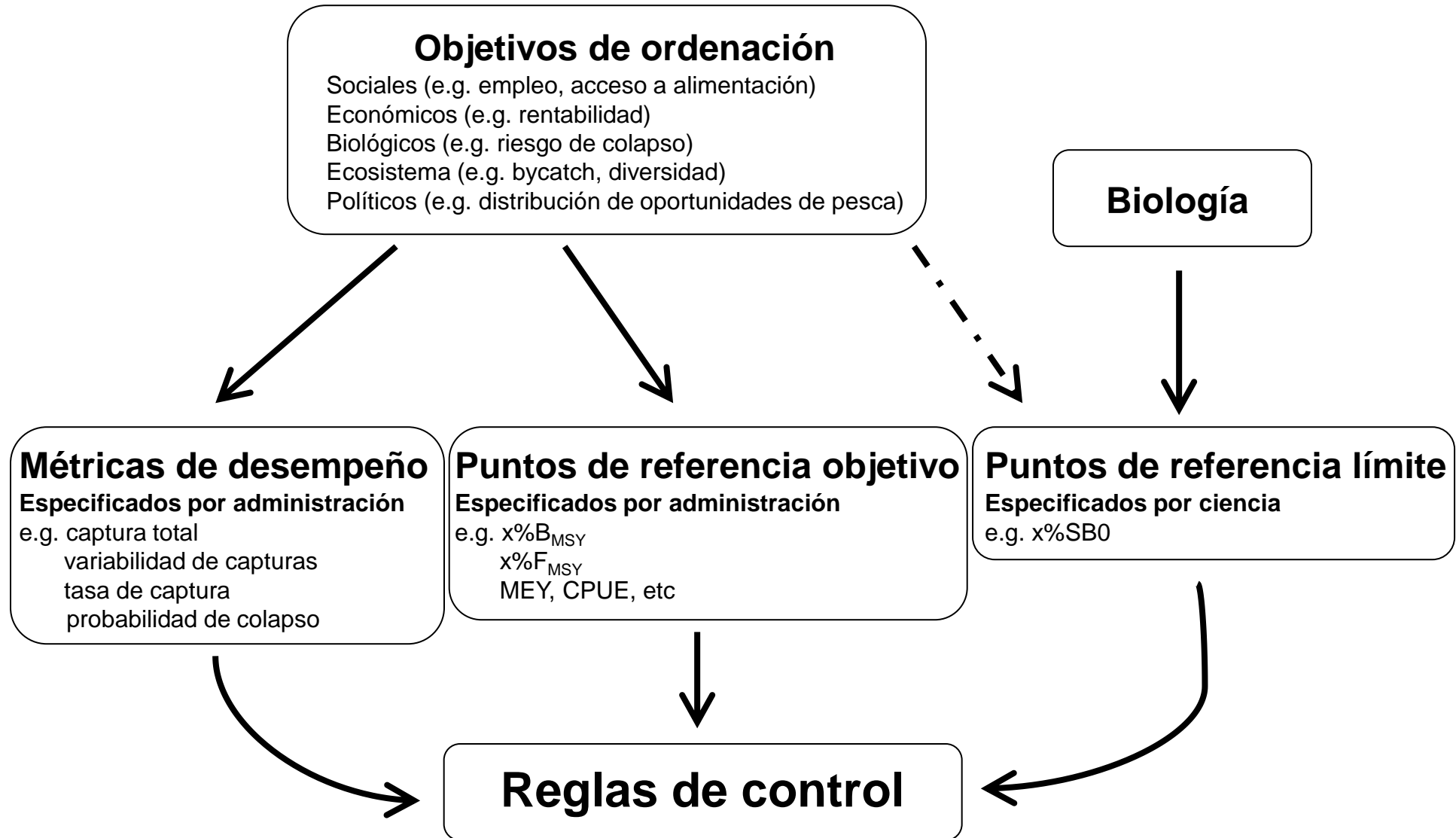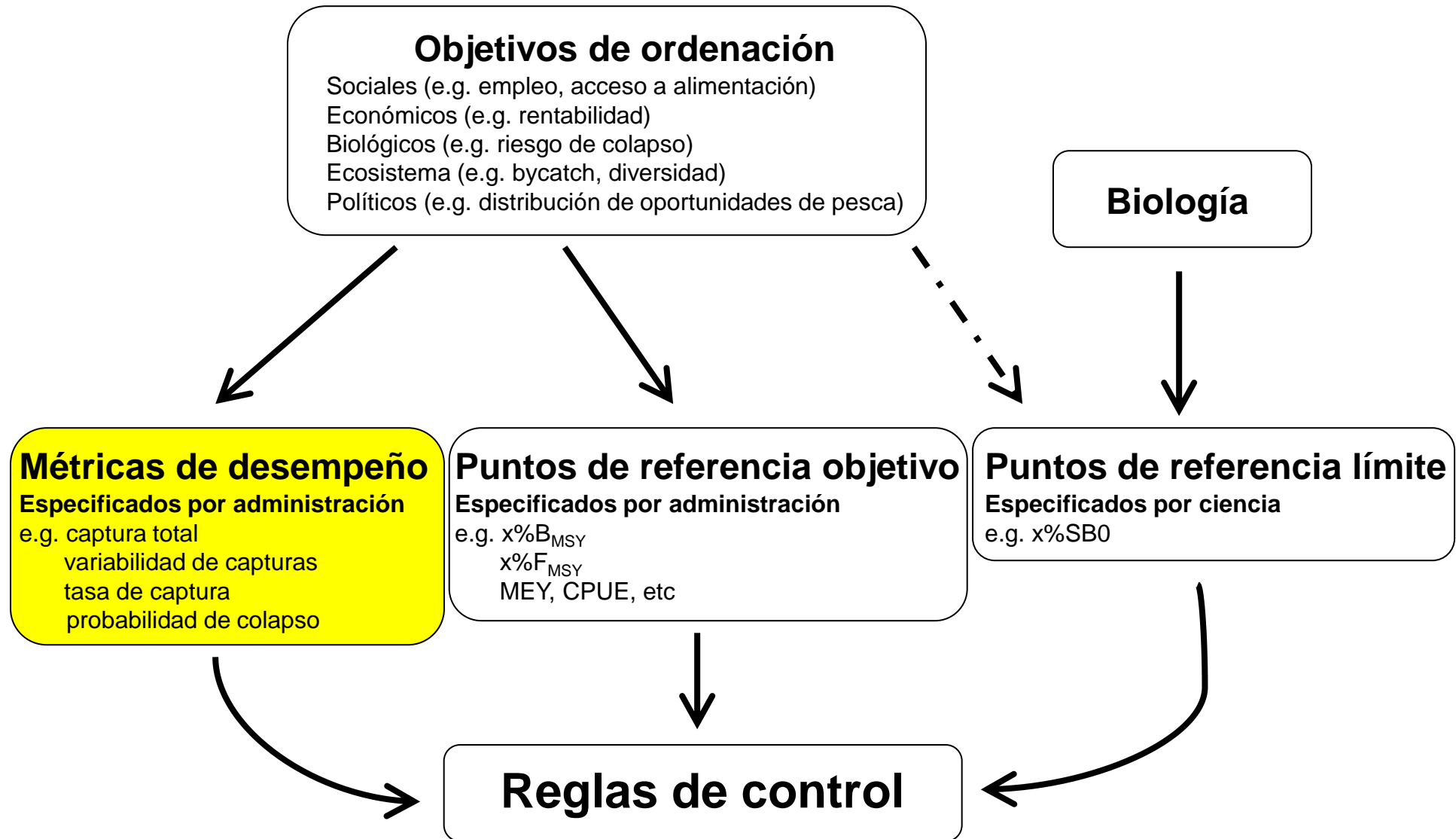# Métricas de Desempeño

2º Taller CIAT sobre Evaluación de Estrategias de Ordenación para atunes tropicales, *por videoconferencia*, Mayo 03-04, 2021

Estrategias de Ordenación

Objetivos de ordenación
Sociales (e.g. empleo, acceso a alimentación)
Económicos (e.g. rentabilidad)
Biológicos (e.g. riesgo de colapso)
Ecosistema (e.g. bycatch, diversidad)
Políticos (e.g. distribución de oportunidades de pesca)

Biología

Métricas de desempeño
Especificados por administración
e.g. captura total
    variabilidad de capturas
    tasa de captura
    probabilidad de colapso

Puntos de referencia objetivo
Especificados por administración
e.g. $x\%B_{MSY}$
    $x\%F_{MSY}$
    MEY, CPUE, etc

Puntos de referencia límite
Especificados por ciencia
e.g. $x\%SB0$

Reglas de control

Modificado de Berger et al. 2012

CIAT
IATTC

Estrategias: Métricas de Desempeño

Objetivos de ordenación
Sociales (e.g. empleo, acceso a alimentación)
Económicos (e.g. rentabilidad)
Biológicos (e.g. riesgo de colapso)
Ecosistema (e.g. bycatch, diversidad)
Políticos (e.g. distribución de oportunidades de pesca)

Biología

Métricas de desempeño
Especificados por administración
e.g. captura total
    variabilidad de capturas
    tasa de captura
    probabilidad de colapso

Puntos de referencia objetivo
Especificados por administración
e.g. $x\%B_{MSY}$
    $x\%F_{MSY}$
    MEY, CPUE, etc

Puntos de referencia límite
Especificados por ciencia
e.g. $x\%SB0$

Reglas de control

Modificado de Berger et al. 2012

Métricas de desempeño

"I want it all, and I want it now…"

Freddie Mercury

- Captura total a largo plazo
- Captura promedio a largo plazo
- Variabilidad en capturas a largo plazo
- Variabilidad en capturas a corto plazo

- CPUE promedio a largo plazo
- Esfuerzo (días de pesca) promedio a largo plazo

- Probabilidad de caer bajo de puntos de referencia
- Probabilidad de recuperación de stock

- Muchos más!

Compromisos *(Tradeoffs)*

"You can't always get what you want…"

Mick Jagger

- Captura a largo plazo & CPUE a largo plazo
- Captura a largo plazo & *Prob.* bajo puntos de referencia
- Captura a largo plazo & Captura a corto plazo
- CPUE a largo plazo & variabilidad anual en capturas
- Esfuerzo a largo plazo & *P* recuperación del stock

Métricas de desempeño y estadísticas asociadas Albacora del Atlántico Norte (ICCAT, 2016)

PERFORMANCE INDICATORS AND ASSOCIATED STATISTICS	UNIT OF MEASUREMENT	TYPE OF METRICS
1 Status		
1.1 Minimum spawner biomass relative to B_{MSY}	B/B_{MSY}	Minimum over [x] years
1.2 Mean spawner biomass relative to B_{MSY}[1]	B/B_{MSY}	Geometric mean over [x] years
1.3 Mean fishing mortality relative to F_{MSY}	F/F_{MSY}	Geometric mean over [x] years
1.4 Probability of being in the Kobe green quadrant	B, F	Proportion of years that $B \geq B_{MSY}$ & $F \leq F_{MSY}$
1.5 Probability of being in the Kobe red quadrant[2]	B, F	Proportion of years that $B \leq B_{MSY}$ & $F \geq F_{MSY}$
2 Safety		
2.1 Probability that spawner biomass is above B_{lim} ($0.4 B_{MSY}$)[3]	B/B_{MSY}	Proportion of years that $B > B_{lim}$
2.2 Probability of $B_{lim} < B < B_{thresh}$	B/B_{MSY}	Proportion of years that $B_{lim} < B < B_{thresh}$
3 Yield		
3.1 Mean catch – short term	Catch	Mean over 1-3 years
3.2 Mean catch – medium term	Catch	Mean over 5-10 years
3.3 Mean catch – long term	Catch	Mean in 15 and 30 years
4 Stability		
4.1 Mean absolute proportional change in catch	Catch (C)	Mean over [x] years of $|(C_n - C_{n-1}/C_{n-1}|$
4.2 Variance in catch	Catch (C)	Variance over [x] years
4.3 Probability of shutdown	TAC	Proportion of years that TAC=0
4.4 Probability of TAC change over a certain level[4]	TAC	Proportion of management cycles when the ratio of change[5] $(TAC_n - TAC_{n-1})/TAC_{n-1} > X\%$
4.5 Maximum amount of TAC change between management periods	TAC	Maximum ratio of change[6]

CIAT
IATTC

Métricas de desempeño por tipo de objetivo (IOTC, 2016)

Candidate performance statistics	Performance measure	Summary statistic
STATUS: maximize probability of stock in the Kobe green zone		
Mean spawner biomass relative to unfished	SB/SB_0	Geometric mean over years
Minimum spawner biomass relative to unfished	SB/SB_0	Minimum over years
Mean spawner biomass relative to BMSY	SB/SB_{MSY}	Geometric mean over years
Mean fishing mortality relative to target	F/F_{targ}	Geometric mean over years
Mean fishing mortality relative to FMSY	F/F_{MSY}	Geometric mean over years
Probability of being in Kobe green quadrant	SB, F	Proportion of years that $SB \geq SB_{targ}$ & $F \leq F_{targ}$
Probability of being in Kobe red quadrant	SB, F	Proportion of years that $SB < SB_{targ}$ & $F > F_{targ}$
SAFETY: maximize probability of stock above the biomass limit		
Probability that spawner biomass is above 20% of SB0	SB	Proportion of years that $SB > 0.2SB0$
YIELD: maximize catches across regions and gears		
Mean catch	C	Mean over years
Mean catch by region and/or gear	C	Mean over years
Mean proportion of MSY	C/MSY	Mean over years
ABUNDANCE: maximize catch rates to enhance fishery profitability		
Mean catch rates by region and gear	A	Geometric mean over years
STABILITY: maximize stability in catches, reduce commercial uncertainty		
Mean absolute proportional change in catch	C	Mean over years of absolute (C_t / C_{t-1})
Variance in catch	C	Variance over years
Variance in fishing mortality	F	Variance over years
Probability of fishery shutdown	C	Proportion of years that $C = 0$

Métricas de desempeño Atun Aleta Azul del Sur (CCSBT, 2018)

Catch performance measures:

Average short term (10 year) and long-term catch

Measure of TAC smoothness: average annual catch variability over 25 years

Maximum TAC decrease

Proportion of occurrence where initial 2 TAC changes are up and then down

Proportion of occurrence where initial 4 TAC changes are set up then down

Proportion of runs with TAC above the current catch at the tuning year.

Lower 10th percentile in year t, e.g. in 10 years

SSB performance:

SSB in medium term relative to SSB0

Spawning biomass in short term relative to current

Spawning biomass in medium term relative to current

Minimum spawning biomass relative to current

Proportion of runs above the current biomass at the tuning year

Catch increases while SSB stays low: ratio of catch/SSB in 2030 for a) lower 10th, b) median, c) upper 90th percentile

SSB lower (10th) percentile continuing to increase (no decline in period 2013-2035)

Lower 10th SSB percentile in year t, e.g. in 10 years

CPUE performance:

CPUE relative to CPUE in the short term.

Discusión sobre Métricas de Desempeño

Discutiremos métricas de desempeño alternativas como parte del debate sobre objetivos

CIAT
IATTC

¿Preguntas?