



# The Management Procedure Development of Southern Bluefin Tuna

*The future of the most valuable  
fish in the world*

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Dr. Moon, thank you for your kind introduction. It is a pleasure to be here today.  
I would like to tell you about something very interesting for all of us involved in  
stock management.

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# We love Shimizu!



CHO Jae Jin  
(Shimizu S-plus)



my colleagues  
in the temperate tuna section,  
Far Seas Lab

When I first attended the University of Tokyo, I studied insect population dynamics.

However, I now research the modeling of tuna stock management procedures at the Far Seas Laboratory in Shimizu.

Shimizu is famous for being the largest import port of tuna in Japan.

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We also have a nice soccer team, Shimizu S-plus.

Cho Jae Jin is playing on our team now.

This season, he is in great physical condition and scored many goals for our team.

Thank you very much for sending him to Shimizu.

I guess he will make a great play at the world cup.

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Today's Presentation:

## The Management Procedure (MP) Development of Southern Bluefin Tuna

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- Introduction of SBT
- MP development in CCSBT
  - Process of MP development
  - Construction of Operating Model (OM)
  - Test of MP performance
  - Selection of MP
  - Final decision and current problems



Let's begin.

Today I want to tell you about our management procedure development of southern bluefin tuna, or SBT.

Management procedure, or MP, was developed by the commission for conservation of southern bluefin tuna, or CCSBT.

During my presentation today, I will explain about SBT biology and fisheries industries briefly, since this aspect has been covered by Dr. Moon.

Then, we'll examine the process of MP development.

After that, we will look at the construction of the operating model, test of MP performance and selection of MP.

Finally, I'll show you the final decision of the CCSBT and the current problems that we are striving to overcome.

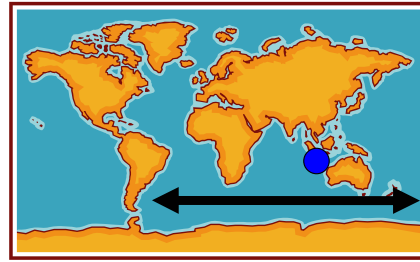
Each process is very interesting, but today I will present the broad overview.

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## Biology

### Southern Bluefin Tuna (*Thunnus maccoyii*)



- Distributed mainly in waters between 30°S and 50°S.
- The only known spawning ground is south of Indonesia (single stock).
- Length >2m, weight >200kg
- Age of maturity >age10
- Longevity >40 years



First, I will discuss the biology of southern bluefin tuna.

These tuna are distributed mainly in open waters, roughly between 30 and 50 degrees south.

The only known spawning ground is south of Indonesia in the Indian Ocean, so they are considered to be a single stock for management.

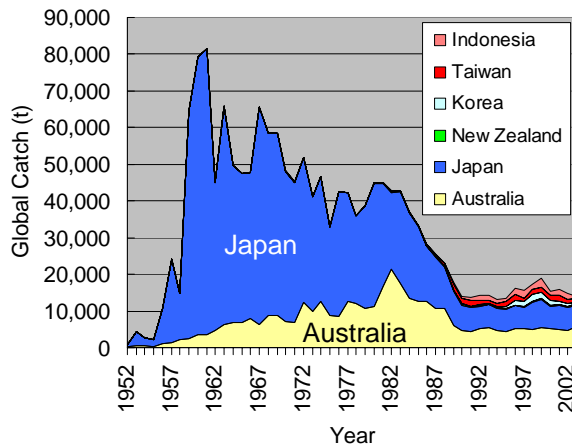
They are large pelagic fish, reaching more than 2 meters in length and 200 kilograms in weight.

Otolith studies indicate that they mature after 10 years and live up to forty years.

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# Fisheries Industries



- Fisheries started in the 1950s.
- Global catch remains at about 15,000 t after 1990.

Next I'll tell you about the SBT fisheries.

Historically, Australia and Japan are two main fishing countries.

The fisheries industries started in the 1950's, and caught 80,000 tons of SBT at their peak.

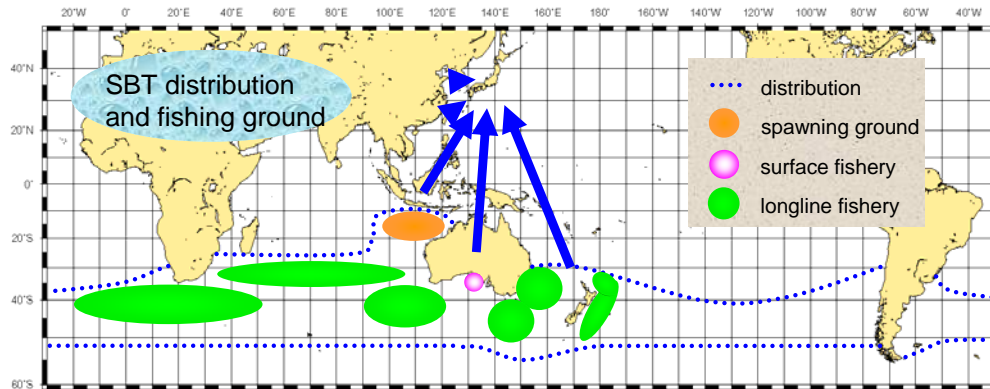
However, this caused the stocks to decrease and the global catch has remained at about 15,000 tons since 1990.

This is because stock abundance declined, and a quota system was introduced in 1985.

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## Fisheries Industries (cont.)



### ■ Purse seine fishery

- Australia  
(age 2-4: farming)

### ■ Longline fishery

- Japan, Korea, Taiwan, NZ  
(age 4-10)
- Indonesia (age >10)

Now, the Australian purse seine fishery catches juveniles for farming in the Great Australian Bight.

Japan, Korea, Taiwan, and New Zealand catch older juveniles and adults in ocean waters by longline.

Indonesia also catches spawning adults unintentionally.

So, different countries catch fish at different ages using different methods.

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Currently, most of the SBT are exported to Japan for sashimi.

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## Price “The most valuable fish in the world”



A billion dollar industry !

→ Young scientist  
3,000\$ / month

→ SBT  
200kg x 50\$/kg  
= 10,000\$



The SBT is one of the most valuable fish in the world.

The SBT industry is smaller than other tuna industries, but it still very large, at a billion dollars per year.

I've been studying SBT for five years, but honestly I have never eaten the fish.

This fish was caught by me during field research four years ago.

It was the biggest that I've ever seen, and it weighed 200 kg.

(click)

If this fish's condition was very good, the price at the fish market would be 50 dollars per kg, so this fish is worth 10,000 dollars.

(click)

I would have to work for more than three months to buy it.

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## Stock Status from 2005 SC report



“NOT VERY GOOD ! ”

- “... the SBT spawning biomass is at a low fraction of its original biomass and well below the 1980 level. The stock is estimated to be **well below the level that could produce maximum sustainable yield.**”
- “Analysis of several independent data sources and the operating model indicate **very low recruitments in 2000 and 2001.**”
- “... it seems highly likely that **current levels of catch will result in further declines** in spawning stock and exploitable biomass, particularly because of recent low recruitments.”

This is a statement about the SBT stock status last year.

If you wish, you can read it later, but suffice it to say that the stock status is not good right now.

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Let's go on to the main subject.

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## CCSBT - Commission for the Conservation of Southern Bluefin Tuna



- All decisions are made by **common consent**.
- 1985: Tri-lateral Commission (Australia, Japan, New Zealand) reduces Quota.
- **1994: CCSBT starts.**
- 1998: Court case (Aus/NZ vs Jpn)
  - Japanese EFP for testing CPUE hypothesis
- 2002: Korea and Taiwan unite.

Currently, SBT is managed by CCSBT.

In this commission, all decisions are made by common consent, not by a majority vote.

This commission was started in 1994, and the original member countries were Australia, Japan and New Zealand.

In 2002, Korea and Taiwan also joined, and now CCSBT functions well.

However, in the past, Australia and New Zealand took Japan to the International Court of the Law of the Sea.

They argued over the Japanese experimental fishing program for testing the CPUE hypothesis.

However, the court ruled that problems regarding SBT should be resolved in the CCSBT, not the court.

I believe this court case led to develop better management procedures in CCSBT.

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# Management



- Quota for each country
- Scientific Committee (SC) & Stock Assessment Group (SAG)
- Views of stock status are different among member countries because of large uncertainty on assessment results.
- It is unrealistic to agree on **Total Allowable Catch (TAC)** based on an annual assessment process.
- CCSBT decided to develop MP in 2001.

Management is conducted by setting a quota for each country.

The scientific committee, or SC, and the stock assessment group, or SAG, make management recommendations to the commission.

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However, the stock status views vary among member countries because they cannot predict the outcomes of the assessments.

It is unrealistic to agree on TACs based on an annual assessment process.

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Therefore, CCSBT decided to develop MP in 2001.

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## What's MP?



- “A MP is defined as a set of rules that are agreed in advance, that dictate how the TAC for the fishery will be adjusted as new data are collected.” (2001SC report).
- MP = “management strategy”, “harvest strategy” and “decision rule”.
- IWC (1992) “Revised Management Procedure”
- MPs are used increasingly for dictating criteria for some fish and lobster species.

Even though you may already know, I have defined all the different aspects of Management Procedure, or MP.

As stated, the CCSBT defines that a MP is a set of rules that are agreed in advance, that dictate how the TAC for the fishery will be adjusted as new data are collected.

I think that this phrase “agreed in advance” is an important feature for the CCSBT.

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“Management procedure” is also called “management strategy”, “harvest strategy” and “decision rule”.

The revised management procedure of the International Whaling Commission is famous for being the first to develop MP.

Since then, MPs are used increasingly for some fish and lobster species, especially in the southern hemisphere.

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## Advantages of MPs



- To guide the process of quota setting, which does not demand an agreement on a preferred assessment approach.
- To develop **MPs that are robust to uncertainty** by pre-testing them in **operating models (OM)** adequately.
- To provide a better chance of achieving management objectives.
- To implement several decisions in advance.
- This tremendous challenge receives much attention from other fishery commissions.

What are advantages of MPs?

The CCSBT report says that MP guides the process of quota setting, which does not demand an agreement on a preferred assessment approach.

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More generally, it is possible to develop MPs that are more robust to uncertainty by pre-testing them in operating models adequately, and they will provide a better chance of achieving management objectives.

(click)

As stated above, MP development has many advantages, but it is also necessary for scientists, industries, and commissioners to make a number of decisions in advance.

In addition, this is the first MP for international pelagic fish.

In this way, this project in CCSBT is a tremendous challenge and this receives much attention from other fishery commissions.

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Today's Presentation:

## The Management Procedure (MP) Development of Southern Bluefin Tuna

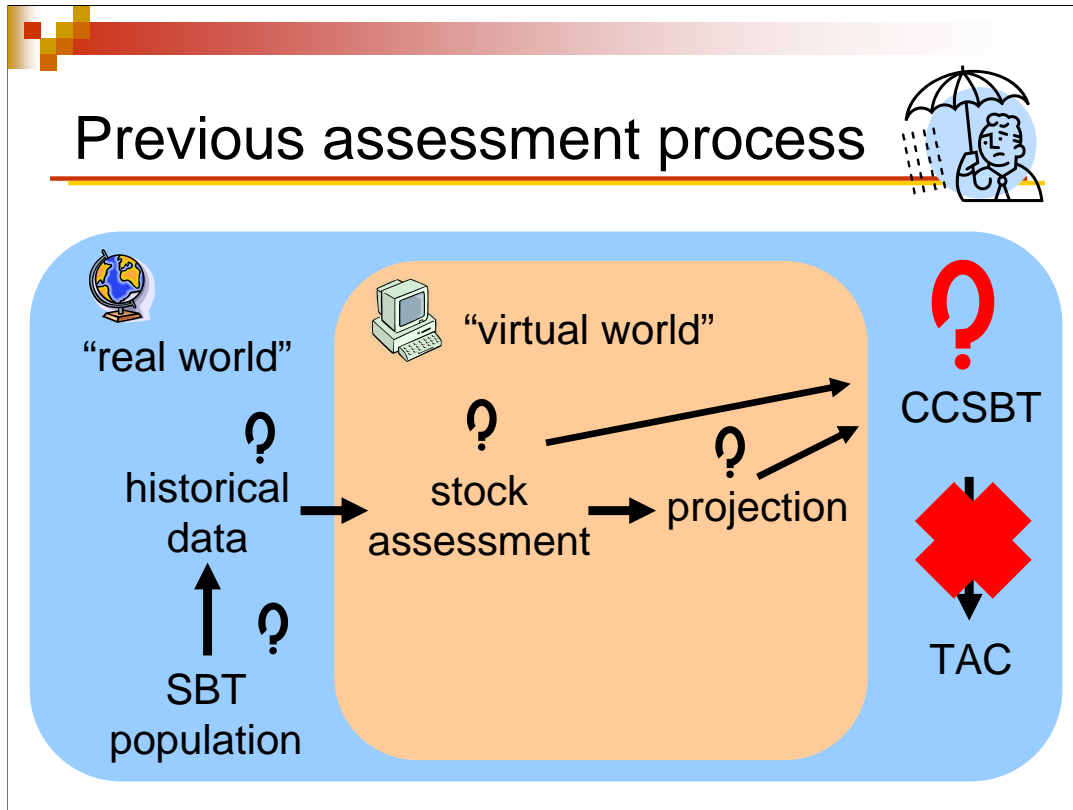
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Here I will talk about developing a framework for MP development in CCSBT.  
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First, as a reference, I will show you the previous assessment process in CCSBT. This blue area indicates the "real world" and the brown area indicates the "virtual world" inside of computers.

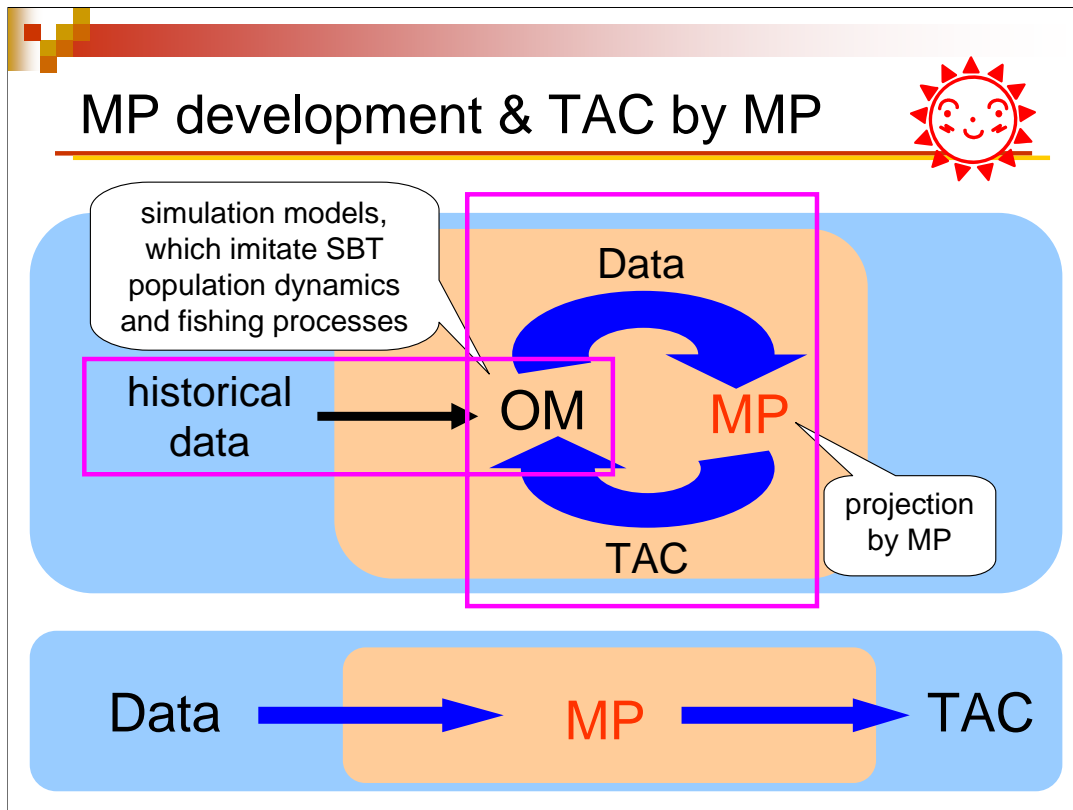
In the previous assessment process, first stock assessment is conducted, then projection is examined by very simple rules such as constant catch and constant F.

Based on these results, scientists and decision makers try to determine TAC, but there are many uncertainties in each step, so we cannot reach an agreement on TAC.

Even if it were possible, we can't be sure that our decision achieves our management objectives.

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On the other hand, we can test MPs during development using an Operating Model, or OM, in advance.

Operating models are simulation models that imitate SBT population dynamics and fishing processes in the virtual world.

Therefore, operating models are conditioned by historical data, like the stock assessment protocols.

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As the next step, the developing MPs are tested with the OMs.

This process is actually an outcome prediction by the MP.

The OM provides fishery data, like CPUE, to the MP.

The MP determines TAC based on the data.

And the OM calculates the stock dynamics of the next year.

This cycle continues for all projection periods.

Through this process, we can evaluate MP performance and select the most preferable MP.

This process provides a better chance of achieving our management objectives.

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Following its completion, the MP calculates the TAC from the fishery data automatically.

As a result, we don't have to dispute over the stock assessment process every year.

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# Management Objectives



- The original management objective is to return the spawning biomass to the 1980 levels by 2020.
- However, the current projection shows that substantial quota reductions are required to achieve this goal.
- The CCSBT has agreed that **this objective will be reviewed** for MP development.

Now I will tell you about the management objective of CCSBT.

The original management objective is to return the spawning biomass status to 1980 levels by the year 2020.

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However, the current projection shows that we will have to reduce the quota substantially to achieve our goal.

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So, the CCSBT has agreed to review this objective during MP development.

This means that we have to consider management objectives and management procedures simultaneously.

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## Main Cast:



### ■ National scientists

- Australia - [T.Polacheck](#), M.Bason, D.Kolody
- Japan - [S.Tsuji](#),  [D.Butterworth](#),   
K.Hiramatsu, H.Kurota
- Korea - D.Moon
- New Zealand
- Taiwan

### ■ Advisory panels

- J.Pope, R.Hilborn, J.Ianelli, A.Parma ([coordinator](#))
- Programmer  
V.Haist, T.Branch



Before looking at each technical step, let me introduce our MP cast in CCSBT. What I am telling you about today results from our combined efforts and achievements.

The MP work has been done mainly by the SC members.

This group consists of national scientists, advisory panels and programmers.

The advisory panels were established in 1999 to facilitate consensus among the member countries.

The current panel members are John Pope, Ray Hilborn, Jim Ianelli and Ana Parma.

Ana is a coordinator of this MP project, as well.

Their contributions are crucial to the success of this project.

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By the way, 90% of the meeting time is spent listening to these two men fight!!

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## World tour



OM and MP upgraded at each meeting.

- 2002
  - Apr 1<sup>st</sup> MPWS (Tokyo, Japan)
  - Sep 3<sup>rd</sup> SAG/SC (Canberra, Australia)
- 2003
  - Apr 2<sup>nd</sup> MPWS (Queenstown, NZ)
  - Aug 4<sup>th</sup> SAG/SC (Christchurch, NZ)
- 2004
  - Apr 3<sup>rd</sup> MPWS (Busan, Korea)
  - Sep 5<sup>th</sup> SAG/SC (Jeju, Korea)
- 2005
  - Feb 1<sup>st</sup> MPTM (Seattle, USA)
  - May 4<sup>th</sup> MPWS (Canberra, Australia)
  - Sep 6<sup>th</sup> SAG/SC (Taipei, Taiwan)

This MP project actually started in April, 2002.

We have had nine meetings around the world so far.

We had the MP workshop in Busan in 2004.

So this is the second visit to this institute.

Both OM and MP were upgraded at each meeting, as originally planned.

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Let's look at each step of MP development.

First, we will look at the construction of the operating model.

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## Model structure of the OM

developed by the SC together



- To imitate SBT dynamics and fishing process  
= stock assessment
- Single species, single stock, no spatial structure
- Age-structured model

$$N_{t,a} = N_{t-1,a-1} \exp(-\overset{\text{fishing mortality}}{F_{t,a}} - \overset{\text{natural mortality}}{M_{t,a}})$$

- Beverton-Holt stock-recruitment relationship
- Age-specific selectivity changes over time

This operating model was developed by the SC together.

We have only one OM in this project.

It imitates the SBT dynamics and fishing process.

This is similar to stock assessment and actually this operating model is used for stock assessment in the CCSBT.

It assumes one species, single stock, and no spatial structure.

Basically, ours is a normal age-structured model similar to this.

The model also assumes a Beverton-Holt stock-recruitment relationship and age-specific selectivity changes over time.

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## Parameter estimation, “Conditioning”

- OM is fitted to historical data and indices.
- Likelihood components
  - Japanese longline CPUE (since 1969)
  - Catch at age and size (since 1952)
  - Tagging data
  - Penalties for rec residuals and sel change
- Estimated parameters
  - $B_0$ ,  $q$ ,  $\sigma q$ , recruitment, selectivity
  - Fixed: natural mortality, steepness, etc.



OM is fitted to historical data and indices to estimate the important parameters. We call this process “conditioning”, and used these data for conditioning for estimating these parameters.

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# Incorporating Uncertainties



- Parameter uncertainty
  - = estimation error of model parameters
  - Natural mortality
  - “steepness” of S-R relationship (stock productivity)
  - Nonlinearity of relationship between biomass and CPUE etc
  - To sample 2000 scenarios (runs) = “reference set” OM
- Future uncertainty in projection
  - Recruitment variation (process error)
  - Observation error in longline CPUE

In developing OMs, incorporating uncertainties is important.

In this project, we discovered two types of uncertainties: parameter uncertainty and future uncertainty.

Parameter uncertainty indicates an estimation error of the model parameters.

We evaluated this type of uncertainty using the Grid method.

This method is a little bit complicated and tricky.

So if you are interested in it, please ask me later.

Considering parameter uncertainty, we sampled 2000 scenarios.

This set of scenarios is called a “reference set” OM, and it is used for evaluating MPs as a base case.

We also considered two future uncertainties in projection.

One is recruitment variation or process error.

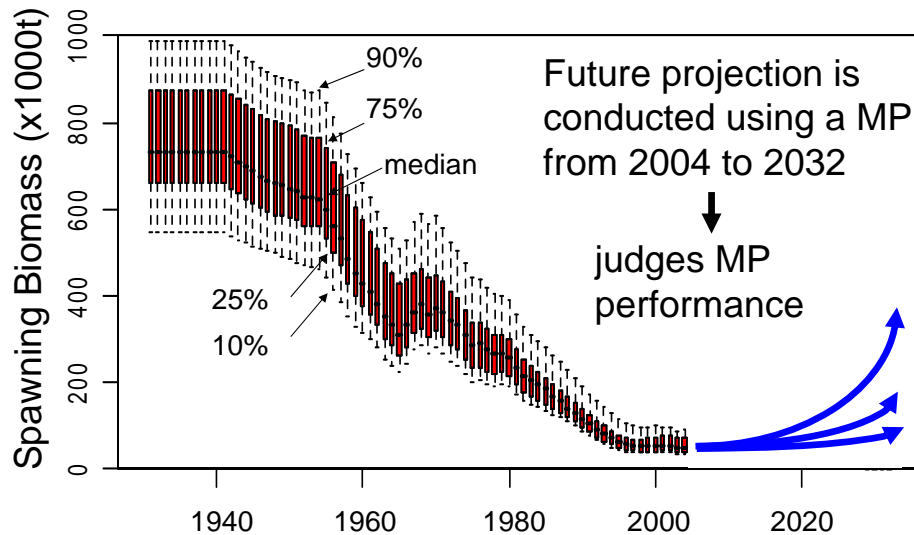
The other is an observation error in longline CPUE.

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## Estimated Spawning Biomass in OM

(reference set including 2000 scenarios)



Now we will look at the conditioning results.

This figure shows that the spawning biomass changed from 1930 to 2004 in the reference set.

As you can see, the current stock condition is not good overall.

The range of the estimation is large, but we can consider that there is a real stock trajectory within it.

We conducted future projections using a MP from 2004 to 2032 and judged the MP performance from the result.

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  - Selection of MP
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Next, we will look at testing of MP performance.

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# Performance Indicators



- Maximizing the catches  
(e.g.) catch over 20 years
- Safeguarding the stock  
(e.g. )  $B(2032)/B(2002)$ ,  $\text{Min}[B(y)/B(2002)]$
- Minimizing the inter-annual variation in catch and effort  
(e.g.) inter-annual variation  
maximum of TAC change

I mentioned MP performance previously.

How should we evaluate MP performance?

In order to quantify MP performance, we defined performance indicators.

These indicators are classified into three categories corresponding to three ideal objectives: maximizing catches, safeguarding the stock, and minimizing inter-annual variation in catch and effort.

Determining which category is important depends on individual preference, which influences the MP selection.

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## Comparison of MPs



- Trade-off is found between maximizing catches and safeguarding the stock.
- To compare MPs easily, each MP is tuned to a target biomass in the reference set.
- “**Tuning**”
  - median of  $(B_{2022}/B_{2002}) = 1.1$  (0.9, 1.3)

But at the early stage of this project, we discovered a trade-off between maximizing the catch and safeguarding the stock.

This is a natural occurrence, but it is a problem for comparing performance among different MPs.

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So, we decided that each MP, and more specifically, the control parameters of the MP, should be tuned to a target biomass in the reference case.

We refer to this as “tuning”.

The median of this biomass ratio is used as the target biomass.

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## MP “HK5” ( “Hiroyuki Kurota ver.5” )

- Adaptive management
- The TAC is set as a minimum of the TAC value specified using the CPUE slope of age 4+ (stock trend) or the CPUE level of age 4 (recruitment).

$$TAC_{y+1} = \min \left( TAC_{y+1}^{trend^{4+}}, TAC_{y+1}^{level^4} \right)$$

$$TAC_{y+1}^{trend^{4+}} = TAC_y \times (1 + k\lambda)$$

$\lambda$  : slope of regression of  
 $\ln(CPUE_{age4+})$  over 10 yrs

$k$ : control parameter

$$TAC_{y+1}^{level^4} = TAC_y \times (a \times CPUE_{age4, y-1} + b)$$

$a, b$ : control parameters

Here as an example of an MP that we evaluated recently, known as “HK5”.

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I like this MP, because it is mine.

This MP is a kind of adaptive management and feed-back control.

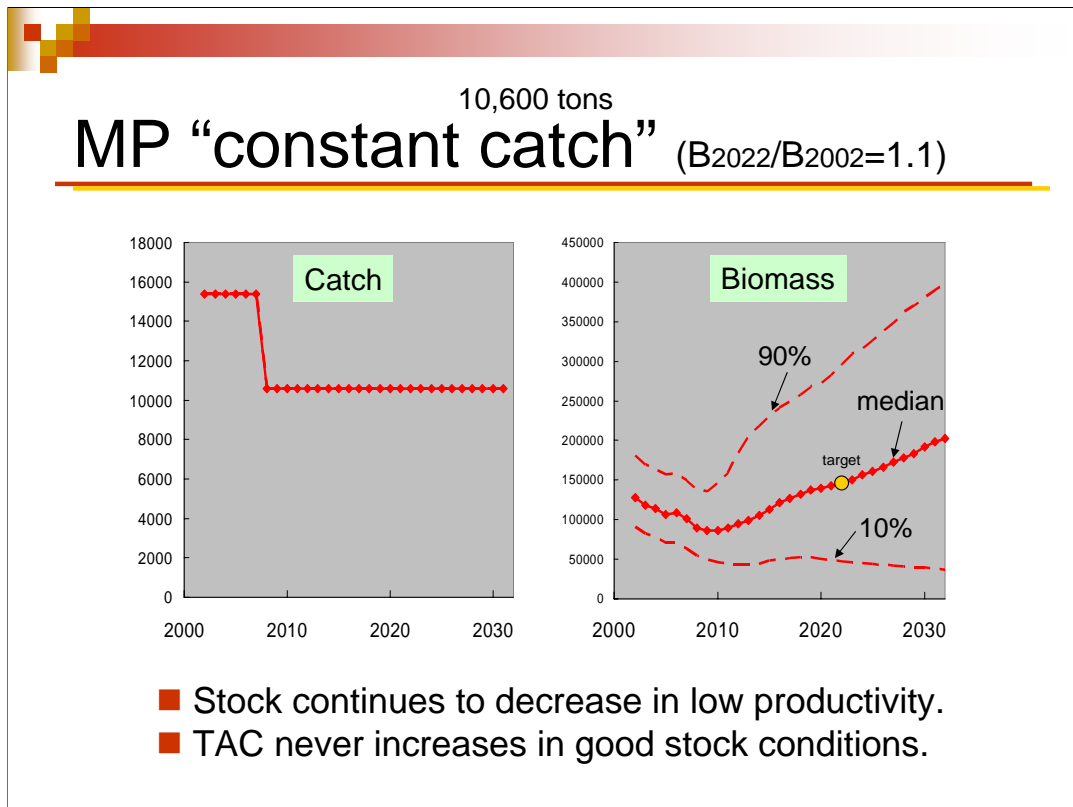
As illustrated on the slide, it sets the TAC as a minimum of the the TAC value specified using the CPUE slope of age 4+ (stock trend), or the CPUE level of age 4 (recruitment).

According to my concept, the TAC is controlled by stock trend, and in the case of low recruitment, the TAC is reduced more for stock safety.

These three parameters comprise the control parameters of HK5.

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For reference, I'll first show you the projection results under a constant catch of 10,600 tons.

The left panel indicates the catch trajectories and the right panel shows the biomass trajectories.

This figure shows the results, when the target biomass is 1.1.

This dashed line and these dotted lines represent the median, 90%tile and 10%tile of the 2000 scenarios.

As you can see, this constant catch MP has two weak points.

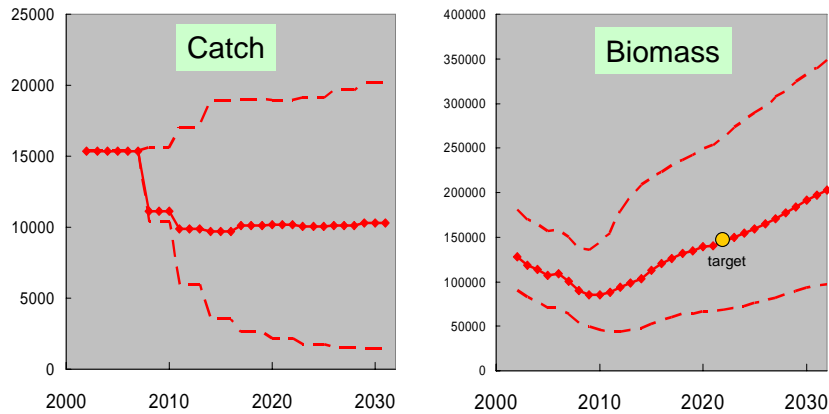
One is that the stock continues to decrease when stock productivity is low.

The other is that the TAC never increases, even if stock condition is good.

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## MP "HK5" ( $B_{2022}/B_{2002}=1.1$ )



■ This MP shows a better performance than the constant catch.

How about HK5?

Of course the target is the same 1.1, as well.

It looks like the TACs are controlled, depending on stock productivity.

When productivity is low, it decreases the TAC to turn around the biomass.

If the stock condition is good, it can increase the TAC compared to the current level.

In addition, the average catch is also similar to that of the constant catch.

So, this MP shows an improved performance over that of the constant catch MP.

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Let's compare HK5 with other MPs.

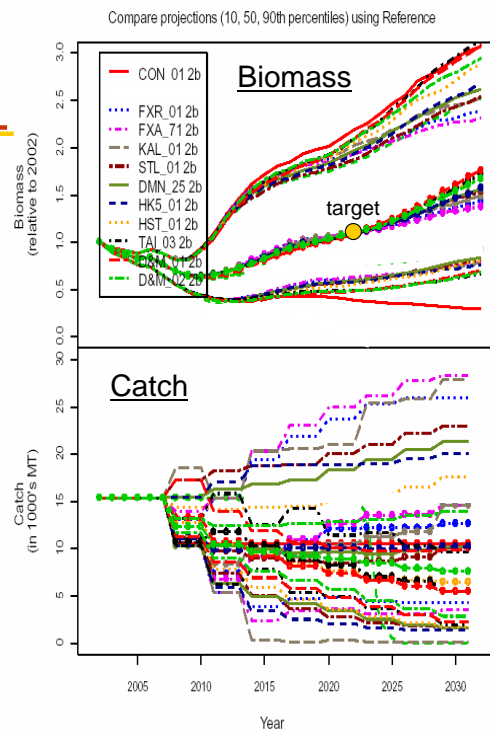
We'll look at the selection of MPs.

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## MP Selection

- 10 MPs were explored in April 2004 in Busan.
- The median of biomass and average catch were similar because of “tuning”.
- However, the range of biomass variation and catch trajectories were different.



Over 30 MPs were developed through this project.

Finally, 10 MPs including HK5 were submitted to the 3<sup>rd</sup> MPWS in April 2004 in Busan.

This figure shows the all results when the target biomass is 1.1.

You can see that the medians of the biomasses are very similar.

Actually, the average catch over 20 years is similar, too.

This is because each MP is tuned to a target biomass.

However, you can also see that the range of biomass variation and catch trajectories are different among MPs.

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H: high, M: medium, L: low

## MP Selection (cont.)

- MPs were evaluated by 15 criteria (target=1.1).
  - early TAC reductions
  - longer term TAC levels
  - risk of low SSB
  - AAV and TAC change
  - robustness tests, etc.
- MPs were categorized into four groups.

criteria	MP	FXR_01	FXA_71	KAL_01	STL_01	DMN_25	HK5_01	HST_01	TAI_03	D&M_01	D&M_02
early TAC reductions	L	H	H	H	M	M	M	L	L/M	L	L
longer term TAC levels	H	H	H	H	M	M	M	L	L	L	L
risk of low SSB (10% SSB and 10% MinB)	L	L	L	L/M	L/M	L/M	L/M	H/M	H	H	H
Increase in TAC at end of period	H	H	H	H	M	M	M	L	L	L	L
Range of TAC variation	?	H	H	H	M/H	M	M	L/M	L	L	L
Range of biomass variation	?	L	L	L	M	M	M/H	M/H	H	H	M/H
post 2022 median biomass	H	L	L	M	M	M	M	H	H	H	H
probability of low TAC	L	L	M/L	H	M	M	M	M	M	M	M/L
AAV and max Tac change	L	H	H	H	M	M	L	L	H	L	L
TAC change reversals (A-stat)	L	M	M	H	M	M	L/M	L	H	L/M	L
Med1_A12/Low1_A12	H	H	H	H	M	M	M	M	L	L	
No_AC	H	M	M	M	H	M/H	H	M/H	L	M/L	L
Low_Rec	H	M	H	M	M	M/L	H	L	L	L	L
Steepness (high) effect on TAC	H	H	H	H	M	M	M	M/L	L	L	M/L
Steepness (low) effect on biomass	H	M	H	H	H	H	M	M	L	L	L

MPs were evaluated and characterized by 15 criteria, as shown.

This table shows the graded results.

These are MPs, and these are the characterization criteria.

From this table, we found that the MPs fell into four groups.

Luckily, each category included MPs from the same county.

So, we selected the most preferable MP from each category.

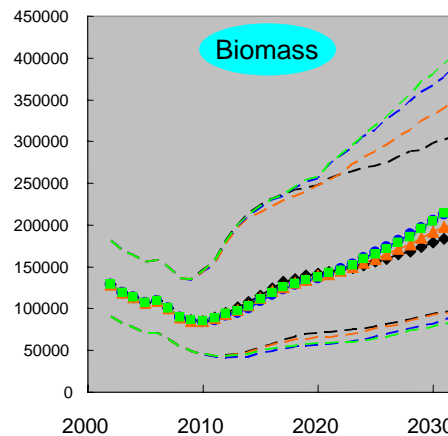
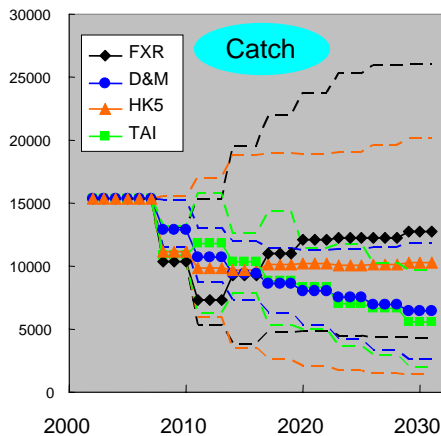
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# Four Candidates

■ HK5 got a high mark.

	risk of low biomass	inter-annual catch variation	longer term TAC levels
<b>ideal</b>	<b>L</b>	<b>L</b>	<b>H</b>
FXR	L	H	H
D&M	H	L	L
HK5	L/M	L	M
TAI	H	H	L



This graph shows the projection results of the final four MP candidates.

Once again, you can see that four MPs are different mainly in their catch variation and risk of low biomass.

For example, FXR (black) has a high catch variability and a low risk of low biomass.

On the other hand, D&M (blue) has a low catch variation, but a higher risk of low biomass.

HK5 (orange) is the medium of the two MPs, and provides a good balance.

I was so happy that HK5 got a high mark.

It looks like TAI is not so good in general.

(click)

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After 2004 spring

## Problems Occurred



- After the data update, reasonable parameter estimates of OM were not obtained.
  - Modified OM through 2004
- Considerable recruitment drop in 2000 and 2001
  - SC recommended significant quota reduction in 2006 (by 5000t) or 2007 (by 7160t) before MP implementation (current TAC: 14930t).

However, we faced some big problems after we selected the four MPs.

One problem was that we did not obtain reasonable parameter estimates of the OM after the data update.

Thus, we modified the OM through 2004.

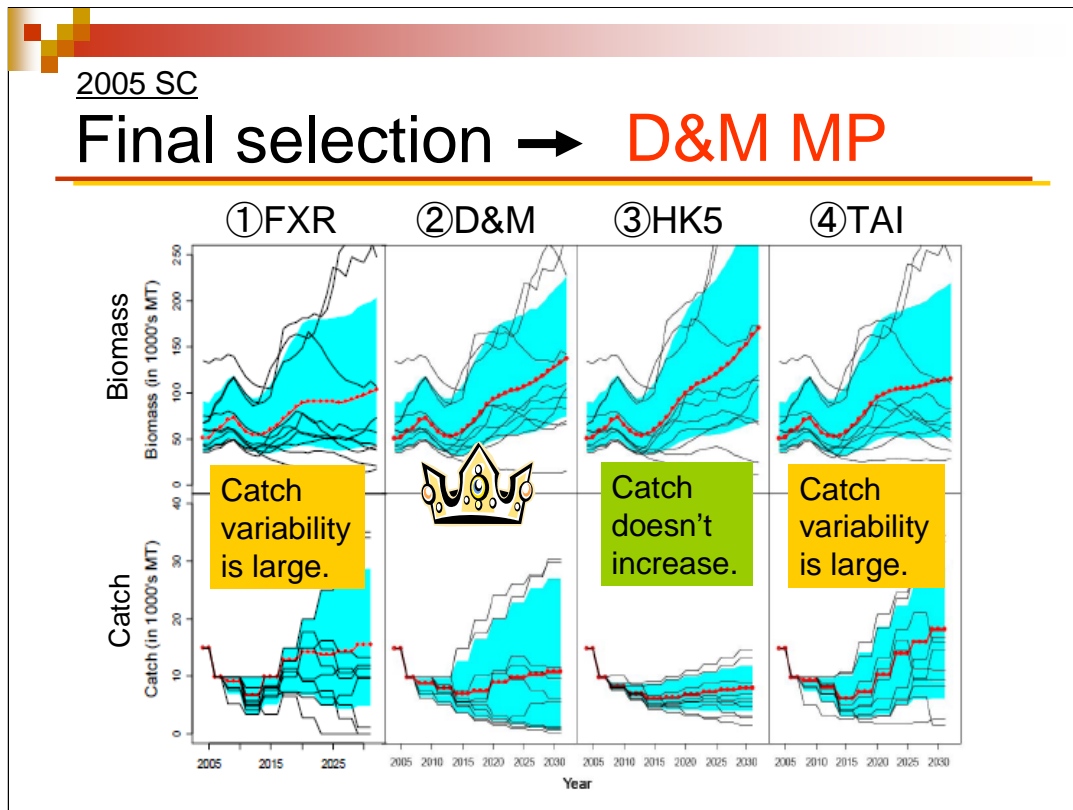
The other problem was that the actual recruitment dropped suddenly after 2000.

This drop was larger than the OM assumed, so we modified the modeling of recent recruitments.

The SC decided to recommend to the commission a significant quota reduction in 2006 or 2007 before MP implementation.

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Under this quota reduction in 2006, we selected the final MP candidate in the SC last year.

We were supposed to conduct tuning of the MPs, but we did not have time for it during the meeting.

So, the tuning levels are different among the MPs, but we considered that we can capture characteristics of each MP from these figures.

In general, we acknowledged that all MPs behaved reasonably.

(click)

But as you can see when you examine the FXR and TAI results, the catch variability is large in these MPs.

(click)

On the other hand, in my HK5, the catch stability is quite high, but doesn't increase after rebuilding the stock.

This is because I developed this MP to achieve a soft landing of catch and I did not consider the TAC increase after rebuilding.

(click)

So, the final selected MP was D&M! Congratulations.

We appreciated the well-balanced performance of this MP.

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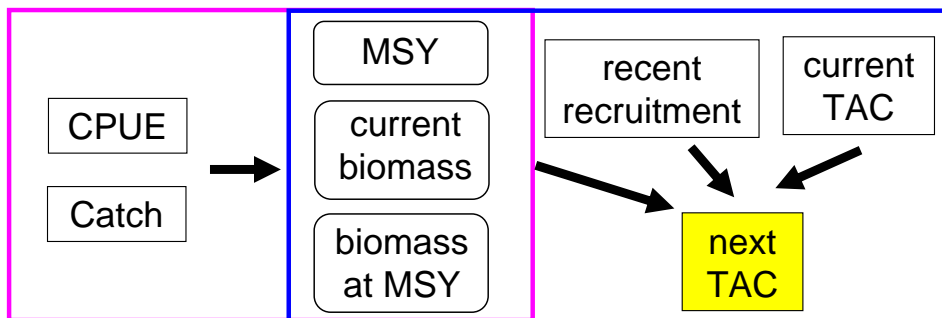
# D&M MP

(by D. Butterworth & M. Mori)



from Univ. Cape town

- I. Estimate MSY, current stock biomass and BMSY from past CPUE and catch using Fox-type production model
- II. Change TAC to achieve MSY and BMSY



This final MP was developed by Professor Dough Butterworth and his student Dr. Mitsuyo Mori from the University of Cape town.

It is aptly named D & M (their initials).

This MP consists of two parts.

(click)

First, it estimates the maximum sustainable yield, or MSY, current biomass and Bmsy from the past CPUE and catch using a Fox-type production model.

Bmsy is biomass at the MSY.

(click)

Second, the TAC in the next year is established from these estimates, recent recruitment, TAC in the current year.

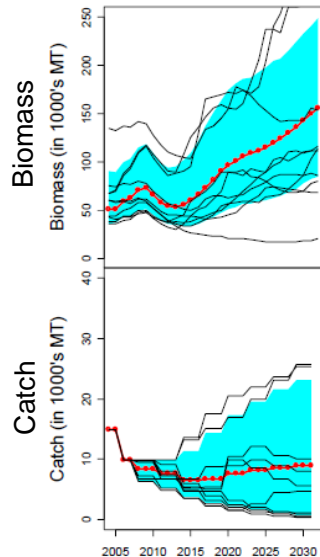
The actual equation is very complicated, but the main objective is to achieve MSY and Bmsy.

If the current biomass is below the Bmsy, this MP reduces the TAC to increase the biomass.

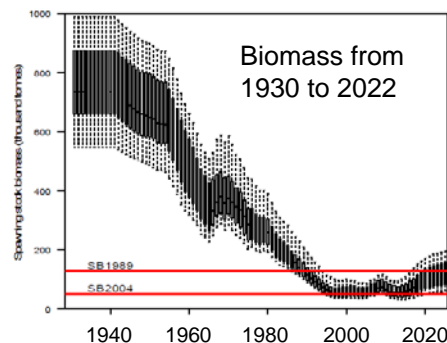
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# Recommendation of Management Objective



- Using D&M MP, we achieve 90% probability that the 2022 biomass will be at or above the 2004 biomass.



In the SC meeting, we discussed the management objective and made a recommendation.

Specifically, our recommendation is that “Using D&M MP, we achieve 90% probability that the 2022 biomass will be at or above the 2004 biomass.”

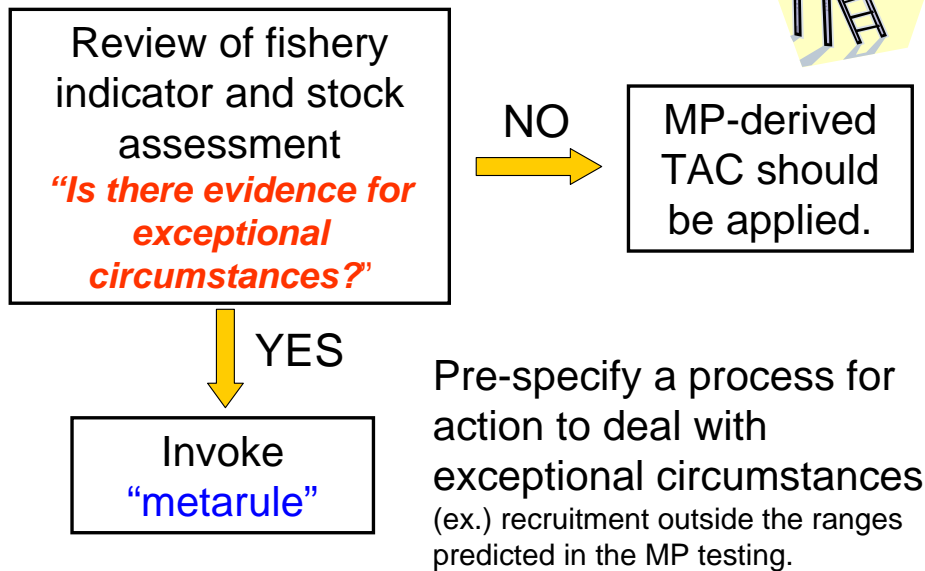
Perhaps this is a dramatic target goal, because we have to accept low TAC for a long time.

However, under this strict management plan, the future biomass level is below the 1980 level.

(click)

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# MP review process



We also determined the framework of the MP review process there.

We reviewed the fishery indicator and stock assessment each at one or three years.

We checked whether there was evidence for exceptional circumstances or not.

If exceptional circumstances exist, such as a sudden recruitment drop, we invoke the metarule.

The metarule is a pre-specified process of action for dealing with exceptional circumstances.

This includes regenerating the OM and MP.

(click)

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Today's Presentation:

## The Management Procedure (MP) Development of Southern Bluefin Tuna

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- Introduction of SBT
- MP development in CCSBT
  - Process of MP development
  - Construction of Operating Model (OM)
  - Test of MP performance
  - Selection of MP
  - Final decision and Current problems






Finally, we'll look at the final decision of the CCSBT commission and current problems.

(click)

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<u>2005 Sep</u>		<u>2005 Oct</u>
SC Recommendation		Commission's decision
■ Select D&M as a final MP	→	
■ Significant TAC reduction before MP implementation	→	
■ Set management objectives	→	
<p>■ Under-reporting issue of Japan and Australia catch was raised.</p> <ul style="list-style-type: none"> <li>➢ Panels will make a final judgment in July 2006.</li> <li>➢ Need OM reconditioning and MP retuning?</li> <li>➢ MP-derived TAC is available in 2009.</li> </ul>		

We made three major decisions at the SC meeting in September 2005.

How did the CCSBT commission accept advice from the SC?

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First, the commission adopted D&M as a final MP.

That is a very good, happy achievement.

We can produce a management procedure after the three-year development work.

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But, our significant TAC reduction was not accepted there.

One reason is that the managers and industries need more time to prepare a vast TAC reduction.

The other serious reason is that there is an under-reporting issue in Japan and Australia catch.

Regarding this issue, independent panels will make a final judgment in July.

If under-reporting the catch is huge, we will need to remake the operating model and MP at the next SC meeting.

This is because large under-reporting is not assumed in developing the MP, and it is an exceptional circumstance.

So, there are still some uncertainties, but the MP-derived TAC will be available in 2009 regardless.

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As you can see, the development and use of an MP is complicated, but very important for stock management.

We at the CCSBT are working very hard to create MPs to manage wild SBT stocks.

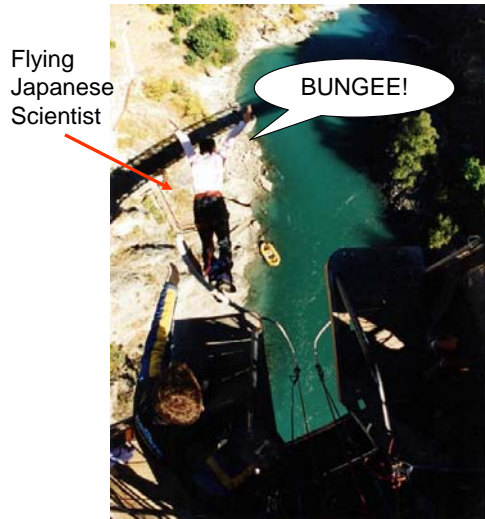
The SBT population is greatly depleted, and decision-making for conservation management is not easy. However, all fisheries industries may face similar management problems.

I hope our efforts will be helpful to them.

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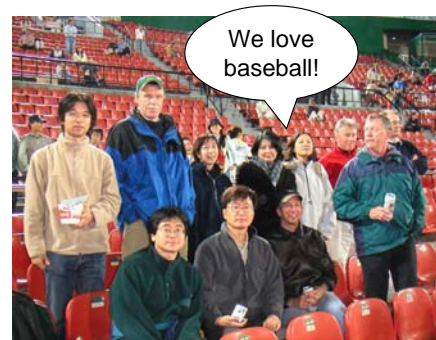
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# Acknowledgements



2003. 4 2<sup>nd</sup> MPWS, Queenstown, NZ

- CCSBT members
- NRIFSF members
- NFRDI and Dr. Moon



2004.4 3<sup>rd</sup> MPWS in Busan, Korea

I would like to close by expressing my sincere thanks to all CCSBT members, my colleagues in Japan, and everyone here in NFRDI and especially to Dr. Moon san who invited me to Busan.

If you have any questions, I'd be happy to answer them now. Thank you very much.

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