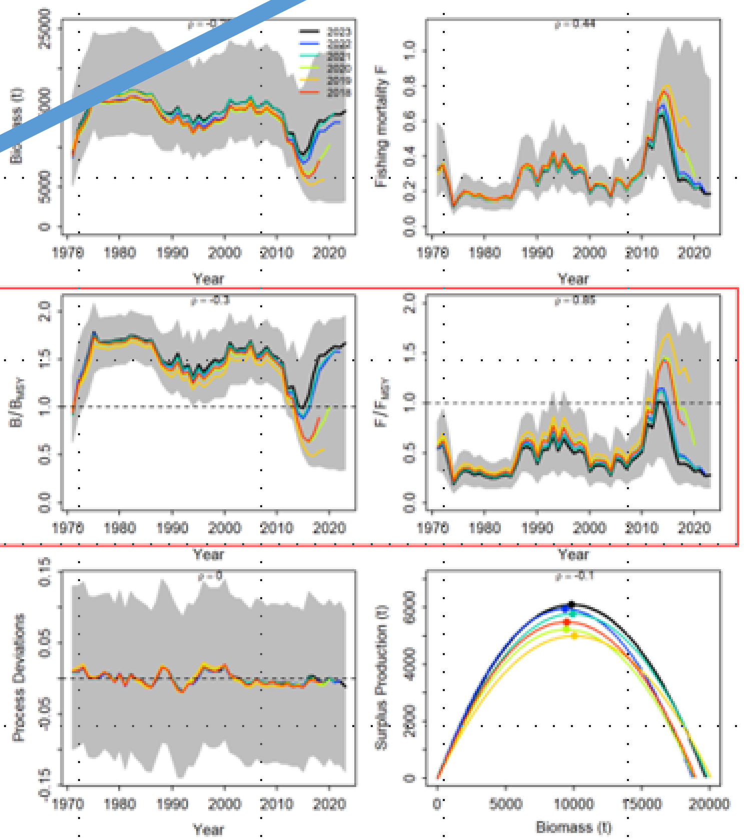
3. Retrospective analyses	
Mohan's ρ (-0.15~2.0)	Visual inspection
# of yellow markers (B & F ratio) less better	All trends should be similar patterns.
# 42 (p.3)	# 40 (p.3)
10	11
(5)	
8	OK
6	NG
6	Not so good

RETROSPECTIVE ANALYSES

(#42) (p.12) Retrospective analyses
for 2 most important parameters (B & F)
Mohan ρ (-0.15 < ρ < 0.2) ➔ Converged
(value closer to 0.025 is better)
Yellow marker (not converged)

Mohan ρ	B	F
2023	-0.07	0.07
2022	0.01	0.00
2021	-0.25	0.33
2020	-0.55	1.22
2019	-0.38	0.58
...age	-0.25	0.44

(#40) (p.14) Retrospective patterns



Count # of yellow

NOT INCLUDE Average

4. Hindcast analyses		
MASE (# of yellow: non significant=NG predicted skill) (for B & F)	MASE (Average value)	Visual inspection
Less # better	should be < 1 & smaller better	# OBS points beyond the 95% CI band
# 43 (p.4)		# 41 (p.4)
12	13	14
	(6)	
2	1.17	0
1	1.10	0
2	1.24	0

Hindcast analyses

(#41) (page 15) Hindcast (predictive skill)

If predicted color points > 95% CI

➔ NG for prediction

(#43) (page 14)

MASE

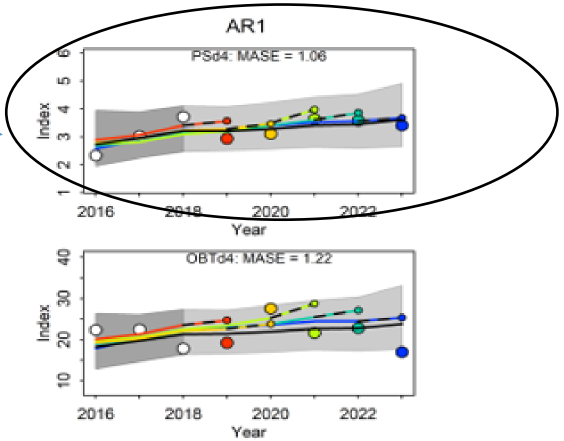
(Predictive skill)

(< 1)

(smaller better)

Yellow markers (> 1)
Not acceptable

Index	MASE
PTh12	NA
PSd23	NA
PSd4	1.06
OBTd4	1.22
Average	1.17



Select th

Methods	Geweke (larger va better)	
Criteria	K	
Output # (page#)		
diagnostics #	1	
Refer to sheet # how to do		
0.5s	0.11	0
0.6s	0.47	0
0.7s	0.35	0
Best scenario?	0.6s	0
(1)	6 best diag	
(2)	0.6s is muc	
(3)	In conclusi	

Larger better

0.6s is the largest
0.47

Thus, it is selected

For others, use criteria selected best scenario and write as below

	Best scenario?	0.6s	0.6s	0.6s	0.5s	same	0.7s	0.7s	0.5s	same	0.6s & 0.7s	same	0.6s	0.6s	same
Comments & decision	(1)	6 best diagnoses for 0.6s, 3 for 0.7s, 2 for 0.5s and 4 for same.													
	(2)	0.6s is much better than others (0.5s & 0.7s).													
	(3)	In condusoin, 0.6s is selected as the final best scenario.													

Finally you count number of the best scenario

For this case, 6 for 0.6s, 3 for 0.7s, 2for 0.5s and 4 for same

0.6s is max count, thus 0.6s is the BEST (final decision)

We will fill out together
Selection form (14) one by one

If you have copies (page 4-5)

for 3 cases (0.5s, 0.6s & 0.7s)

It will be easier

We will provide !!

But the report file (page 3-4) (PC) is also OK

although it may be a bit inconvenient

Implementation
JABBA runs Case 2~4 (Scenario approach)

Base case runs
(scenarios)(by 0.2)
(0.2 0.4 0.6 0.8) (wide range)
3 Strategy

Sensitivity
(by 0.1)
0.5s & 0.7s
+
Best scenario
(Base case)
0.6s

Selection form (5)
5 diagnostics
SKIP

Select the best
scenario
(base case)
SKIP

Select a few good
scenarios
(base case)
SKIP

Selection form (14)
(14 diagnostics)

Select final best run from
Best run (Base case) & Sensitivity
0.7s

From Selection form (14)

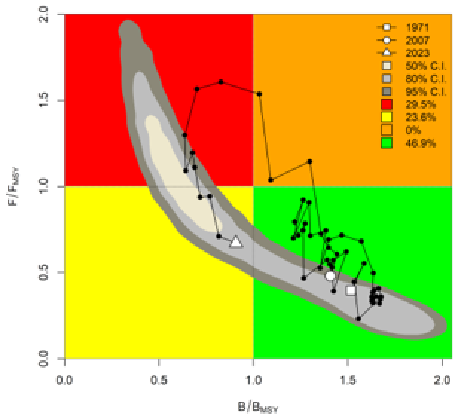
The best scenario 0.7S

Now let’s explain final results for 0.7s in details

Summary of results & diagnoses (1/2) (Key diagnoses)

KOBE PLOT

(#18) (page 18) Kobe plot



CONVERGENCE

(#20) (p.5) Convergence (MCMC)
(> 0.05) (higher better)
Yellow markers
(not converged)

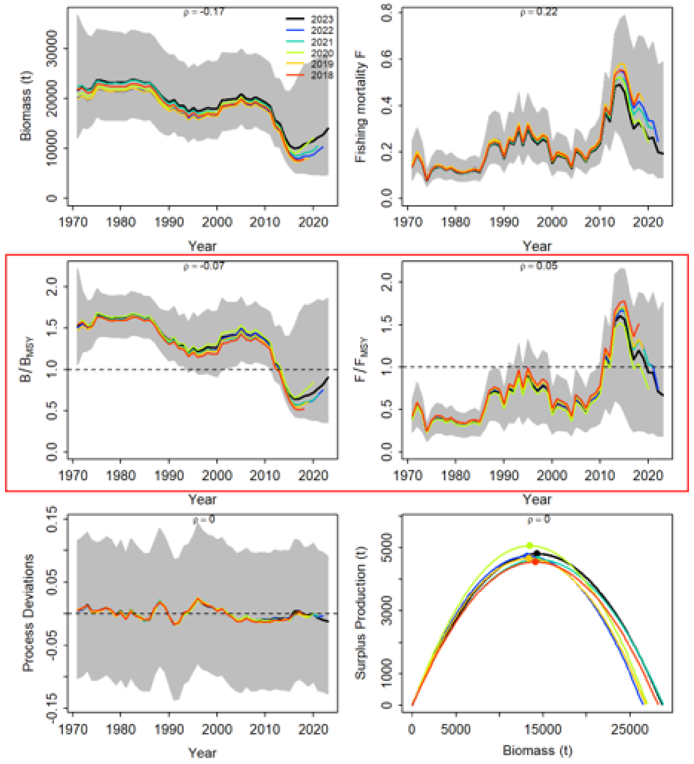
	Geweke.p	Heidel.p
K	0.61	0.69
r	0.89	0.79

RETROSPECTIVE ANALYSES

(#42) (p.12) Retrospective analyses
for 2 most important parameters (B & F)
Mohan ρ (-0.15 < ρ < 0.2) ➔ Converged
(value closer to 0.025 is better)
Yellow marker (not converged)

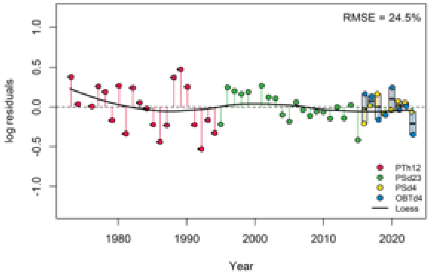
Mohan ρ	B	F
2023	-0.19	0.22
2022	-0.14	0.16
2021	0.06	-0.06
2020	-0.28	0.39
2019	-0.28	0.38
Average	-0.17	0.22

(#40) (p.14) Retrospective patterns

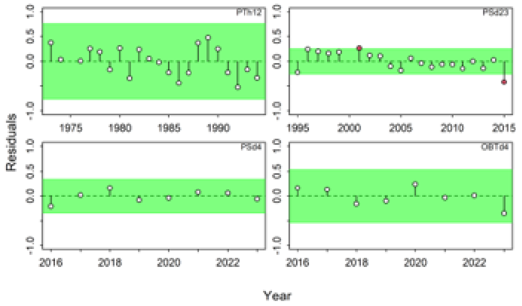


CPUE FITNESS

(#10) (page 8) CPUE fitness (1)
(lower RMSE better)



(#13) (page 7) CPUE fitness (2)
Red band: No randomness
Red points: outliers

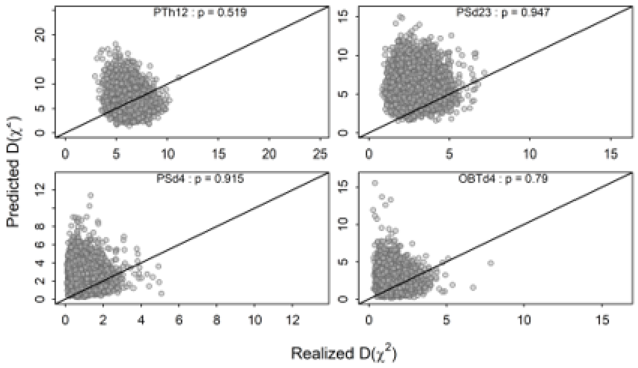


Summary of results & diagnoses (2/2)

Model fits

(#12) (page 11)
Posterior Predictive Check (PPC).
p should be
0.2<p<0.8
and closer to 0.5
is better fit.
(Users: compute Ave. & write below)

Ave. p=___



Estimated Depletion=0.67

Estimated parameter values

(#21)
(page 16)

Parameter	Meaning	Mean	Lower (95%)	Upper (95%)
K	Carrying capacity (t)	28,683	19,034	39,777
r	Pop. growth rate	0.67	0.43	1.33
B0/K	Depletion (EST)	0.75	0.53	1.09
sigma.proc	Estimable process VAR	0.05	0.03	0.09
m	Shape parameter	2	2	2
Fmsy	F at MSY	0.33	0.21	0.67
TBmsy	TB at MSY (t)	14,342	9,517	19,889
MSY	MSY (t)	4,633	4,009	7,698
Catch(2023)	Current catch	2,724		
bmsyk	Limit Ref. Point (TB/TBmsy)	0.50	0.50	0.50
TB(1971)/ K	Depletion (OBS)(start)	0.76	0.53	1.11
TB(2023)/ K	Depletion (OBS)(last)	0.45	0.18	0.93
TB/TBmsy	TB ratio	0.91	0.36	1.86
F/Fmsy	F ratio	0.67	0.19	1.77

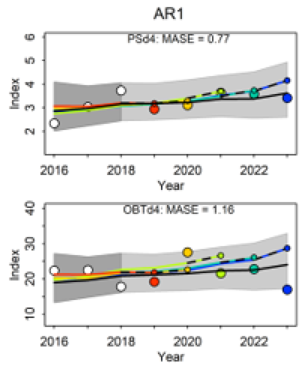
Hindcast analyses

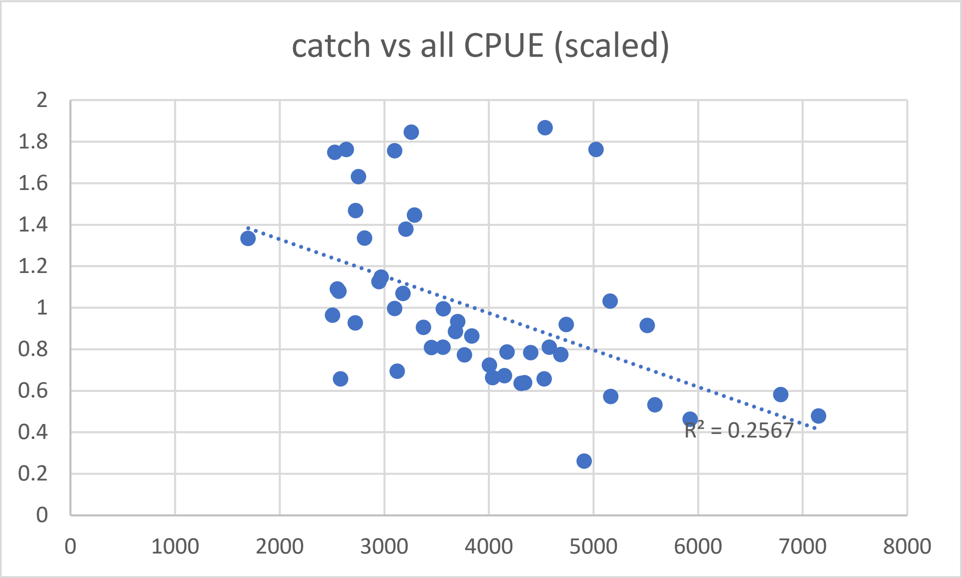
(#41) (page 15) Hindcast
(predictive skill)
If predicted color points > 95% CI
➔NG for prediction

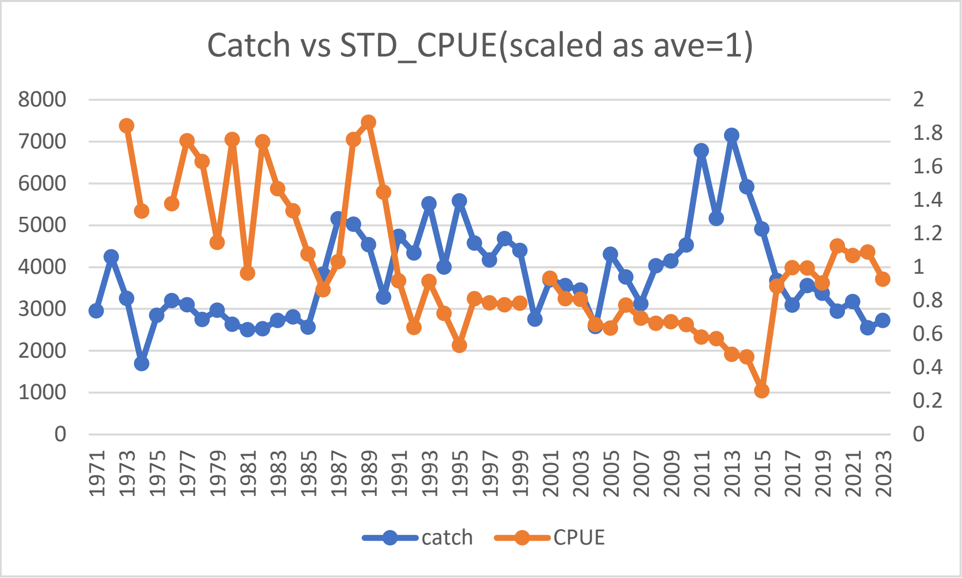
(#43) (page 14)
MASE
(Predictive skill)
(< 1)
(smaller better)

Yellow markers (> 1)
Not acceptable

Index	MASE
PTh12	NA
PSd23	NA
PSd4	0.77
OBTd4	1.16
Average	1.03



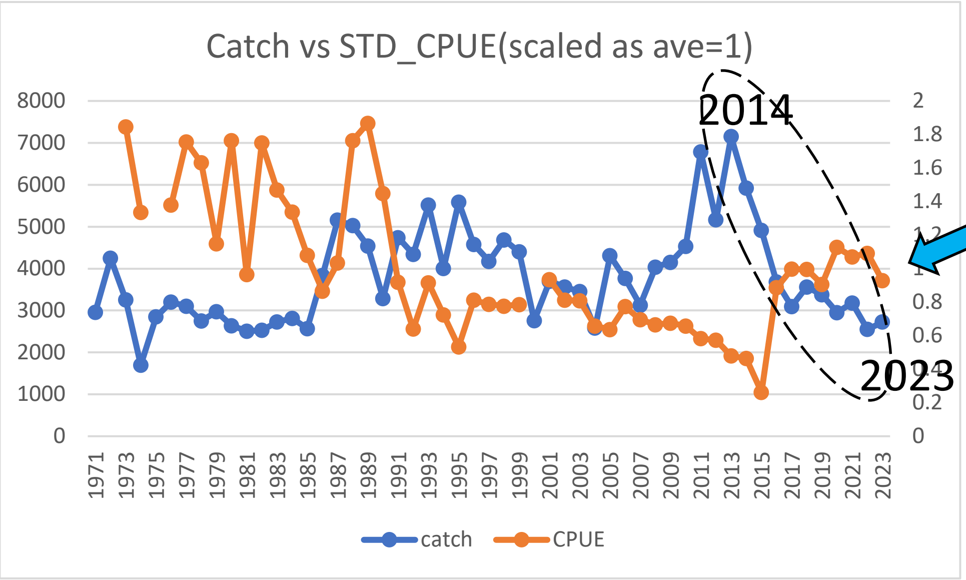


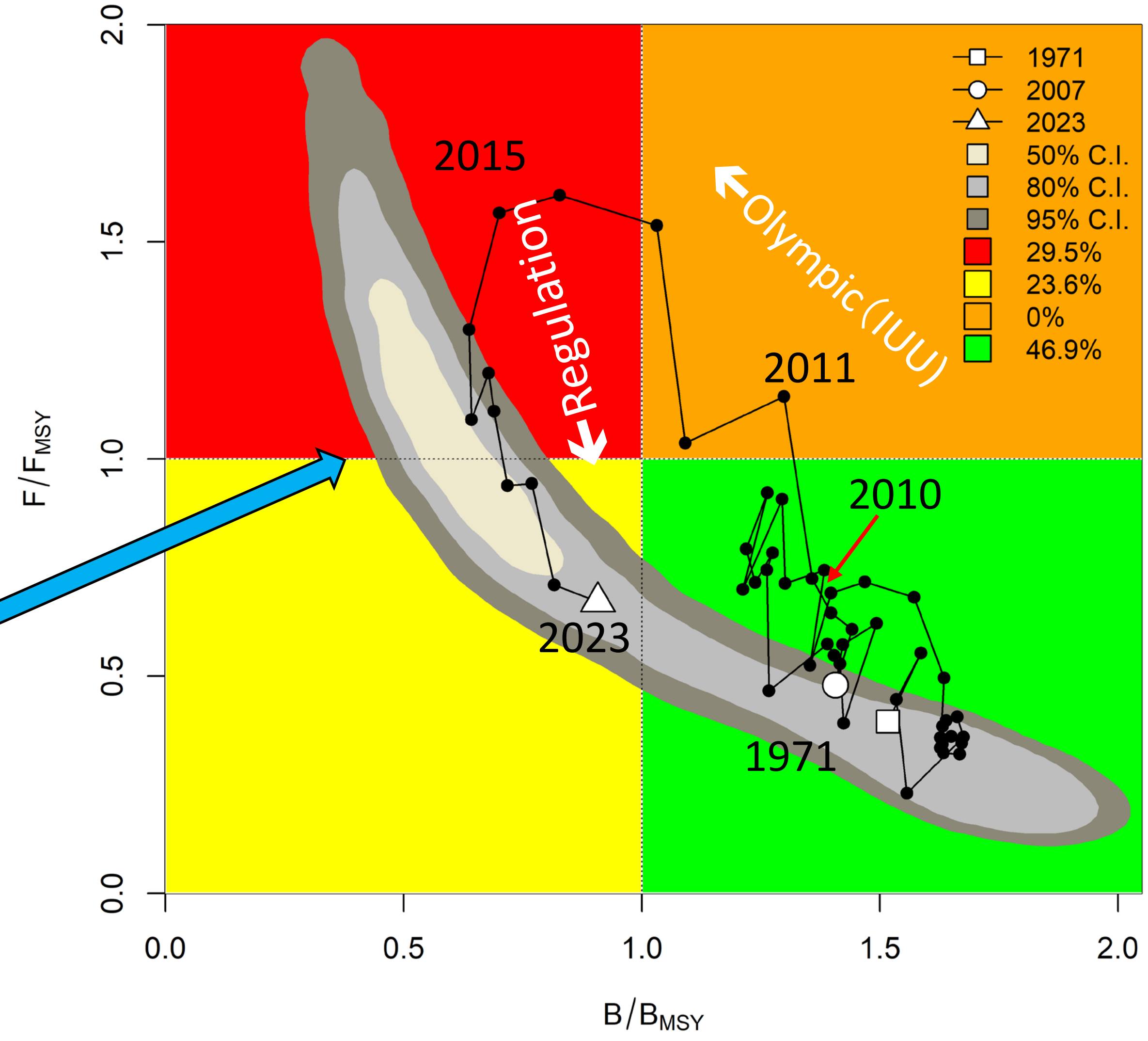


3 selected individual CPUE had high –r2 and the combined one is also high r2=-26%.
Unlike the one for SM, SU has steadily good negative correction.

The global situation shows very good relation between catch and STD_CPUE.

Stock status (SS) (2023) ➔Yellow

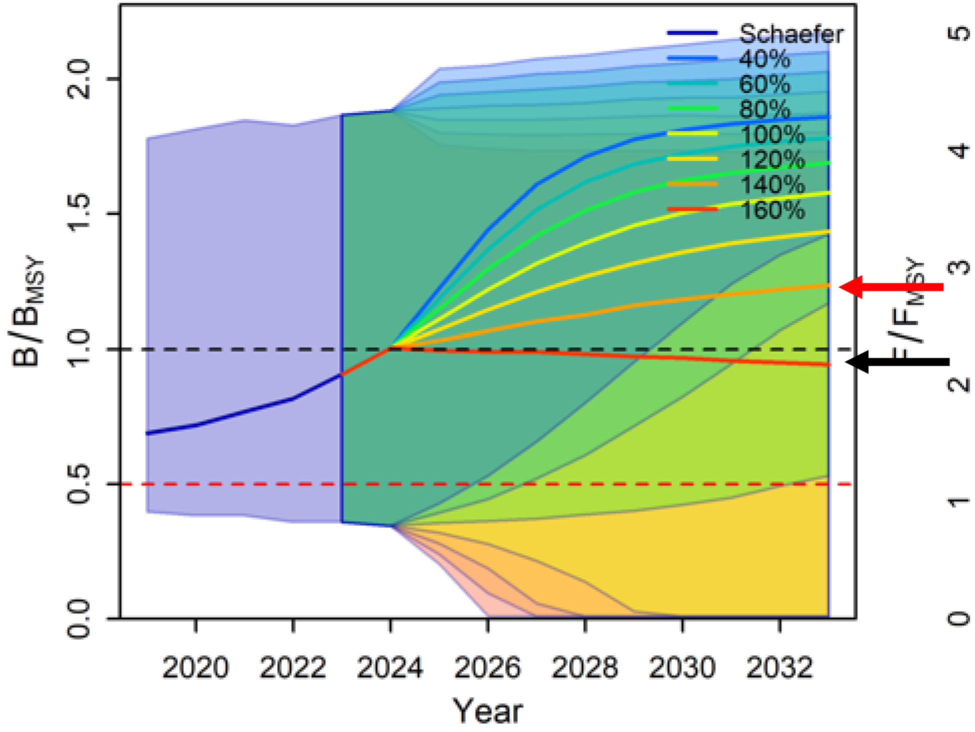


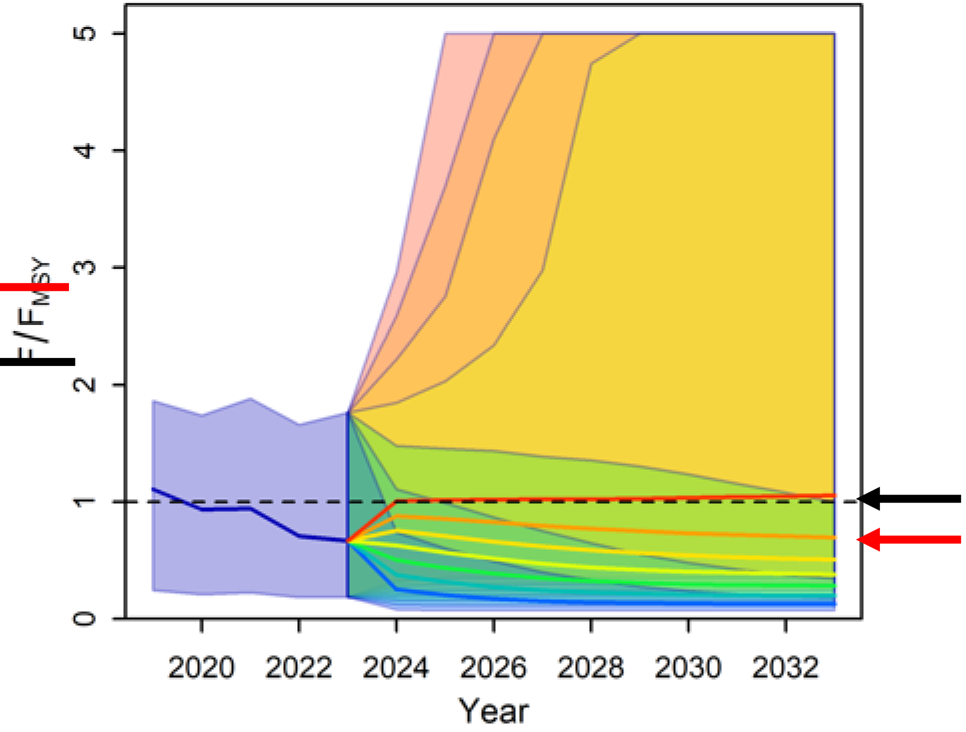


Catch & CPUE changes are well reflected by the Kobe plot

Projection (10 years, until 2032) (page 19, Report)

- If current catch level (2023) (2,700 tons) is increased by **40%** (3,800 tons) and continued by 2023, both TB and F are sustainable to the MSY level (4,700 tons) in high probability levels (red arrows).
- But **+60%** not sustainable (black arrows) (NG)
- Hence, TAC can be 40% of the current catch level (3,800 tons) considering uncertainties.





HINDCAST ANALYSES

(#41) (page 15) Hindcast
(predictive skill)
If predicted color points > 95% CI
➔NG for prediction

(#43) (page 14)
MASE
(Predictive skill)
(< 1)
(smaller better)

Yellow markers (> 1)
Not acceptable

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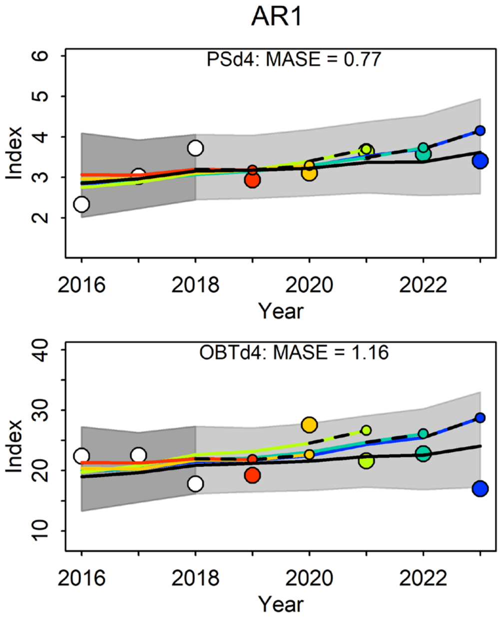
Average	1.03



Prediction power
not strong and not too weak as MASE=1.16,
+
Predicted points large color circles are within 95%CI.

TAC (3,800 tons) (one of choice)

2 fleets (CPUE) (PTh12 & PSd23)
➔NA as both don't have recent CPUE for prediction.
f3 (PSd4) is significant (reliable)
f4 (OBTd4) is not
➔we need to look at the prediction result with caution.

Retrospective analyses

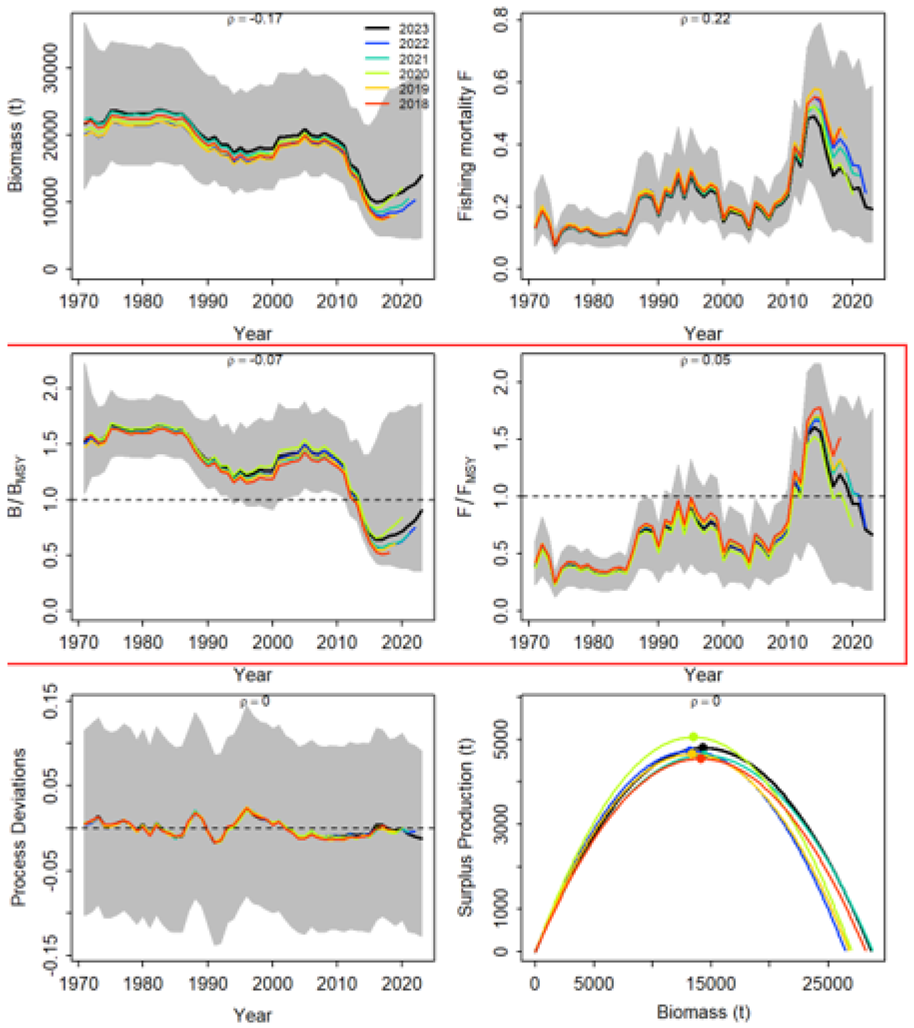
- Retrospective patterns OK

  ➔ JABBA results are OK

(not perfect but similar)

80% ism

(#40) (p.14) Retrospective patterns



Retrospective analyses

- As the results are reasonable, we stop at this point.
- We never get 100% perfect Results in stock assessments

  ➔ Hindcast analyses
- So, our aim are 80%, which is better in stock assessments
- Even if some tries, it will be difficult to find the better results.

JABBA GOAL 80%??

80% satisfaction➔ Good

100% not possible

(no perfect results)

same as our life = not perfect but 80% is OK(happy)

Day 2 PM

- Comparisons with TB & other models
- Summary + discussion + Future
- JABBA practice

JAM PC : JAM +Weerapol

Supapong PC : NIPA+PUY

- R-4.3.0
- R-4.4.0
- R-4.4.1
- R-4.4.2

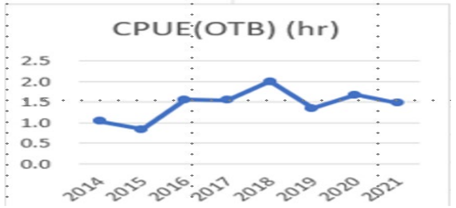
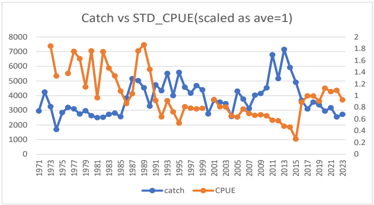
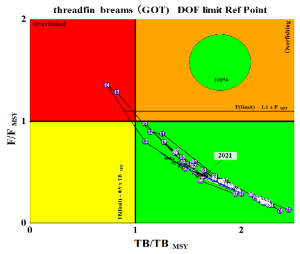
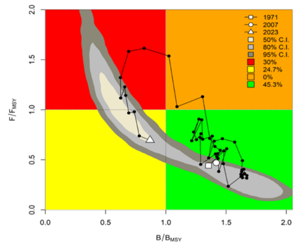
8. Discussion, Summary & Future plan

- JABBA
- q
- Current Stock status and management advice
- Species composition
- CPUE standardization
- Comparison
- Future

Comparison with other SA models

LAST year (ASPIC) vs THIS year (JABBA)

No BANANA

Comparisons of major SA results: Last year vs This year		
Note	*(1) SA Last year was for Lizardfish (6 species combined) & This year for one of 6 species. Bluetooth Lizardfish (SU).* *(2)Thus results are not comparable. But SU is one of major Lizardfish, thus comparison are reliable in some extent.*	
	last year	this year
catch	1971~2023 (n=53)	
# of CPUE	1	3
period	short (2001~2022) (n=23)	long (1973~2023) (n=51) (good)
standardized CPUE		
model	ASPIC	JABBA
# q	1	3 (good)
Kobe plot	Strange： straight line & no uncertainties (as no constrain/long CPUE) 	Explain the situation very well 
comments	3 major points why results this year are much better than last year : (a) Better model (JABBA) (b) 3q explains situation well (c) Long CPUE (51 year) provides stable & robust results	

JABBA Comparisons with ASPIC

JABBA Far better

Technical & practical aspect

(ASPIC very outdated)

⇩

Estimation (robust) **Space-State**

No local minimum problem (ASPIC)

because of the Bayesian approach

Multi CPUE (flexible)

Many useful outputs

Comparison between ASPIC and JABBA

Based on the description on JABBA outlines & features, a summary is made on reasons why JABBA is superior to ASPIC. This is because we have been using ASPIC for many years, thus, we need a comparison for users to understand.

	JABBA	ASPIC
(1) Estimation methods	Estimation method (Bayesian approach based on likelihood) used by JABBA is theoretically much better, more flexible and superior than the least squares (tractional) method used by ASPIC.	
(2) Parameter estimation	JABBA can estimate parameters much easily & effectively in a short time by the Bayesian approach with MCMC.	ASPIC needs a tedious grid (pin point) search (Batch job), which sometimes produces incorrect parameters due to local (false) minima.
(3) CPUE	JABBA can accept any CPUE series. After the run, implausible CPUE will be detected.	ASPIC needs to check CPUE series if it is plausible in advance by the data QC. Otherwise, it is difficult to get convergence.
(4) Outliers	Outliers can be found easily after runs by inspecting the residual plots.	Need to check outliers before runs. It may be difficult to detect outliers after run as no effective graphs as in JABBA.
(5) Theory	JABBA theory is difficult & complicated. But it is easy to implement if the menu-driven software is used.	Theory is not difficult as for JABBA. But implementation by the menu-driven software is not as easy nor effective as for JABBA.

Let’s compare with TB & other models

Presentation by Weerapol san

Future

Future Publication (SU)

We will publish Fish for the People (SEAFDEC)
as it directly relates to SEAFDEC (good contribution)

Weerapol (priority) + Nipa + Puy + Jam + Nishida

Online Zoom 2=times/month

NEXT For threadfin breams (13 species)

We will do same way (2026)

Together Weerapol san ➔ Main Player

Ornate threadfin bream

Nemipterus spp.

Which one ?

sp1	sp2	sp3	sp4	sp5	sp6	sp7	sp8	sp9	sp10	sp11	sp12	sp13
Nemipteridae	Nemipterus bipunctatus	Nemipterus furcosus	Nemipterus hexodon	Nemipterus japonicus	Nemipterus marginatus	Nemipterus mesoprion	Nemipterus metopias	Nemipterus nematophorus	Nemipterus nemurus	Nemipterus peronii	Nemipterus tambuloides	Nemipterus tolu

DOF stock assessment

If DOF is OK,

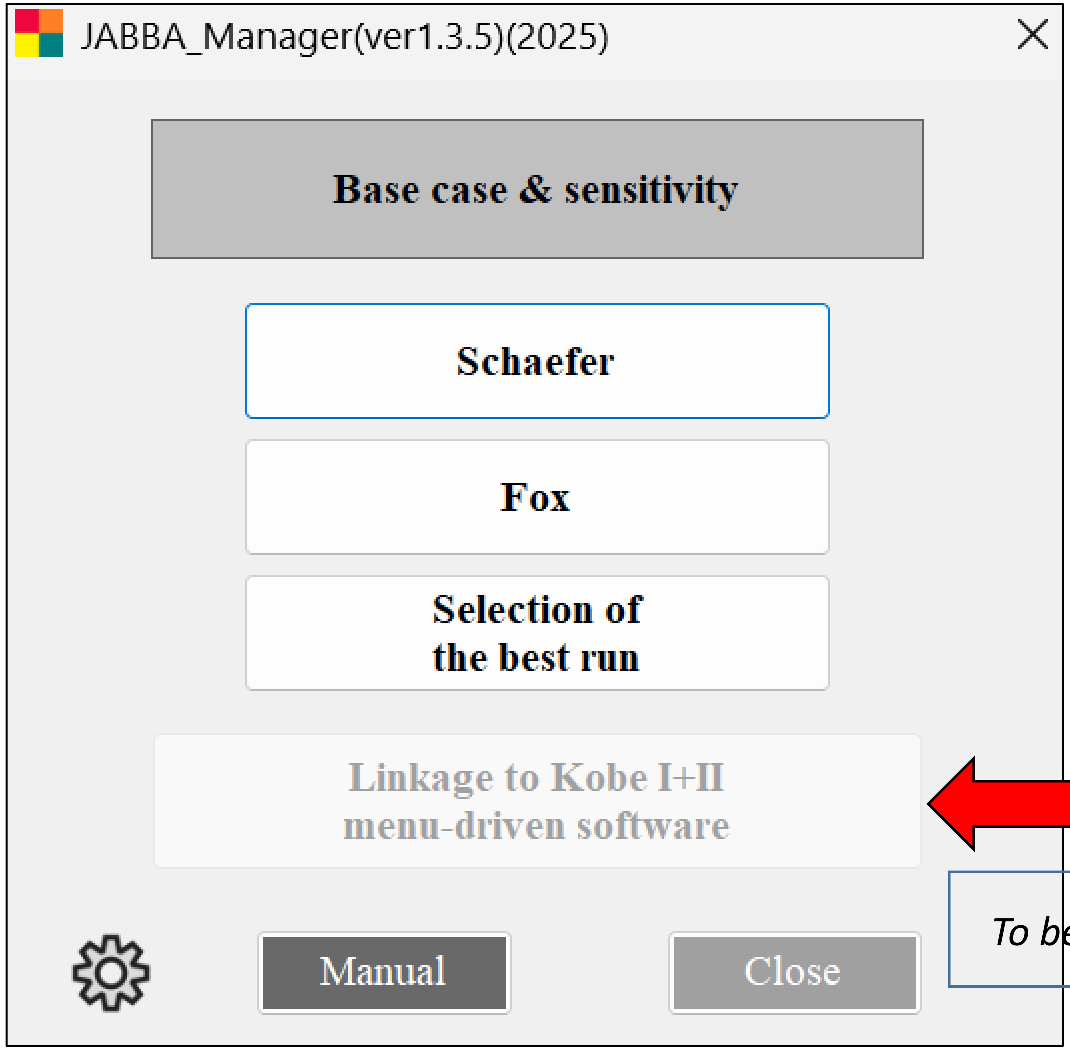
we can do JABBA assessment routinely

(for example, every 3 years)

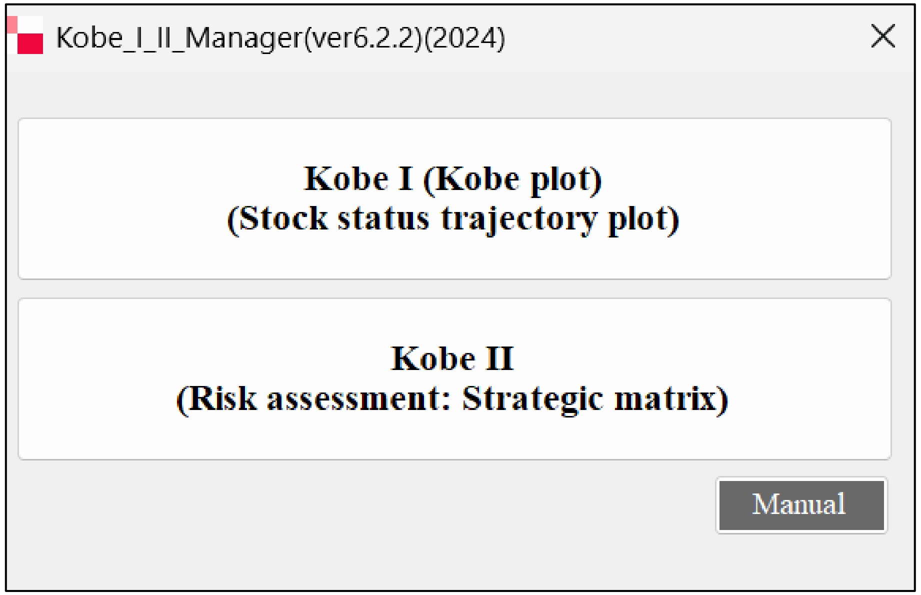
for important species as reference.

Can be considered

Future software

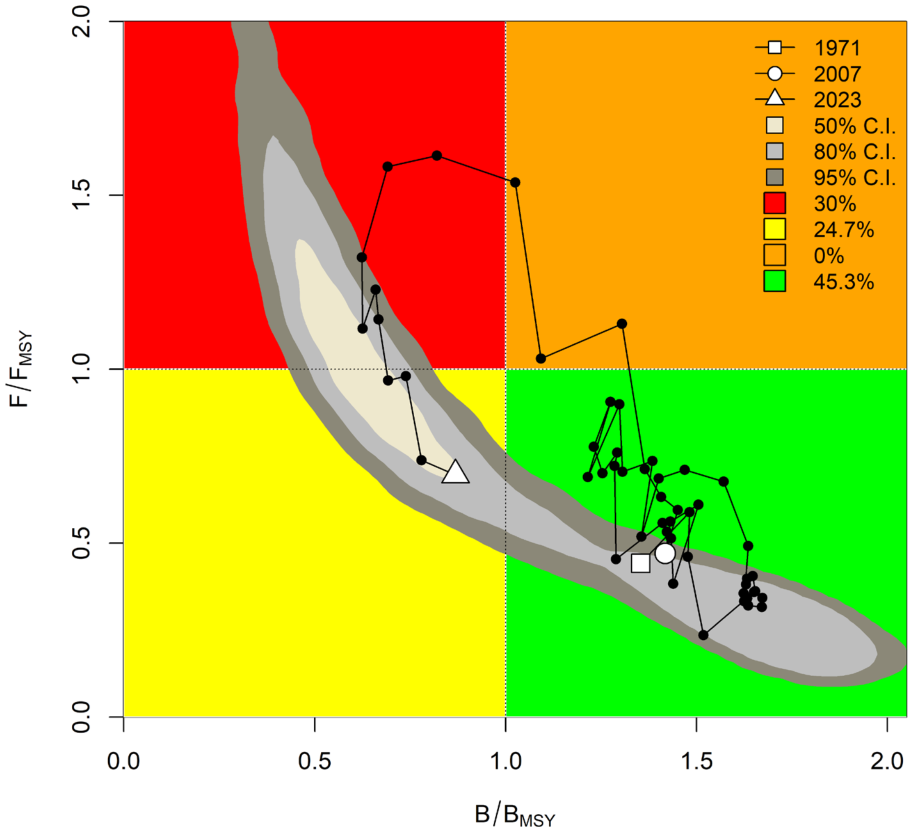


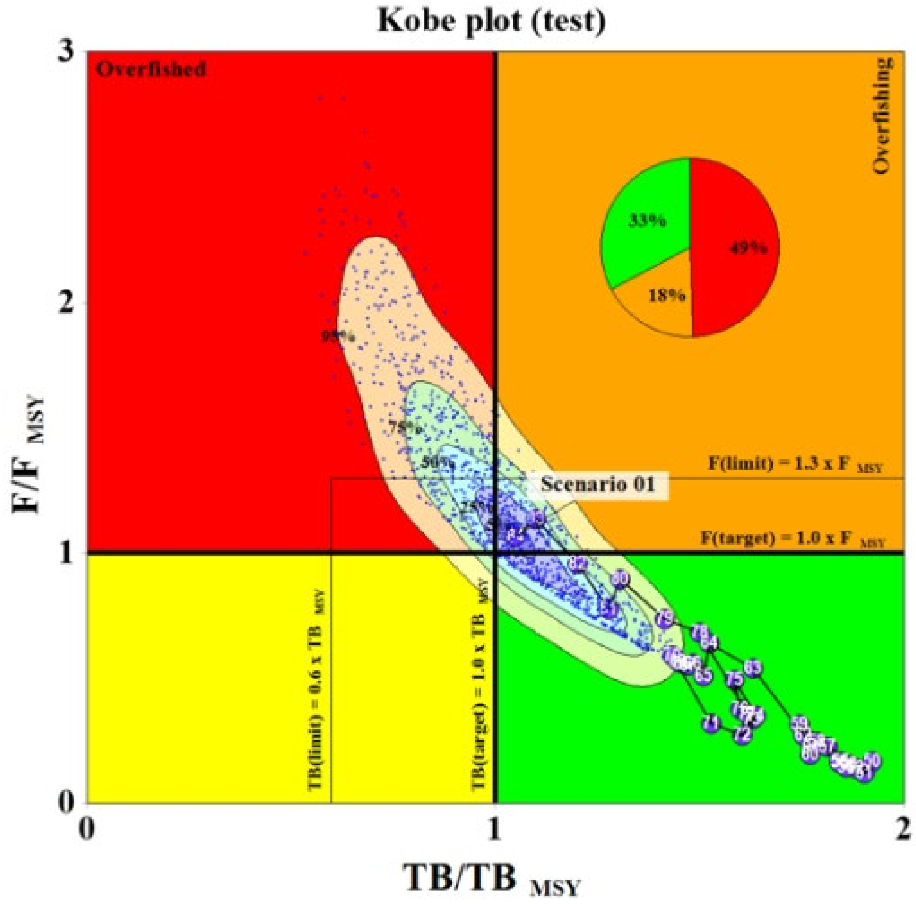
To be completed by 2026.



Better Kobe plot ➔ Pie Chart + Target/Limit Reference Point

Thai use Reference points DOF (0.9*TB and 1.1*F as RP)





Kobe II Risk assessment ➔Good for Management (TAC)

Risk probability (%) violating TB(MSY) level by catch level

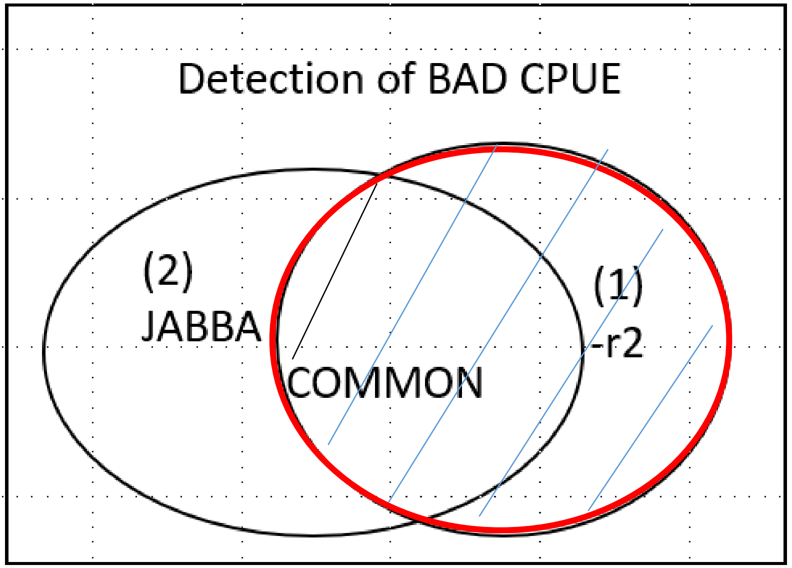
Color legend				
Risk levels	Low risk	Medium low risk	Medium high risk	High risk
Probably	0 - 25%	25 - 50%	50 - 75%	75 - 100%

	%	Catch (tons)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
% Increased from the current catch level	200%	40,533	42%	99%	100%	100%	100%	100%	100%	100%	100%	100%
	150%	33,778	42%	96%	99%	100%	100%	100%	100%	100%	100%	100%
	100%	27,022	42%	89%	96%	99%	100%	100%	100%	100%	100%	100%
	80%	24,320	42%	85%	93%	97%	99%	100%	100%	100%	100%	100%
	60%	21,618	42%	79%	88%	93%	96%	98%	99%	100%	100%	100%
	40%	18,915	42%	71%	80%	87%	91%	94%	96%	97%	98%	99%
	30%	17,564	42%	65%	75%	82%	87%	91%	93%	95%	96%	97%
	20%	16,213	42%	60%	69%	76%	81%	86%	89%	91%	92%	93%
	10%	14,862	42%	54%	60%	68%	73%	77%	81%	84%	86%	88%
*** Current catch**	0%	13,511	42%	48%	51%	56%	61%	64%	68%	72%	75%	77%
% decreased from the current catch level	-5.6%	**12,760	42%	42%	45%	48%	51%	54%	57%	60%	62%	64%
	-10%	12,160	42%	39%	41%	43%	45%	48%	50%	52%	54%	55%
	-20%	10,809	42%	30%	28%	28%	27%	26%	27%	27%	27%	27%
	-30%	9,458	42%	21%	15%	11%	9%	8%	8%	8%	8%	9%
	-40%	8,107	42%	10%	4%	2%	1%	1%	1%	1%	1%	1%
	-60%	5,404	42%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	-80%	2,702	42%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	-100%	0	42%	0%	0%	0%	0%	0%	0%	0%	0%	0%

*(Note) * Average catch for 3 last assessments years   ** MSY level*

JABBA

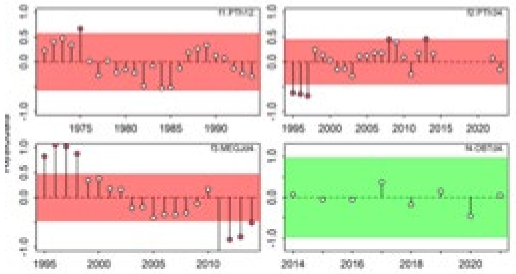
Relation of outliers between (1) & (2)



BIG outliers excluded before JABBA (1) –r2,

➔ JABBA will produce less outliers (red points)

& Produce more Green



Provide good results in a short time.

Otherwise, takes a long time

JABBA

- Good CPUE ➔ good results in short runs (time).
- JABBA will detect bad data (outliers).
- Remove in advance by –r2 ➔ smooth run (a short run).
- BAD CPUE ➔ many runs & hours ➔ end up NO results
- NO result ➔ one of good solution
- Scenario approach: diagnostics (5)➔(14) (good screenings)

JABBA good CPUE

Standardized CPUE**(minor gear)** ➔ Good for some cases

Need to check all available nominal CPUE

In the same gear, effort unit also need to check

➔some good CPUE

For example(same gear different r2) ,

OBT (kg/day) r2=-34%

OBT(kg/hr) r2=+2%

JABBA GOOD CPUE

We found 3 gears (out of 35)→ GOOD CPUE

STAT : PS(kg/day) & PT (kg/hr) (minor)

Port sampling : OBT (kg/day)

↓

Next 3-4 years

we can use same 3 gears (with updated data) as it takes time

Unless some big change in fisheries

↓

After 3-4 years, we need to check ALL again

JABBA scenario approaches

Robust & effective

Direct approach unstable

(depletion rate)

Recommended

Butterworth, Wang and other (papers)

Special treatment

JABBA menu driven software
merit & demerit

- If you know R, you can use JABBA.
- But JABBA have many options, so that you need to know details by R.
- You need to change r codes. It will be **tough.**
- On the other hand, software run **by default**.

JABBA menu driven software

- Default is standard and good enough to get useful results.
- Software is very easy & simple to use.
- Then you can run freely without worrying about details of JABBA.
- However, scenario manipulation is **a bit tedious**.
- But after practice, you can easily handle the software.

Summary

- JABBA reliable, practical & useful → DOF can use
- JABBA Good standardized CPUE →key for successful JABBA
- Assessment results by JABBA (SU) → publication (SEAFDEC)
- Annual species composition can be used to estimate SU catch
- 3q by period important for unbiased JABBA
- JABBA scenario approach → robust & reliable (B1/K & others)
- New CPUE standardization with 7 Covariates →useful ENV, category
- Need to learn whole process (inc. data process)

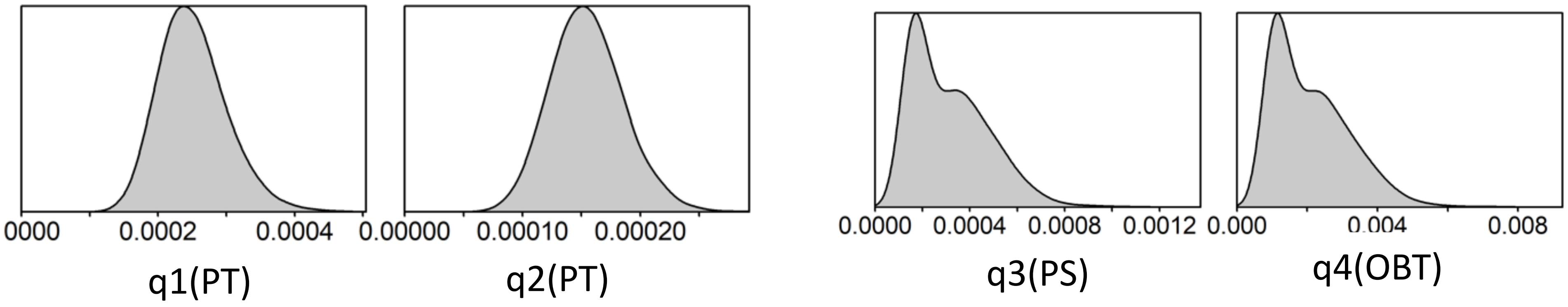
  → online work for publication

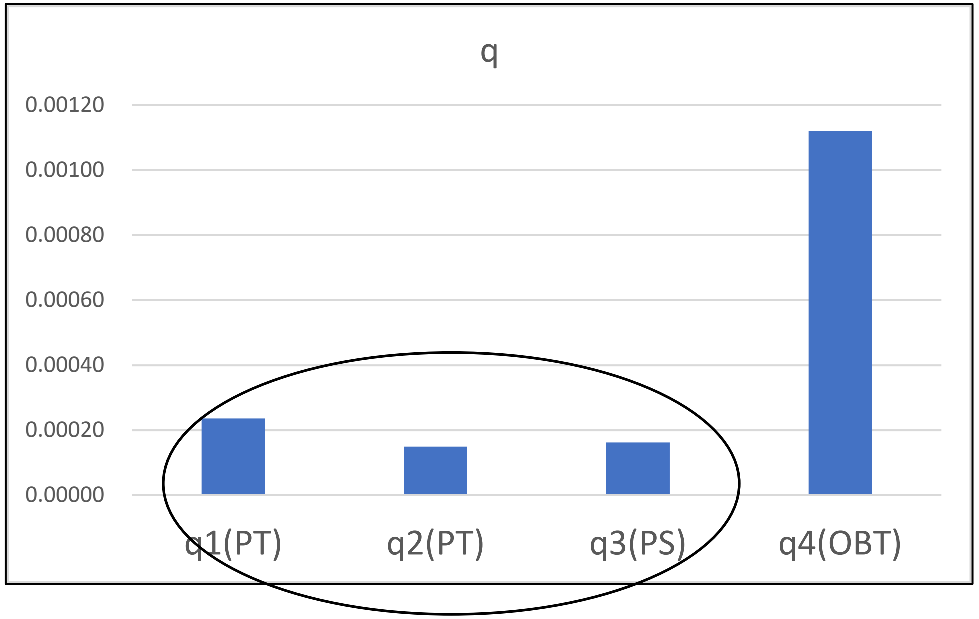
- JABBA
- q
- Current Stock status and management advice
- CPUE standardization
- Comparison
- Future

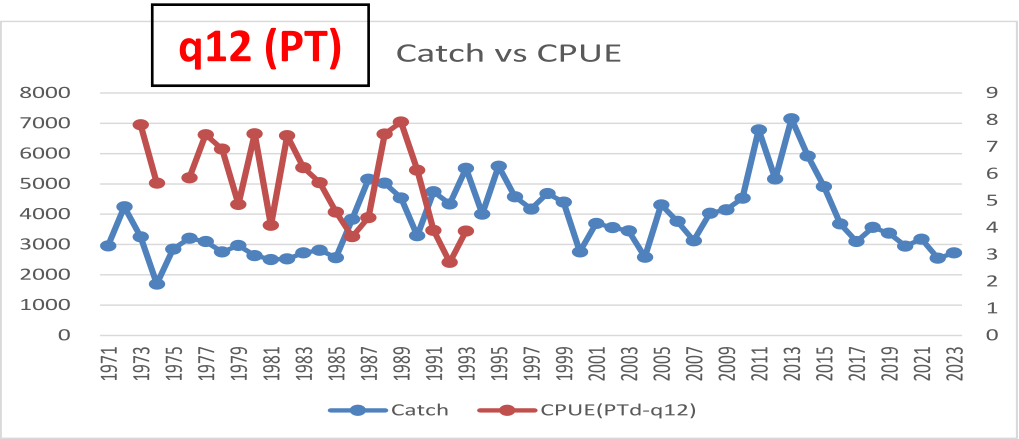
q catchability

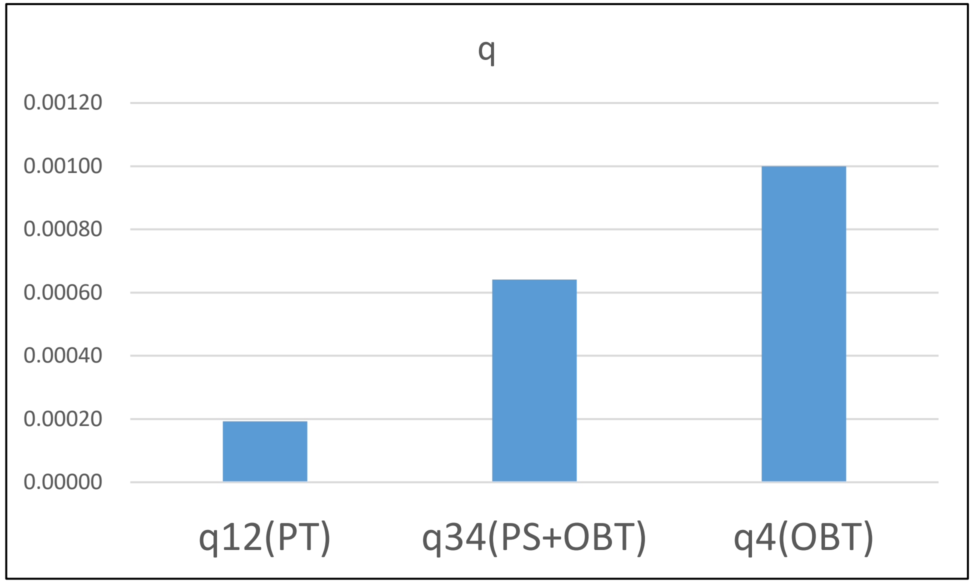
SU 3 q ➔ good Strategy

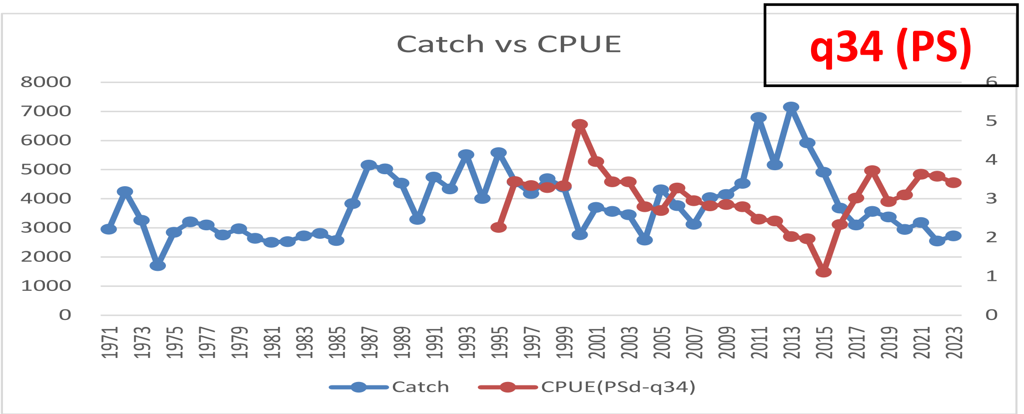
posterior

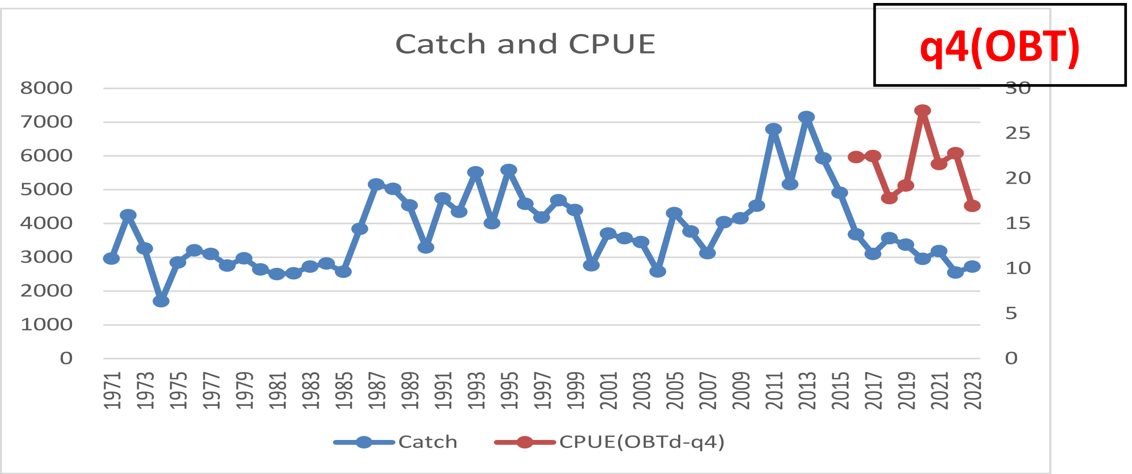





q12 (PT)
Catch vs CPUE
Catch
CPUE(PTd-q12)


q
0.00120
0.00100
0.00080
0.00060
0.00040
0.00020
0.00000
q12(PT)
q34(PS+OBT)
q4(OBT)


Catch vs CPUE
q34 (PS)
Catch
CPUE(PSd-q34)


Catch and CPUE
q4(OBT)
Catch
CPUE(OBTd-q4)

About q

- As explained by Weerapol san, Situation Fisheries are changed by 3 times since 1960.

- However, actual q (catchability) among gears are likely similar as q values are almost constant (1971~2015).

- The big increased of q is after 2016.

About q

- This is due to sudden technical evolution ?
- Probably no, but there may be small contribution.
- The real cause is probably the changes of new regulation.
- That produce high q .
- Thus, it was good to estimate 3 q and incorporate to JABBA

- JABBA
- Current Stock status and management advice
- q
- Species composition
- CPUE standardization
- Comparison
- Future

Retrospective analyses

- As the results are reasonable, Wise to stop at this point.
- We never get 100% perfect Results in stock assessments.
- So, ours are 80%, which is better in stock assessments

- JABBA
- q
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- CPUE standardization
- Future

Species composition

Species composition（Lizardfish)

Demersal survey (OBT) + Port sampling (PT+OTH)

(fine scale set by set data)

To estimate SU catch

(a) Annual average SC

(b) Annual, Mo & area SC average SC

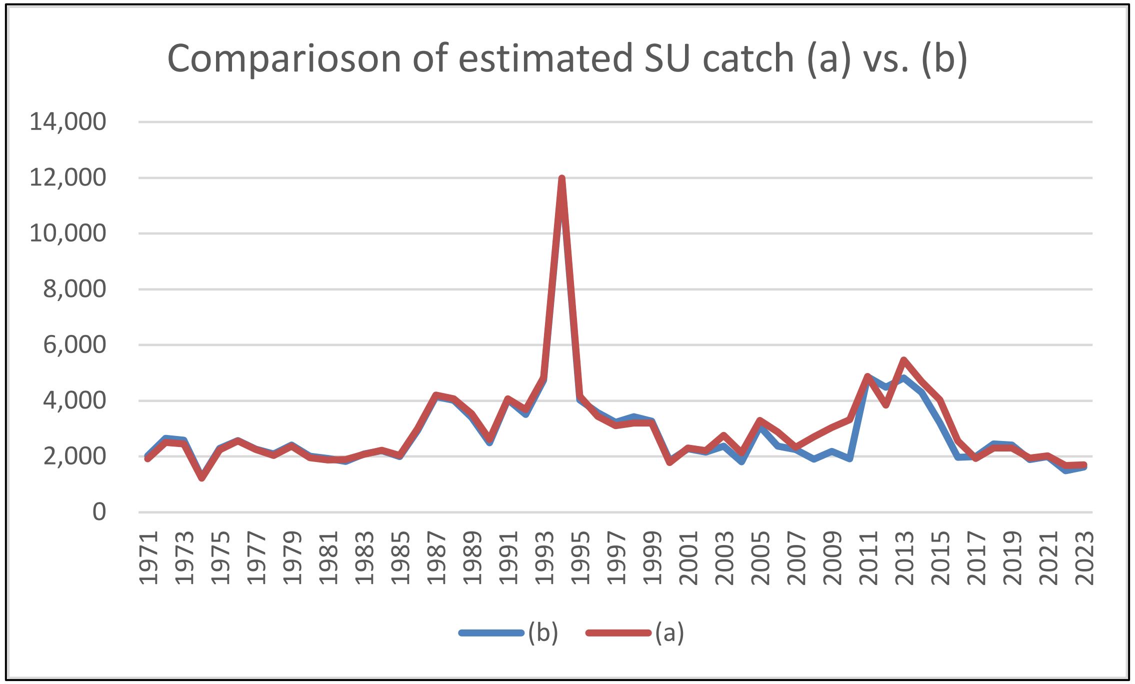
➔But missing data make it difficult for substitution

Finally, we used (a)

Species composition（Lizardfish)

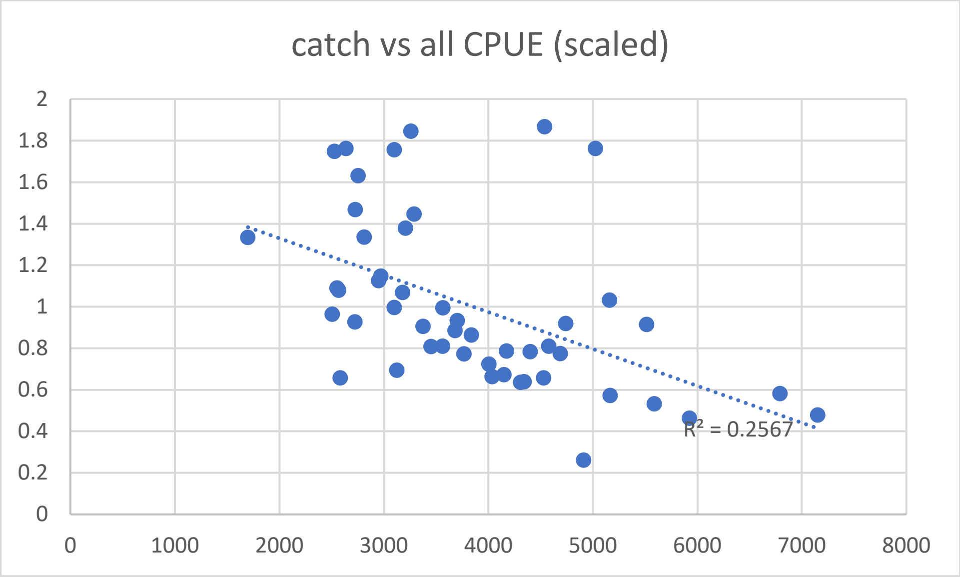
Estimated SU catch (a) vs. (b) are very similar

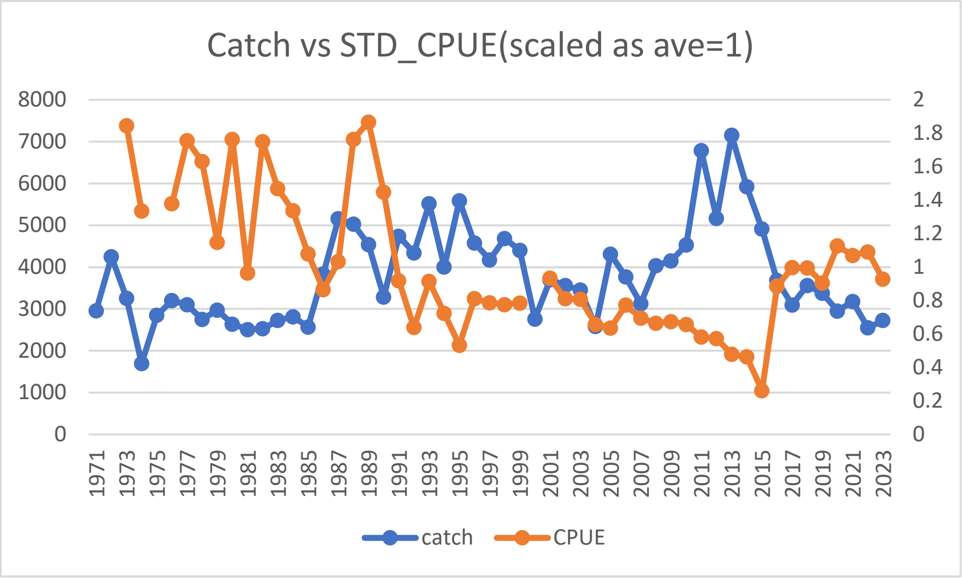
With error in 1994



- JABBA
- q
- Current Stock status and management advice
- Species composition
- CPUE standardization
- Comparison
- Future

Comparisons





3 selected individual CPUE had high –r2 and the combined one is also high r2=-26%.
Unlike the one for SM, SU has steadily good negative correction.

The global situation shows very good relation between catch and STD_CPUE.

We will practice later to make these graphs online after WS2

JABBA Comparisons of result with TB model or other models (DOF)

Practice

								Series #	1	2	3	4	5	6
								Scenario #	IN1					
								depletion	0.4	0.4	0.6	0.6	0.8	0.8
								Model s(Schaefer) f(Fox)	s	f	s	f	s	f
Source	Period		q	n=	Gear	Kg per	r2 (%)	run ID	SU-IN1-0.4s	SU-IN2-0.4f	SU-IN3-0.6s	SU-IN4-0.6f	SU-IN5-0.8s	SU-IN6-0.8f
Statistical Division	1971~1994		q12	24	PT	hr	-7	strategy 1 INdividual (IN)						
	1971~2023	1995~2015	q3	21	PS	day	-38							
		2016~2023	q4	8										
Port sampling	1995~2023		q4	29	PT	day	-65							
Diagnoses & Results								(1) Kobe plot	ng					
								(2) CPUE	ok					
								(3) Retro	ok					
								(4) Convergence	ok					
								(5) Retro-Hind	ok					
								Results	ng					
Note														

You can make it by yourself

Implementation
JABBA runs Case 2~4 (Scenario approach)

Base case runs
(scenarios)(by 0.2)
(0.2 0.4 0.6 0.8) (wide range)
3 Strategy

Sensitivity
(by 0.1)
0.5s & 0.7s
+
Best scenario
(Base case)
0.6s

Selection form (5)
5 diagnostics
SKIP

Select the best
scenario
(base case)
SKIP

Select a few good
scenarios
(base case)
SKIP

Selection form (14)
(14 diagnostics)

Select final best run from
Best run (Base case) & Sensitivity