WP 5 : Stock assessment and scientific advice

WP5 : Integrating newly collected data (WP2 & WP3) to improve scientific knowledge and enhance fisheries sustainability

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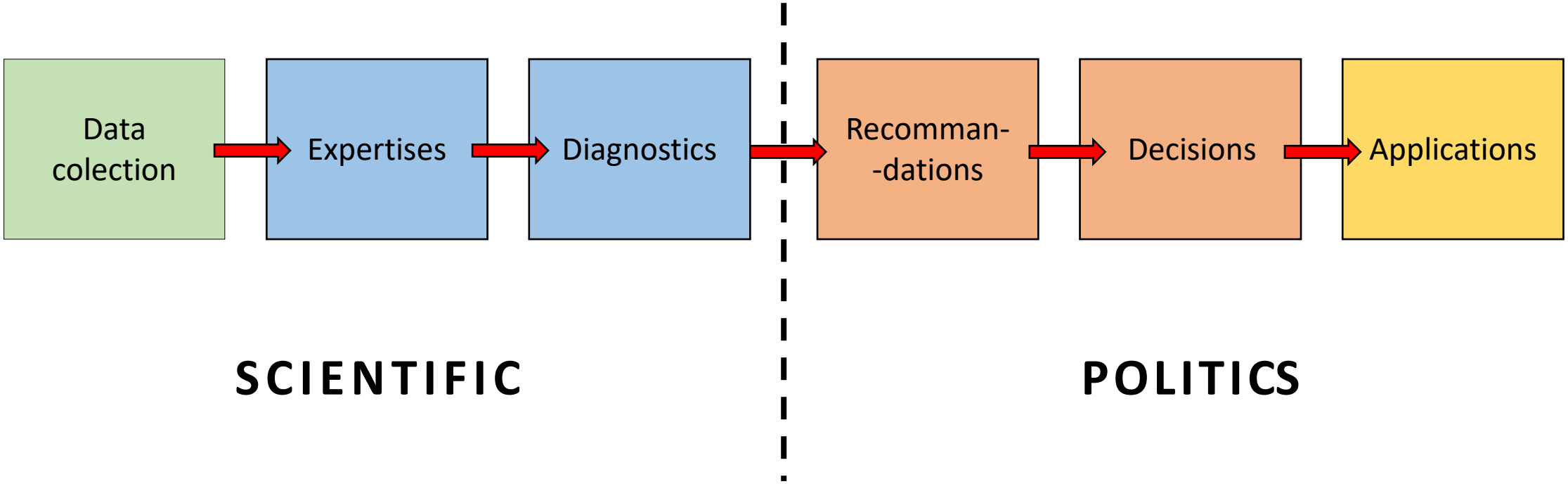
WP 5 : Stock assessment and scientific advice

Fisheries management stages



WP 5 : Stock assessment and scientific advice

ACTIVITY	YEAR 1				YEAR 2				YEAR 3			
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
T5.1-Surplus production model (Jabba, SPICT)												
T5.2-Length Based model (LBB,LBSPR,)												
T5.3-Integrated Model (e.g. SS3)												

Introduction to stock assessment

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1. Introduction to stock assessment

***Why** and **how** assess stocks ?*

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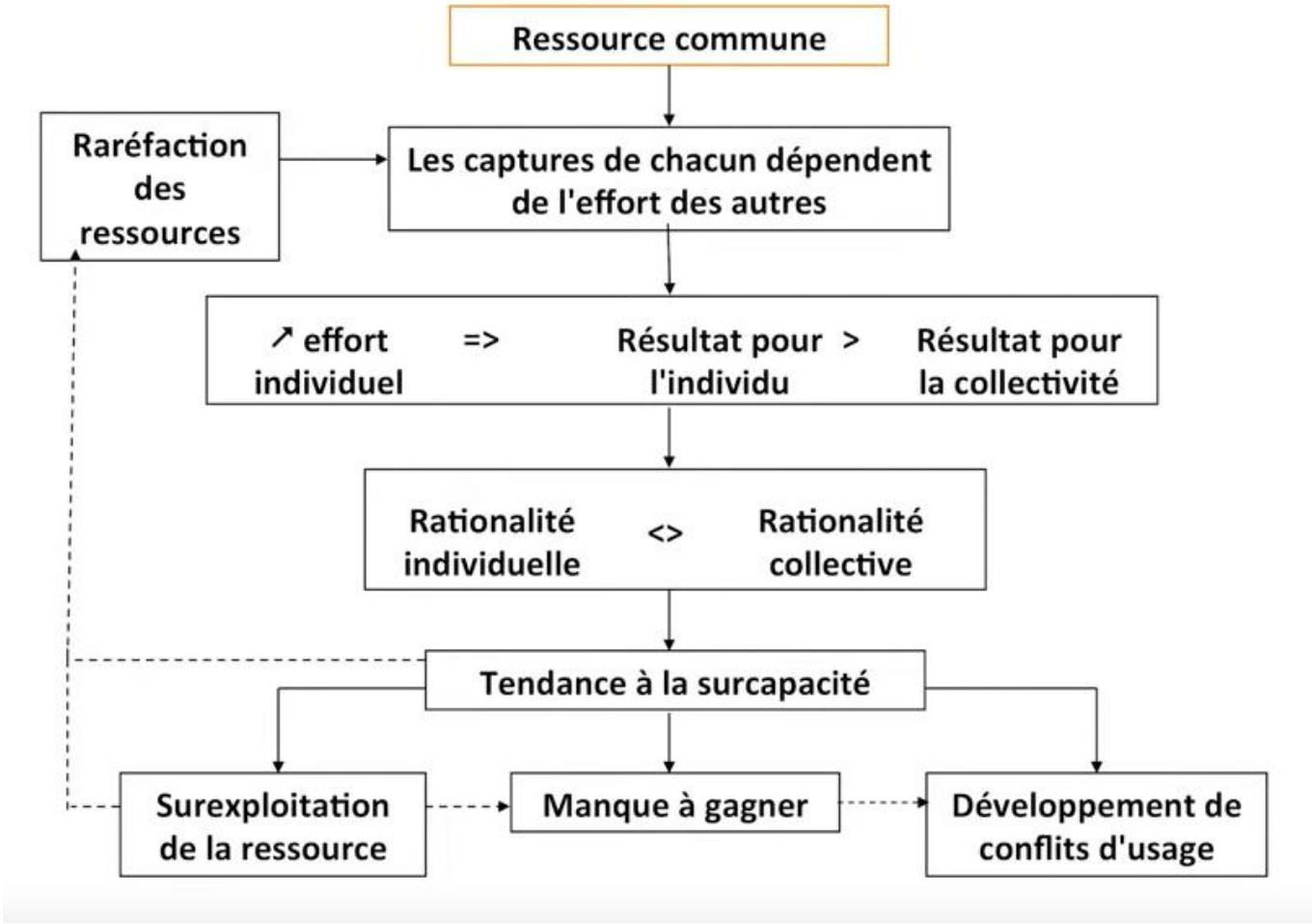
WP 5 : Stock assessment and scientific advice

1. Introduction to stock assessment

The tragedy of the commons



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WP 5 : Stock assessment and scientific advice

1. Introduction to stock assessment

The tragedy of the commons

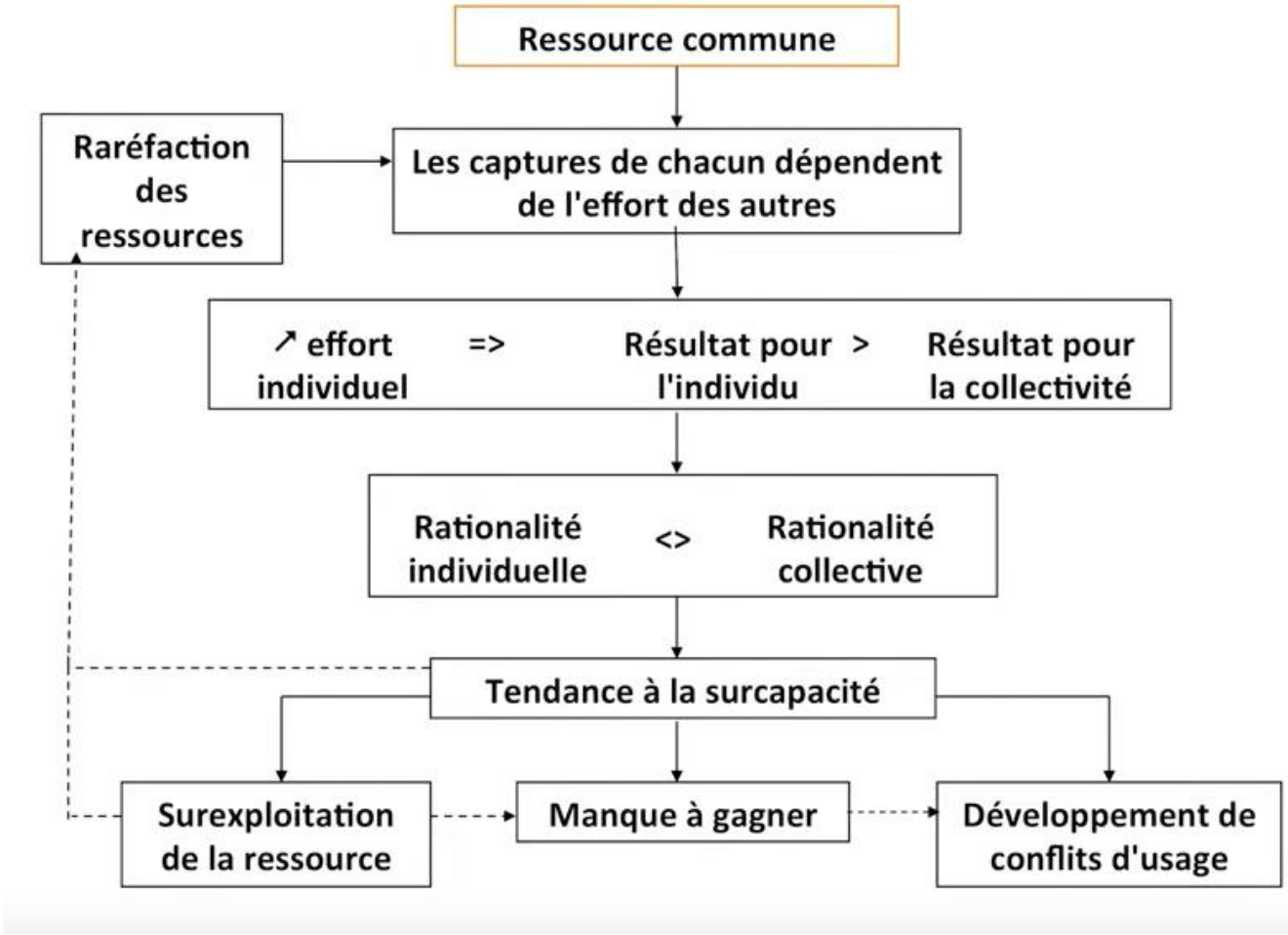
Harvesting limited and shared natural resources

➔ « Natural » tendencies leads to overexploitation

➔ Need for rules and cooperative management systems to ensure sustainable exploitation

➔ Social, economic, and environmental monitoring — supported by clear indicators and reference points — is essential.

➔ **Need for scientific assessment**



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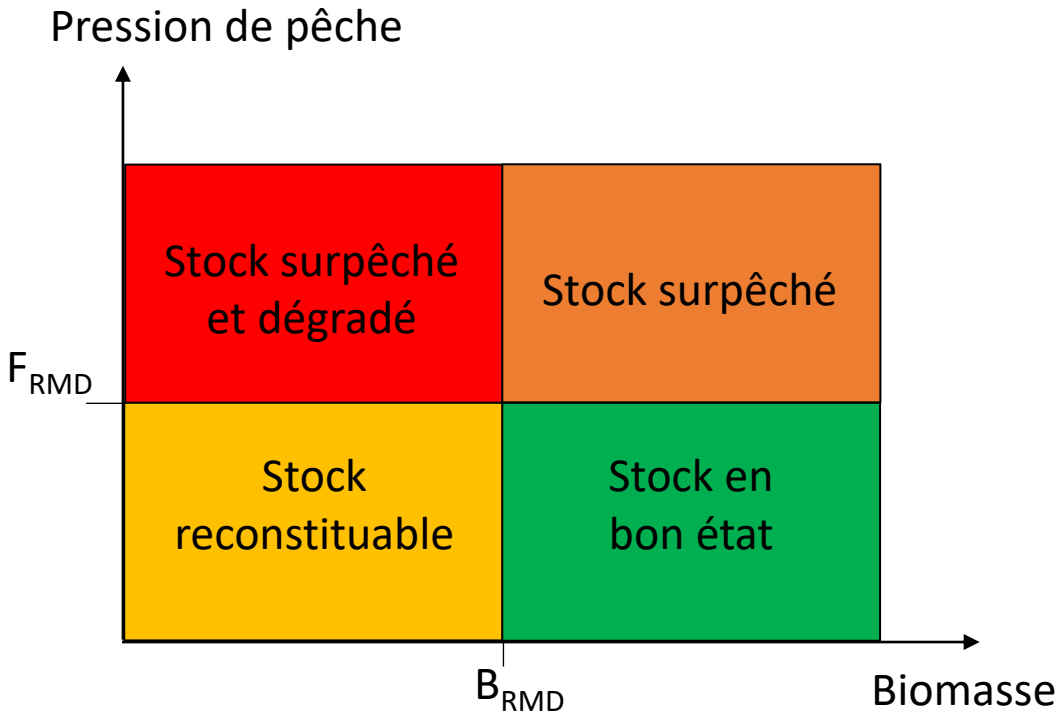
1. Introduction to stock assessment



Matrice de Kobe : classification de l'état des stocks

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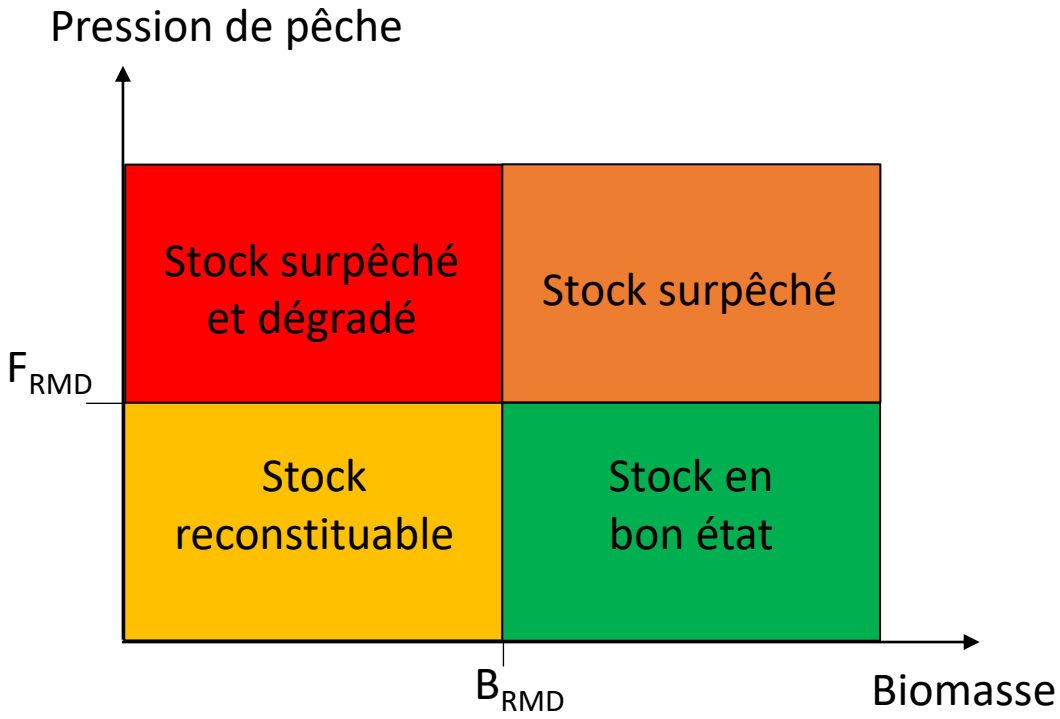
1. Introduction to stock assessment

« Stock assessment is making quantitative predictions about the reactions of fish populations to alternative management choices"

Hilborn & Walters, 1992

« Management is defining and putting into measures allowing a sustainaible exploitation while taking account of scientific advice as well as politicals, economical, social and culturals considerations.»

Cochrane, 2002



Matrice de Kobe : classification de l'état des stocks

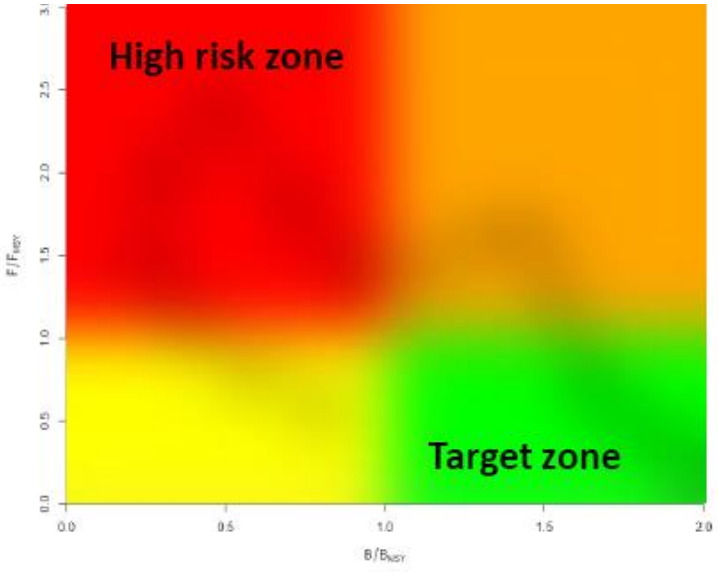
WP 5 : Stock assessment and scientific advice

*Why and **how** assess stocks ?*

WP 5 : Stock assessment and scientific advice

2. Modelling process

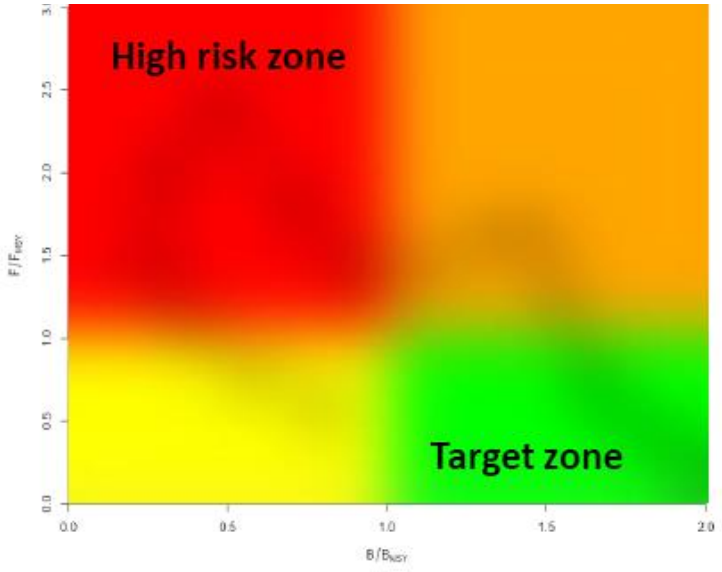
➔ Aims to bring better understanding of complex system

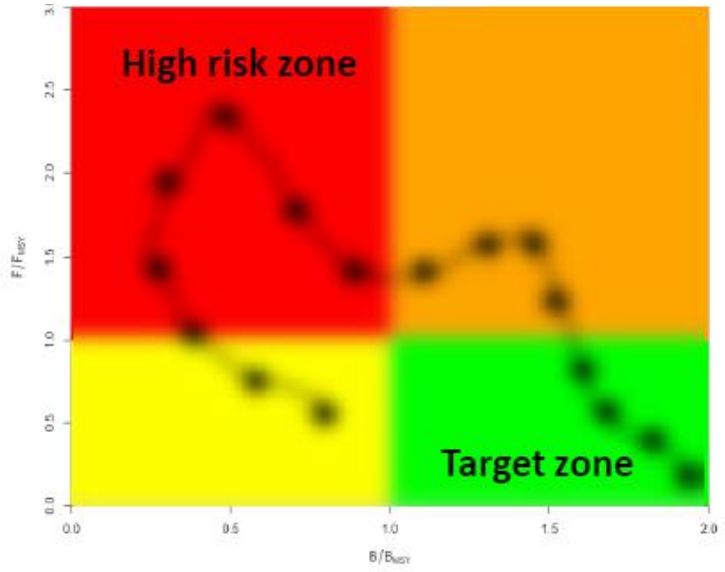


WP 5 : Stock assessment and scientific advice

2. Modelling process

- ➔ Aims to bring better understanding of complex system
- ➔ Based on assumptions

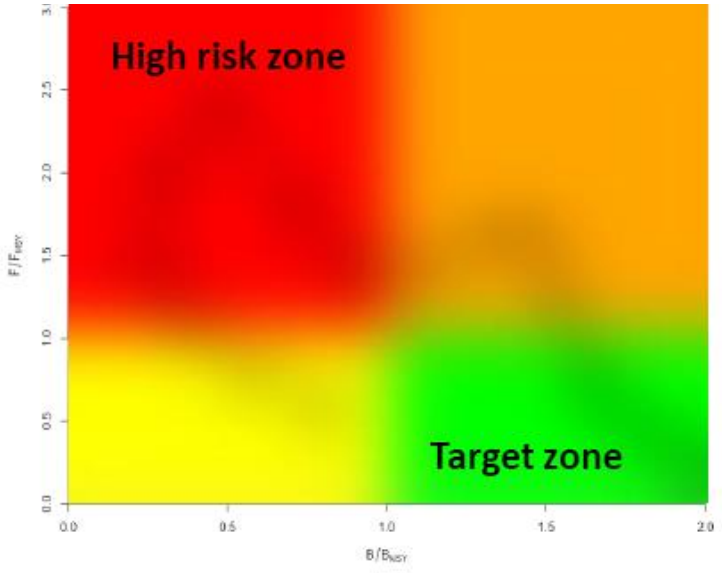


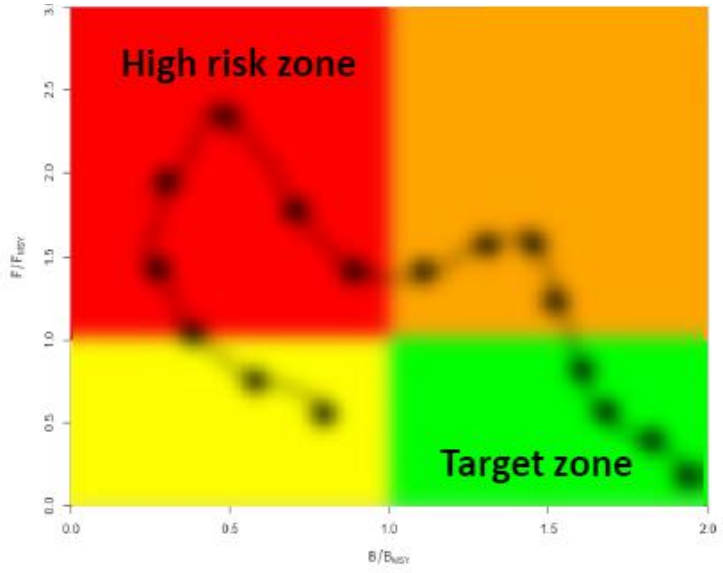


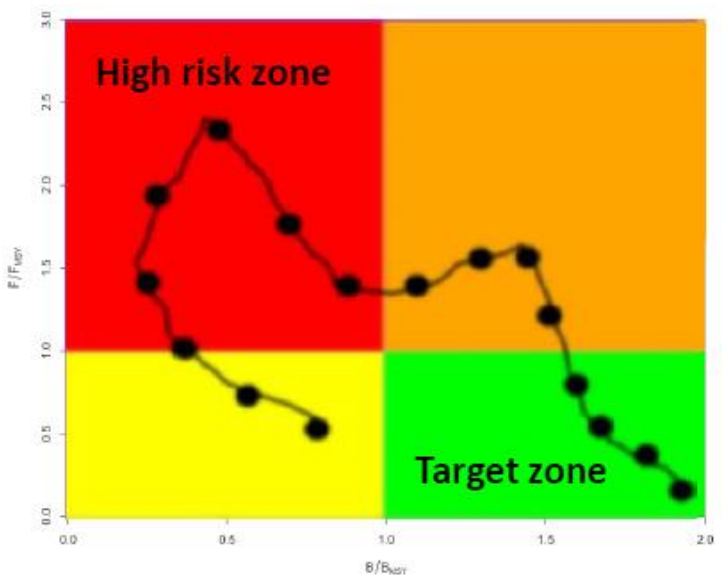
WP 5 : Stock assessment and scientific advice

2. Modelling process

- ➔ Aims to bring better understanding of complex system
- ➔ Based on assumptions
- ➔ Provide scientific advices combining diagnostic on stock status and management measures







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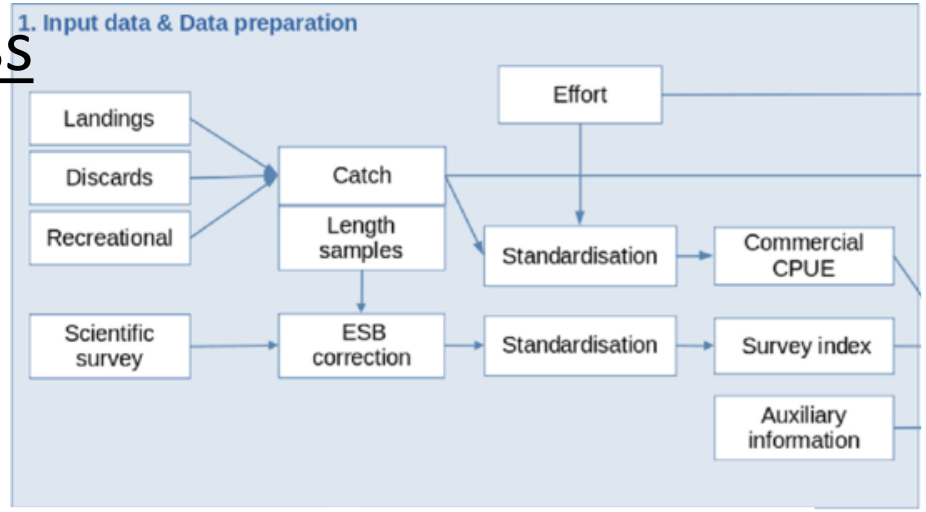
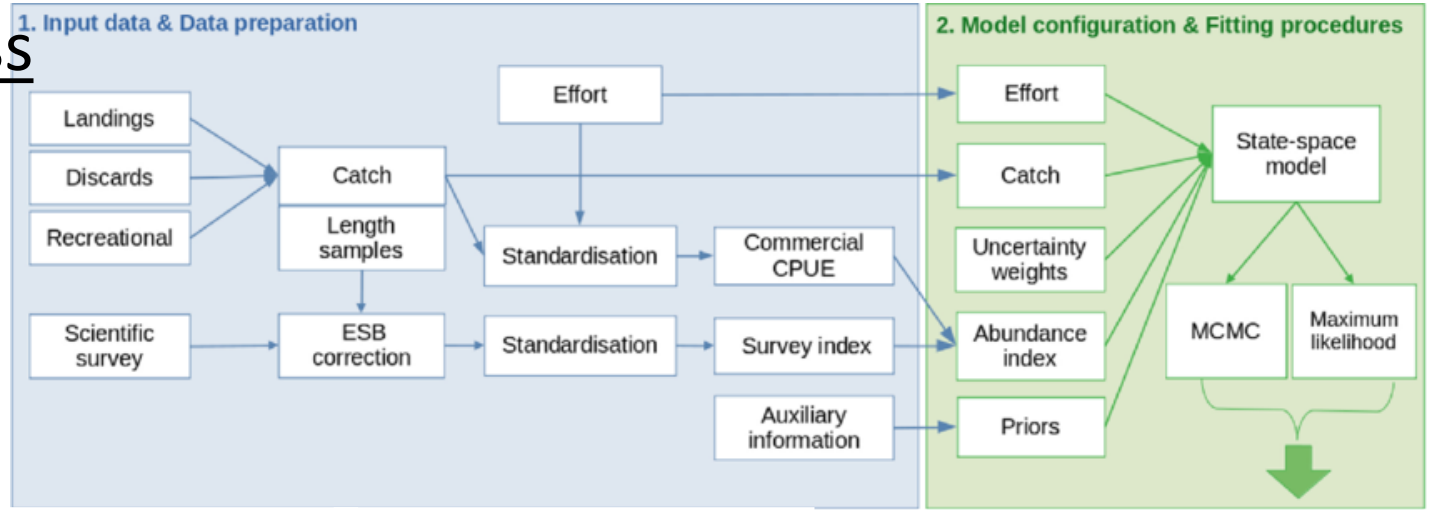
WP 5 : Stock assessment and scientific advice

2. Modelling process



WP 5 : Stock assessment and scientific advice

2. Modelling process



WP 5 : Stock assessment and scientific advice

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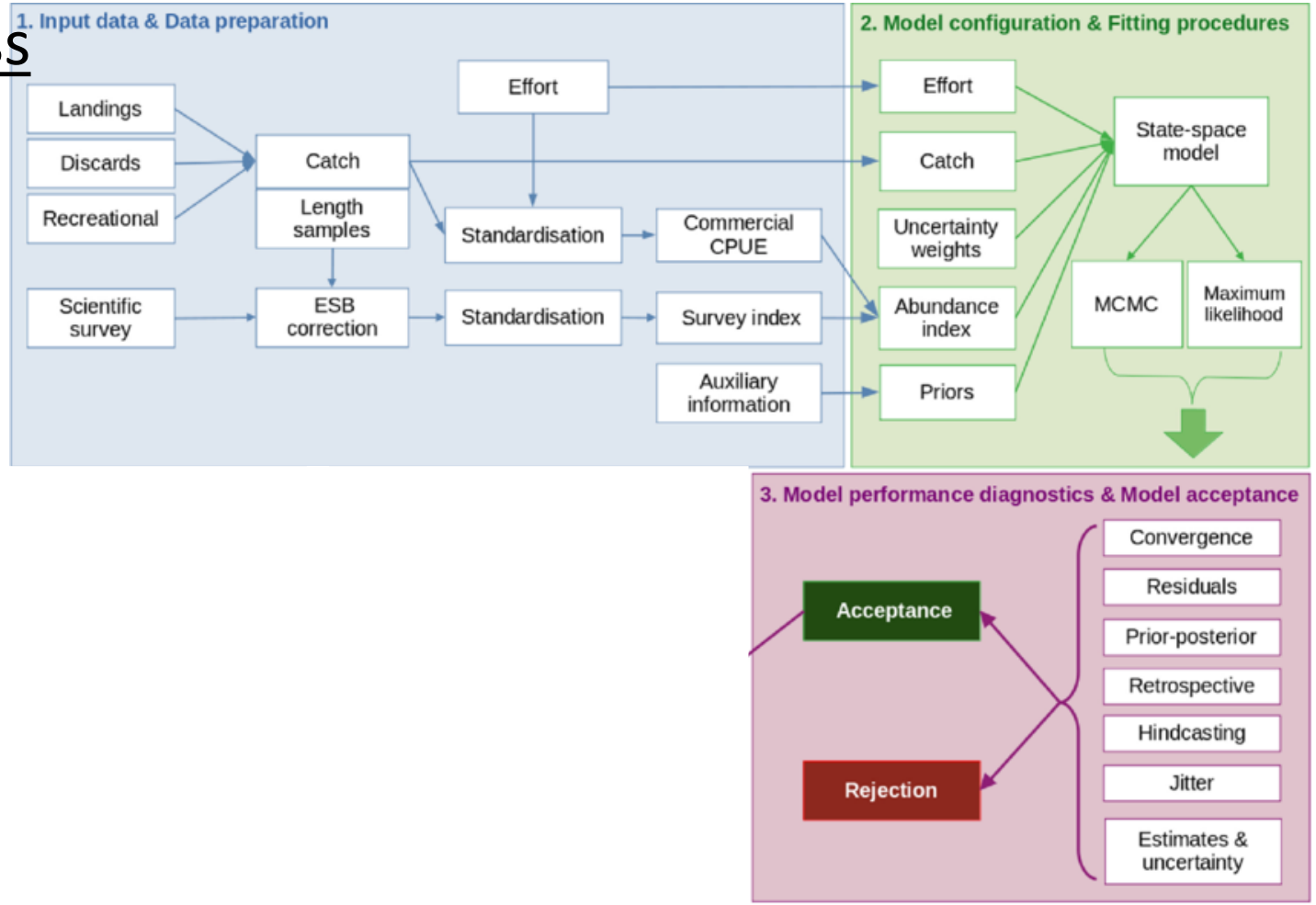

WP 5 : Stock assessment and scientific advice

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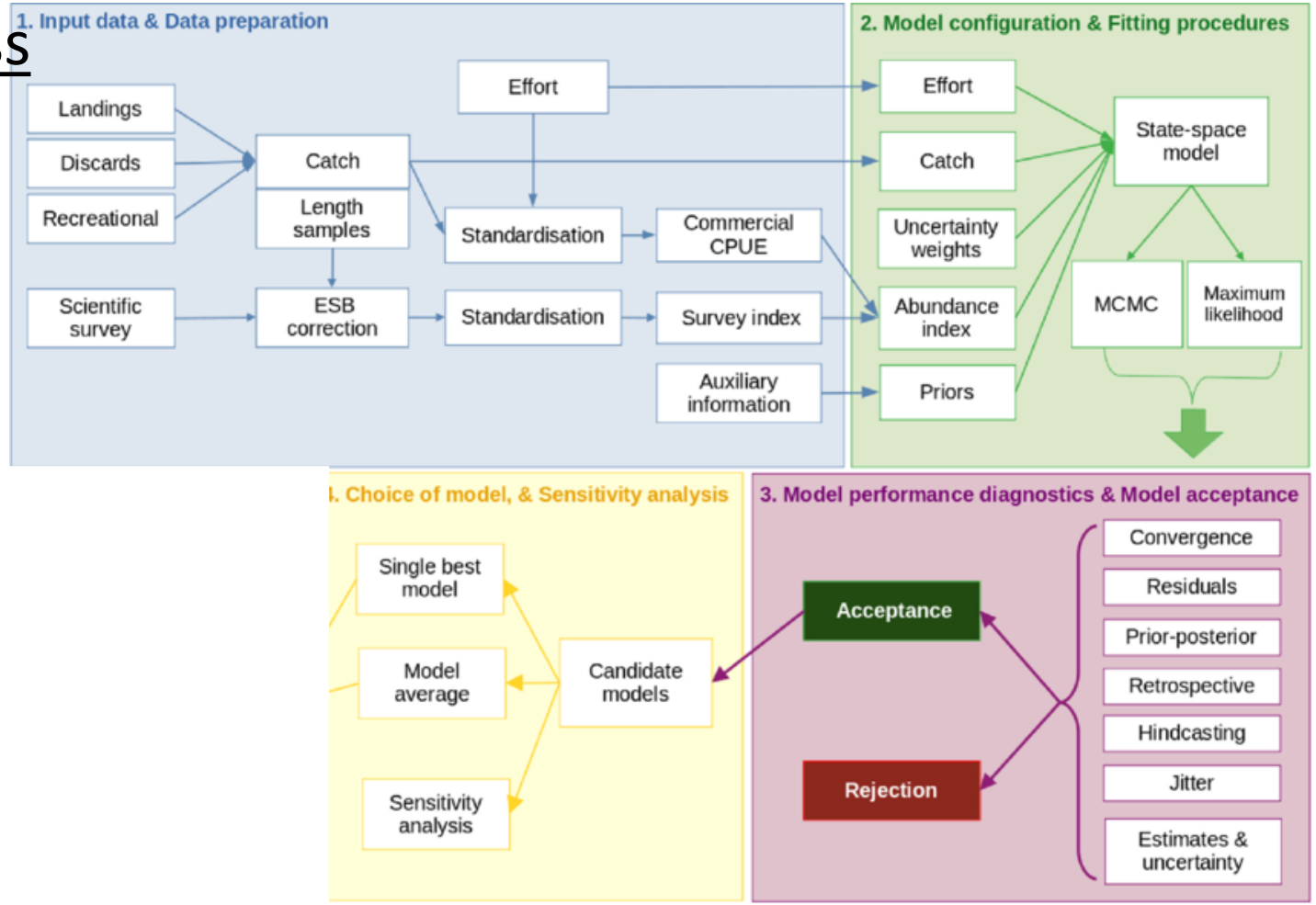

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WP 5 : Stock assessment and scientific advice

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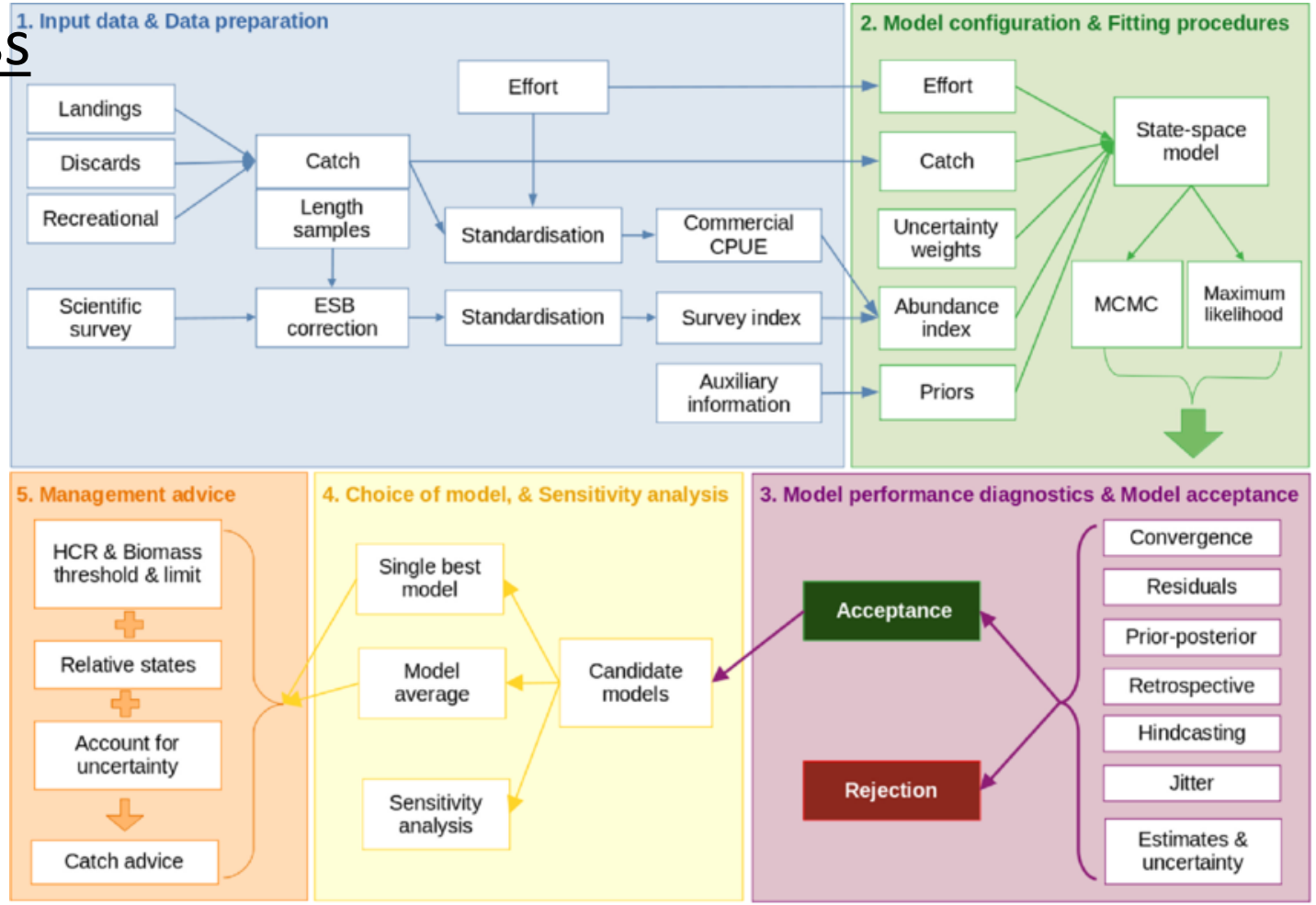

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3. Different stock assessment approaches

Surplus production model
Approche globale

Analytical approach / Structurés en âge

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3. Different stock assessment approaches

Surplus production model
Approche globale

Capture

Indice de B

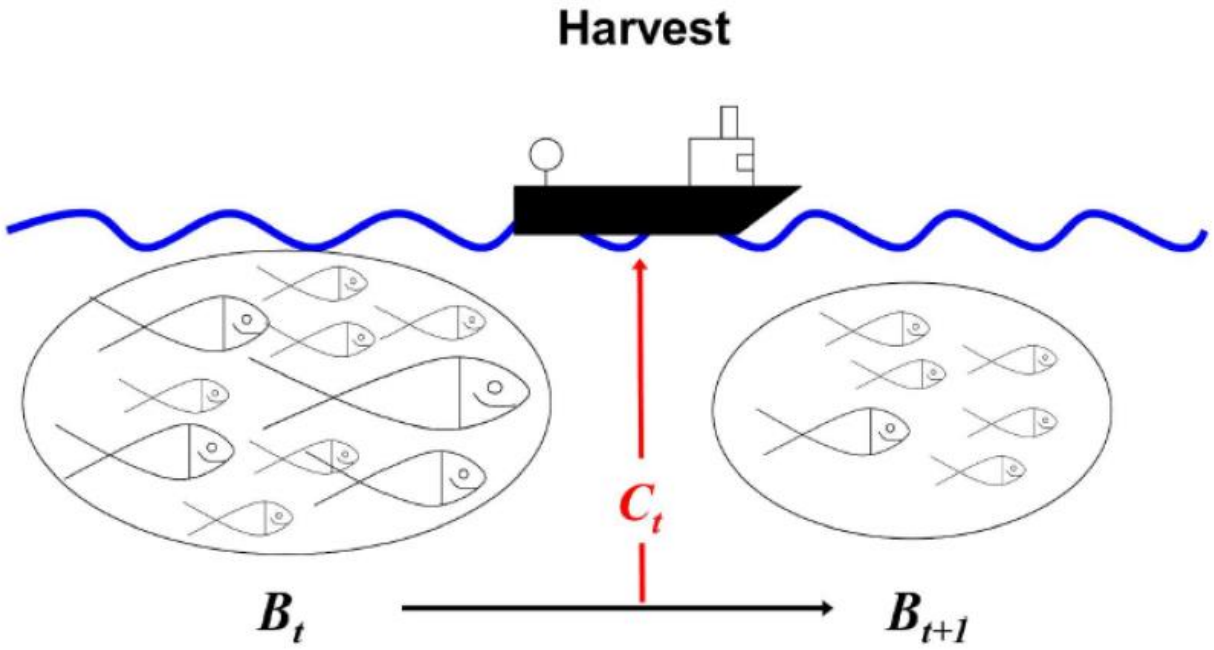
~~Tailles~~

~~Age~~

Analytical approach / Structurés en âge

3. Different stock assessment approaches

Surplus production model / Approche globale



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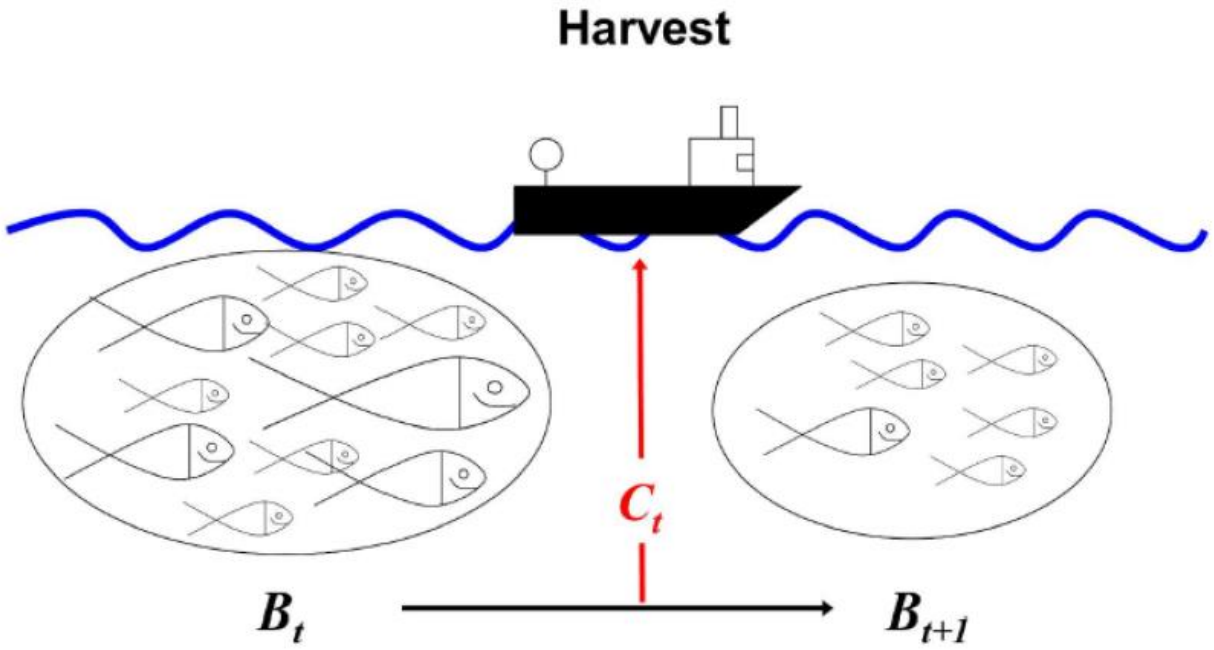
3. Different stock assessment approachs

Surplus production model / Approche globale

$$B_{t+1} = Bt + Pt - C_t$$

À l'équilibre : $$B_{t+1} = Bt = Be$$

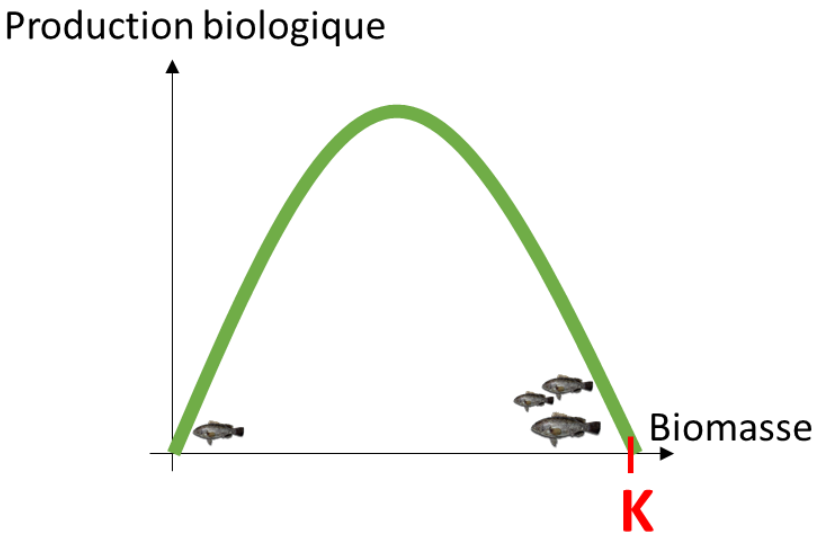
D'où : $$P_e = Ce$$

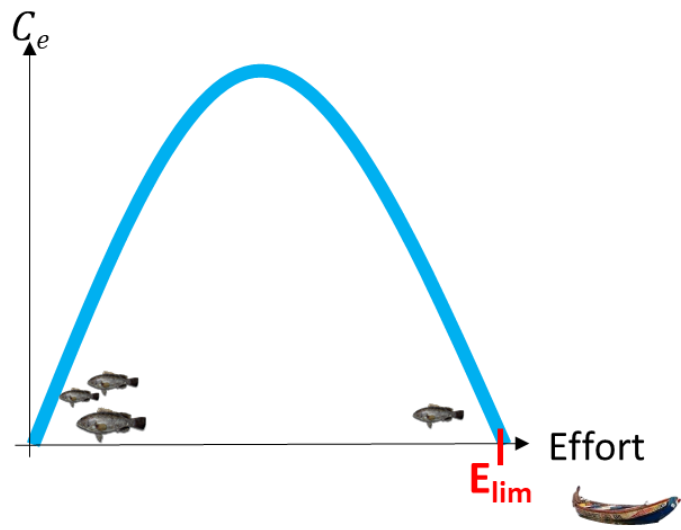


3. Different stock assessment approachs

Surplus production model / Approche globale

D'où : $P_e = Ce$





$P_t = g(\boldsymbol{parameters}, B_t)$

$B_t = g(\boldsymbol{parameters}, E_t)$

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3. Different stock assessment approachs

Surplus production model
Approche globale

Capture

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Indice de B

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Analytical approach / Structurés en âge

WP 5 : Stock assessment and scientific advice

3. Different stock assessment approachs

Surplus production model
Approche globale

Capture

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Indice de B

~~Age~~

Analytical approach / Structurés en âge

Length-based

~~Capture~~

Tailles

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Analyse de cohortes

Capture

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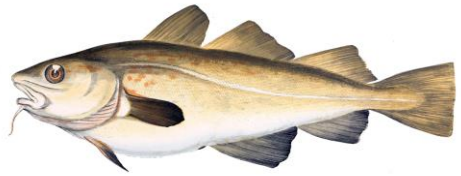
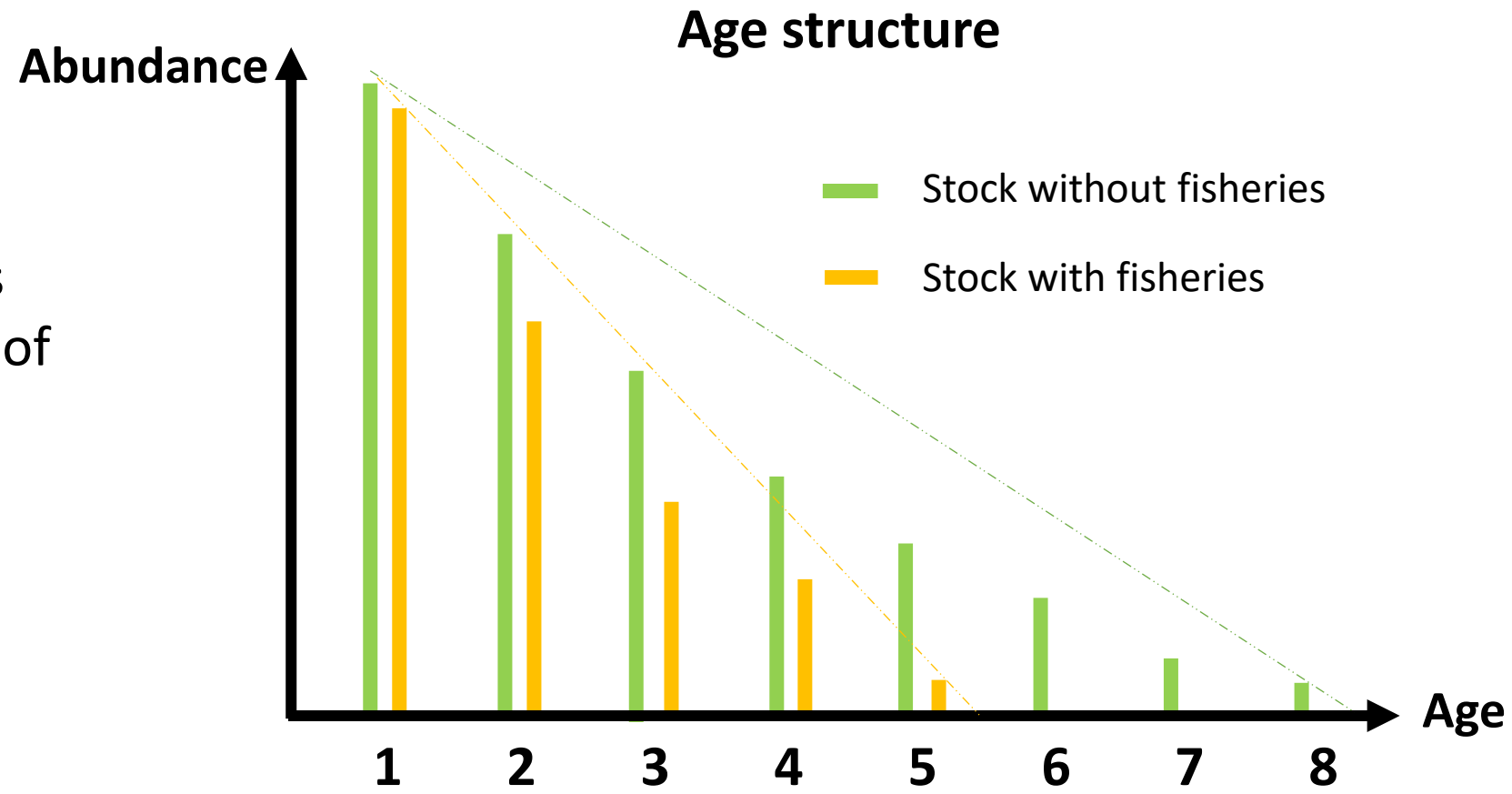
Indice de B

Age



3. Different stock assessment approachs

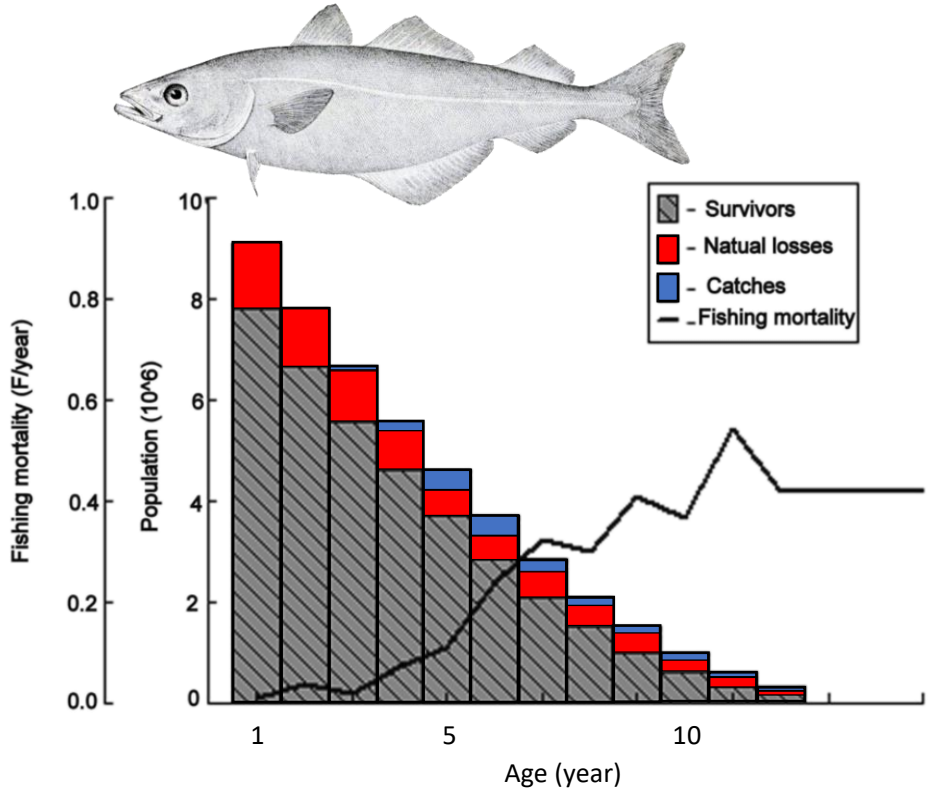
➔Fishing activity impacts demographic structure of harvested population



WP 5 : Stock assessment and scientific advice

3. Different stock assessment approachs

➔Reestimate the abundance decrease by age-group (cohort) while their age and targetted by fishers



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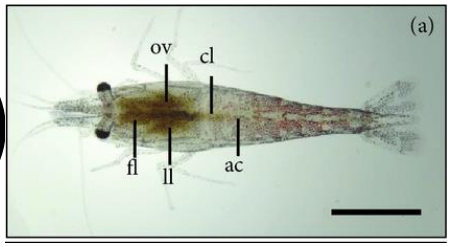
3. Different stock assessment approachs

Data-Limited Stocks : When the data are missing…

- Species with modelling issues (Life cycles/ageing possibilities/high interranual variablility…) : Fish // {crustaceans; cephalopods and other molluscs…}
- Low economic values (by-catch)
- Sampling trade-off : Costs / Sampling effort (survey unavailable…)
- Short time series or with gaps
- Need for more data sharing among countries exploiting same stocks

3. Different stock assessment approachs

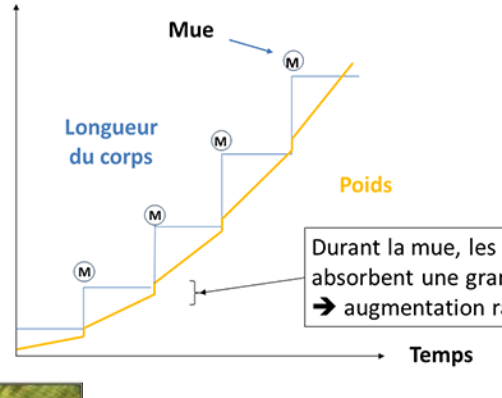


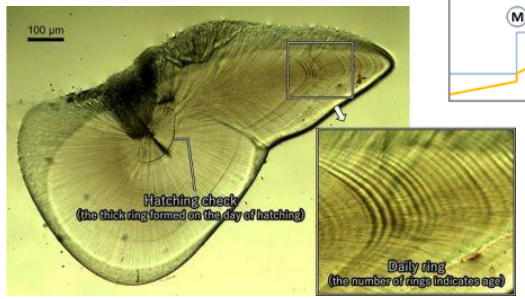
Short life cycle species challenge for age measurements

Short life cycle : ~ 1 year, important effort for data collection, high sampling on short periods

Impossble/complex ageing : No calcified structures (growth by molting), or too time-consuming for an annual stock assessment (collection of seasonal ages and reading of statoliths/stylets depending on daily accretion).

High interannual variability: strong recruitment, natural mortality and growth rates, and migratory species that are exploited at specific life stages.





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3. Different stock assessment approachs

Surplus production model
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Analytical approach / Structurés en âge

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Analyse de cohortes

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Tailles

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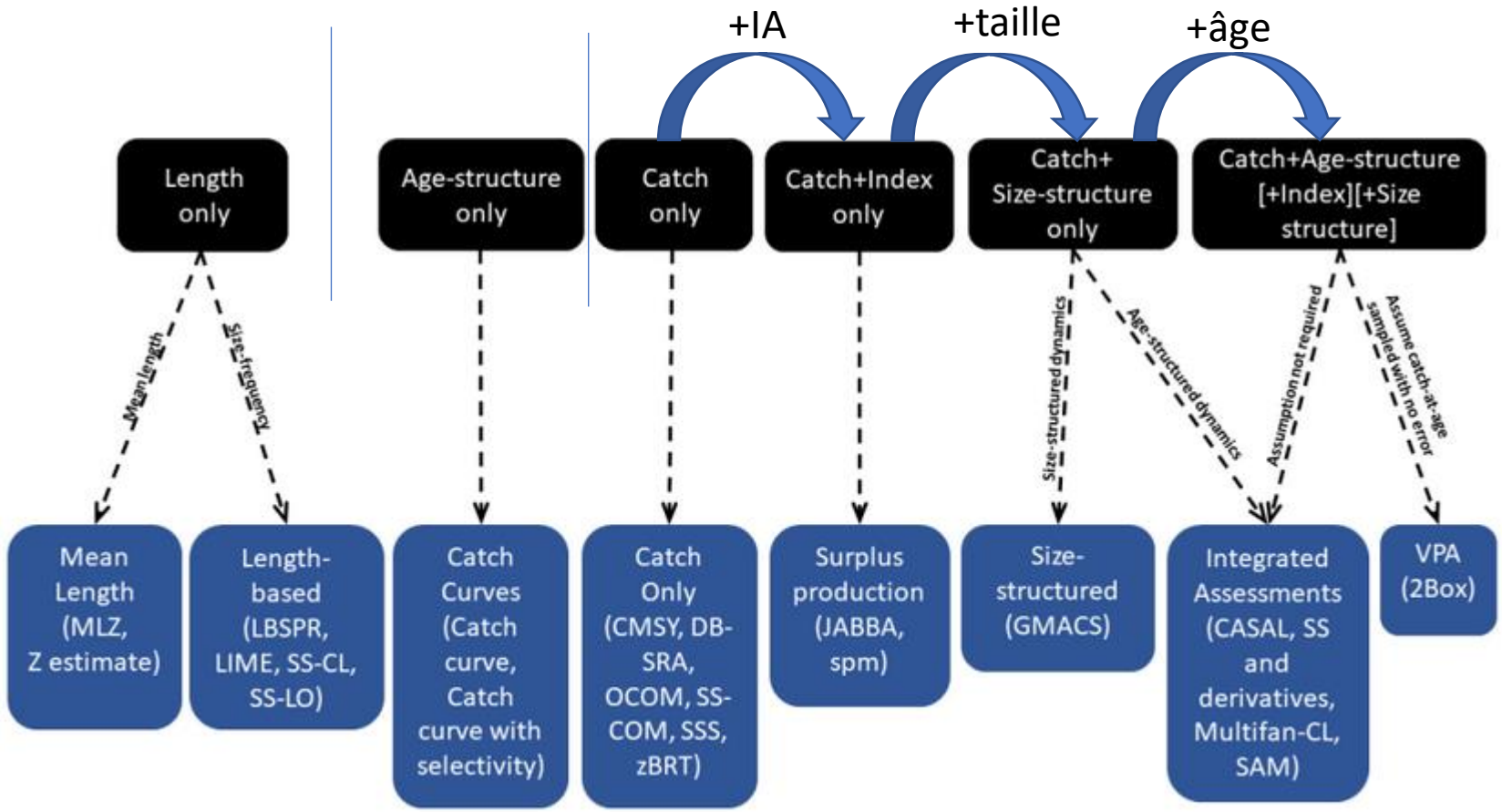
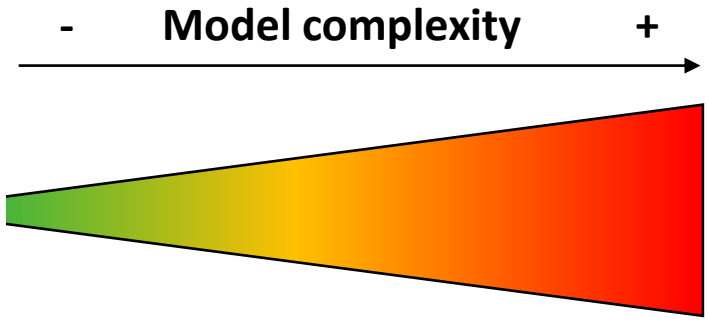
WP 5 : Stock assessment and scientific advice

3. Different stock assessment approachs

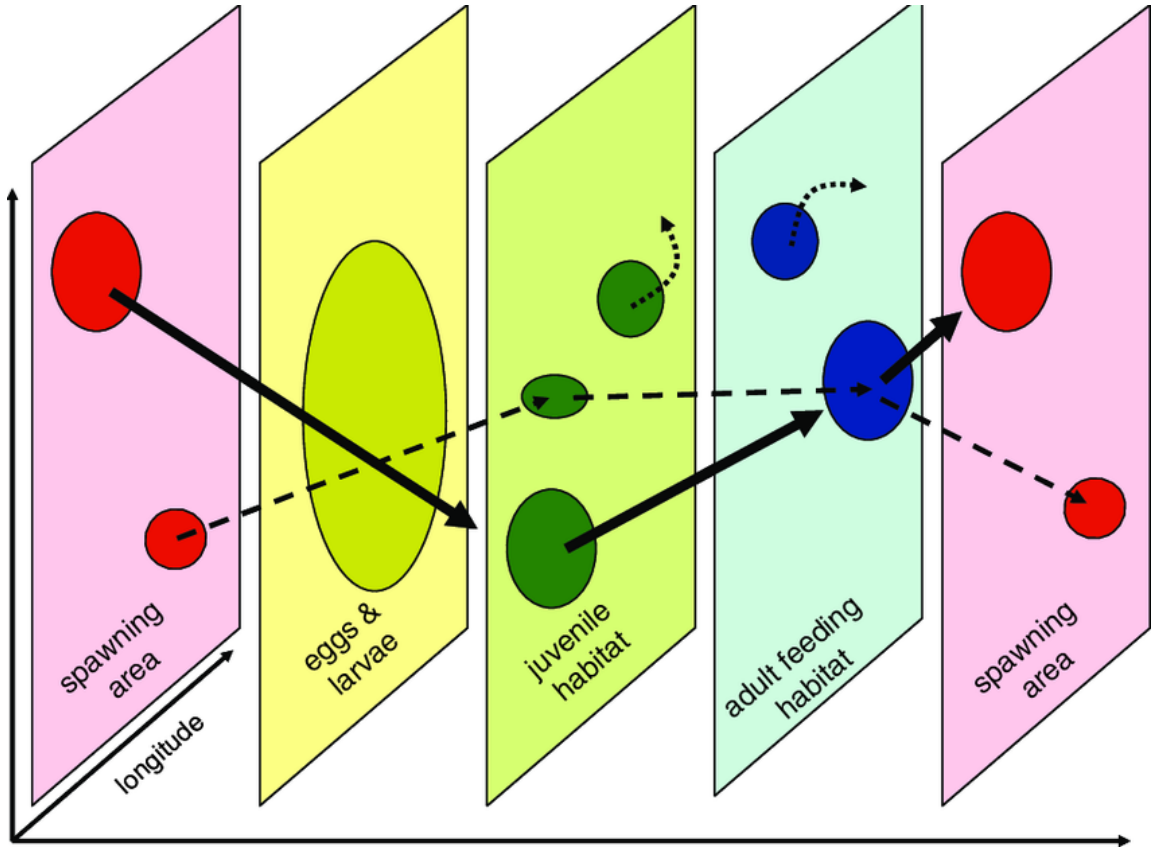




WP 5 : Stock assessment and scientific advice

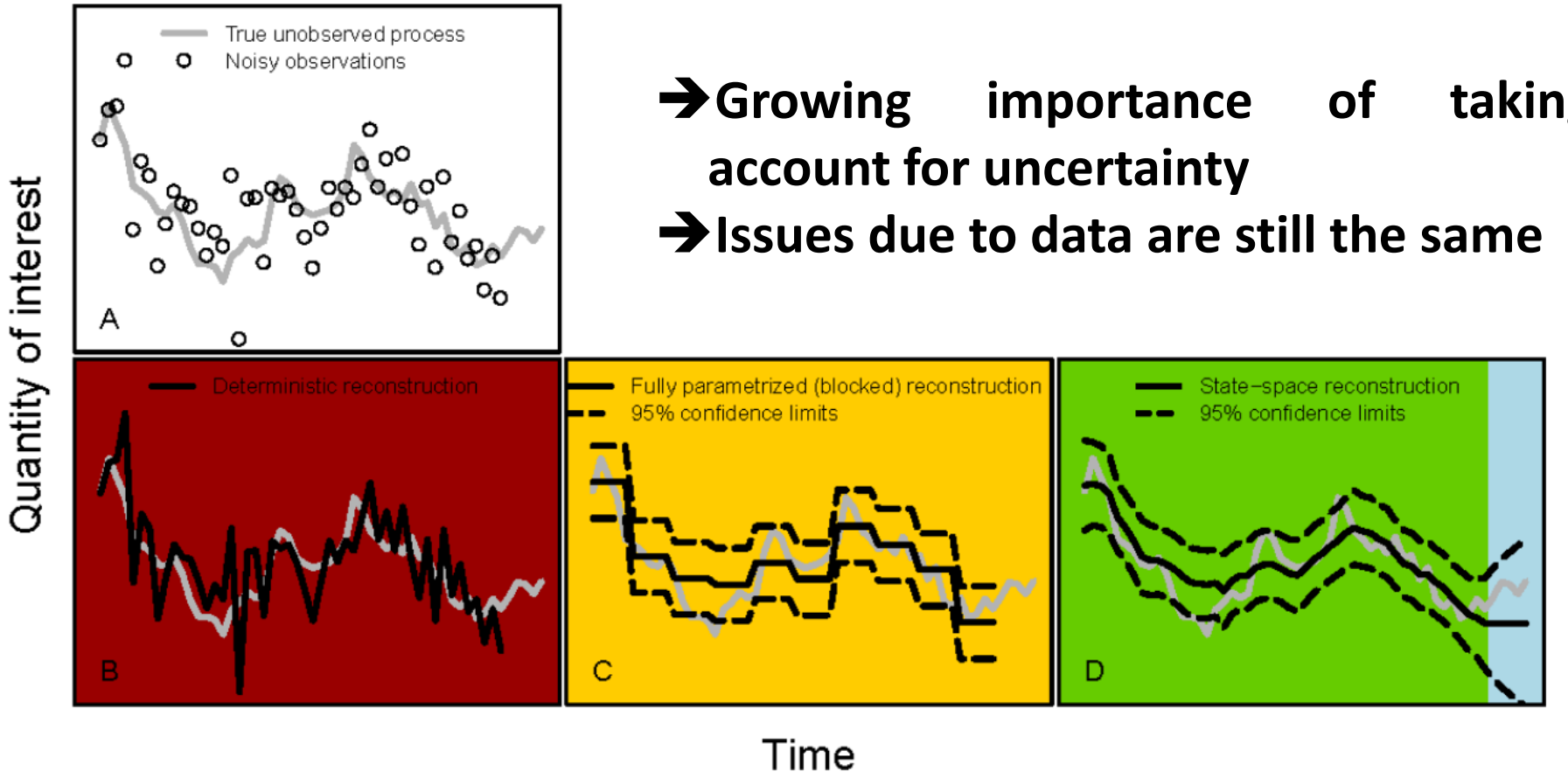
3. Different stock assessment approachs

Prospects : Spatialised and ecosystemic management in global warming context



WP 5 : Stock assessment and scientific advice

3. Different stock assessment approachs

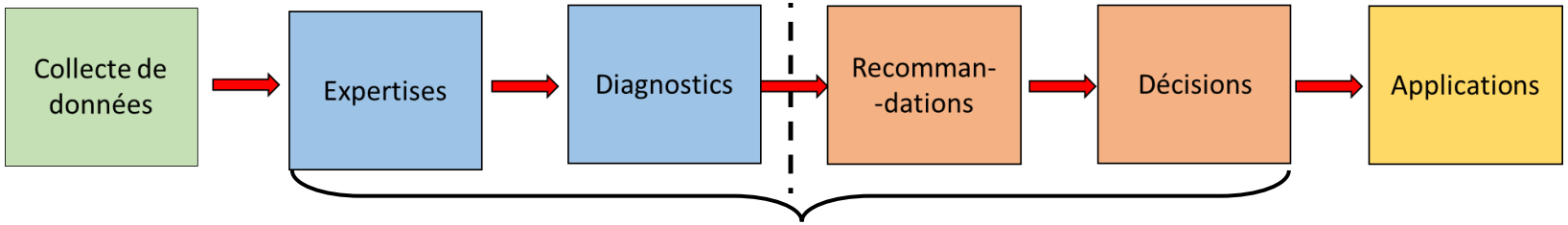


➔**Growing importance of taking account for uncertainty**

➔**Issues due to data are still the same**

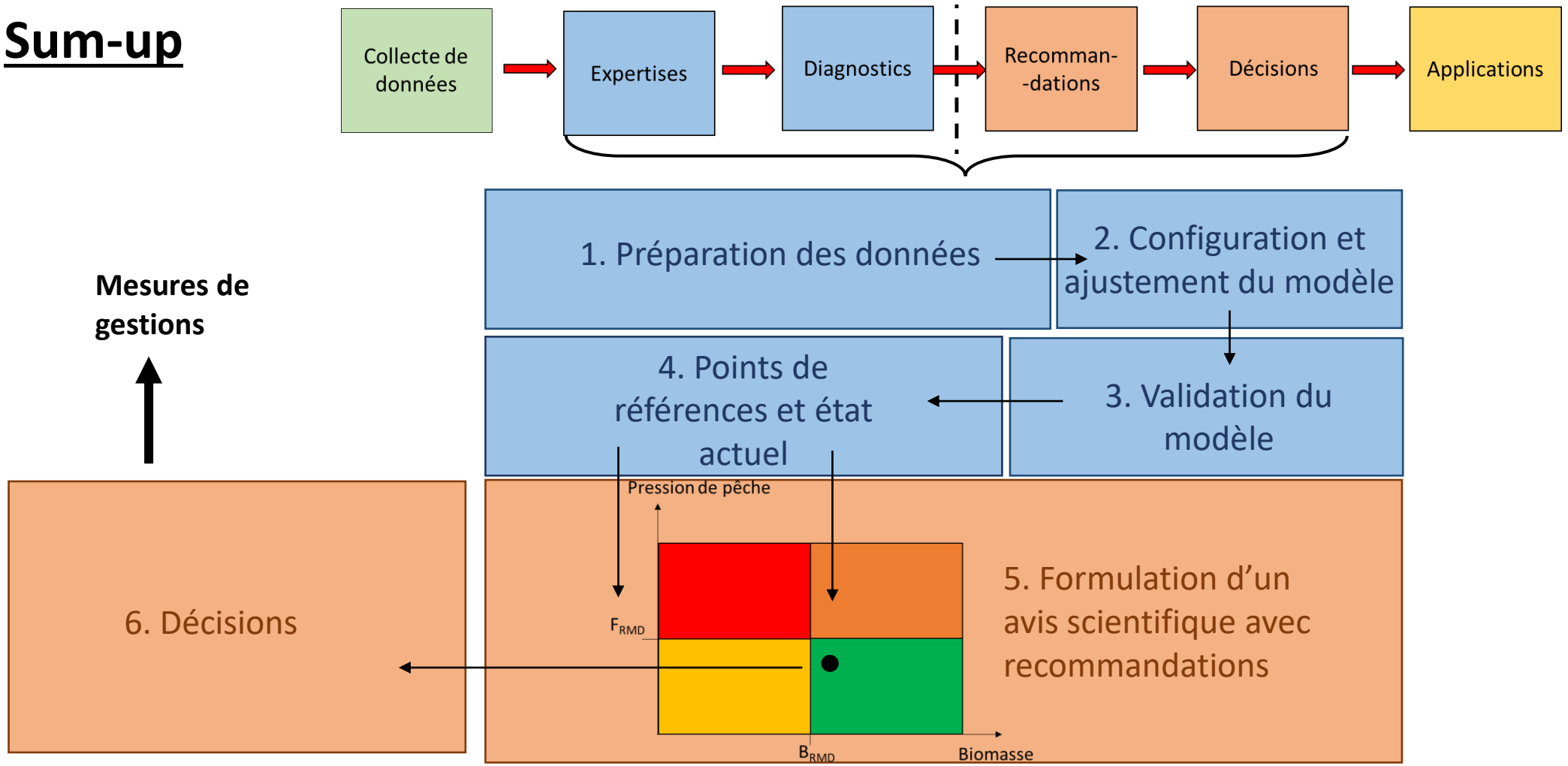
WP 5 : Stock assessment and scientific advice

Sum-up



WP 5 : Stock assessment and scientific advice

Sum-up



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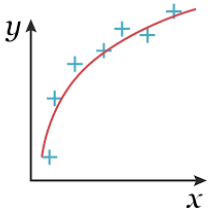
WP 5 : Stock assessment and scientific advice

Sum-up

Collecte de données → Expertises → Diagnostics → Recomman--dations → Décisions → Applications

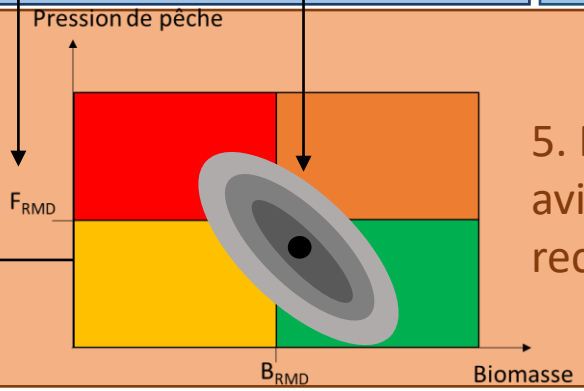
Mesures de gestions

1. Préparation des données → 2. Configuration et ajustement du modèle



Ajustement et incertitudes

2. Configuration et ajustement du modèle → 3. Validation du modèle → 4. Points de références et état actuel



4. Points de références et état actuel + 5. Formulation d'un avis scientifique avec recommandations → 6. Décisions

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WP 5 : Stock assessment and scientific advice

Sum-up

Collecte de données → Expertises → Diagnostics → Recomman--dations → Décisions → Applications

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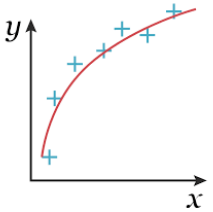
1. Préparation des données → 2. Configuration et ajustement du modèle



Ajustement et incertitudes

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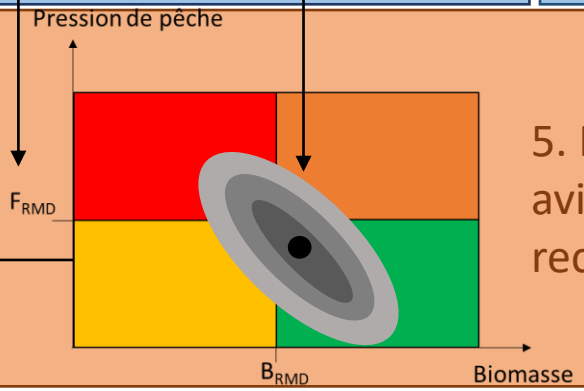
5. Formulation d'un avis scientifique avec recommandations



6. Décisions

- **Pratiques différentes selon la donnée**
- **Procédures d'ajustements évoluent avec la puissance de calcul**
- **Futurs enjeux, nouvelles approches**
- **Connaissances halieutiques**

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WP 5 : Stock assessment and scientific advice

Thank you for your attention !

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