



INTERNATIONAL PACIFIC



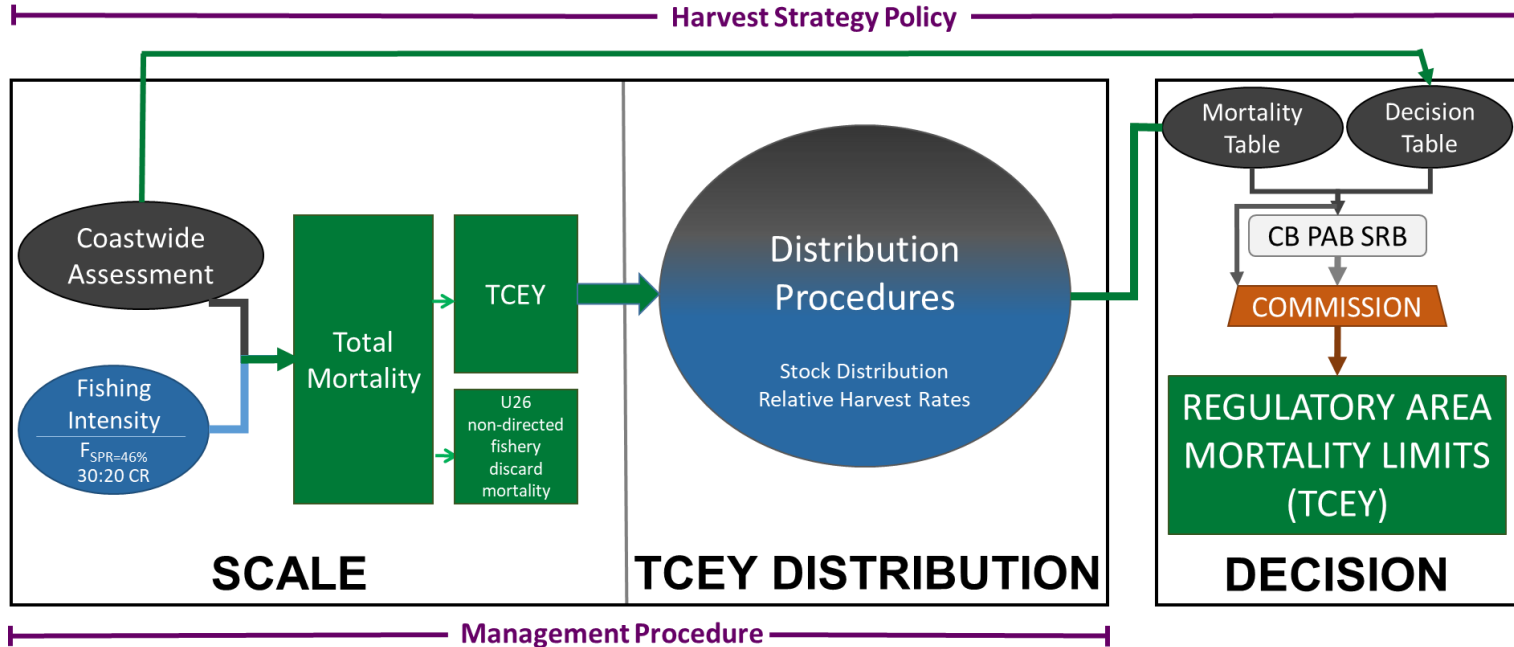
HALIBUT COMMISSION

Management Procedures

Agenda Item 6

IPHC-2019-MSAB014-07

Management Procedures



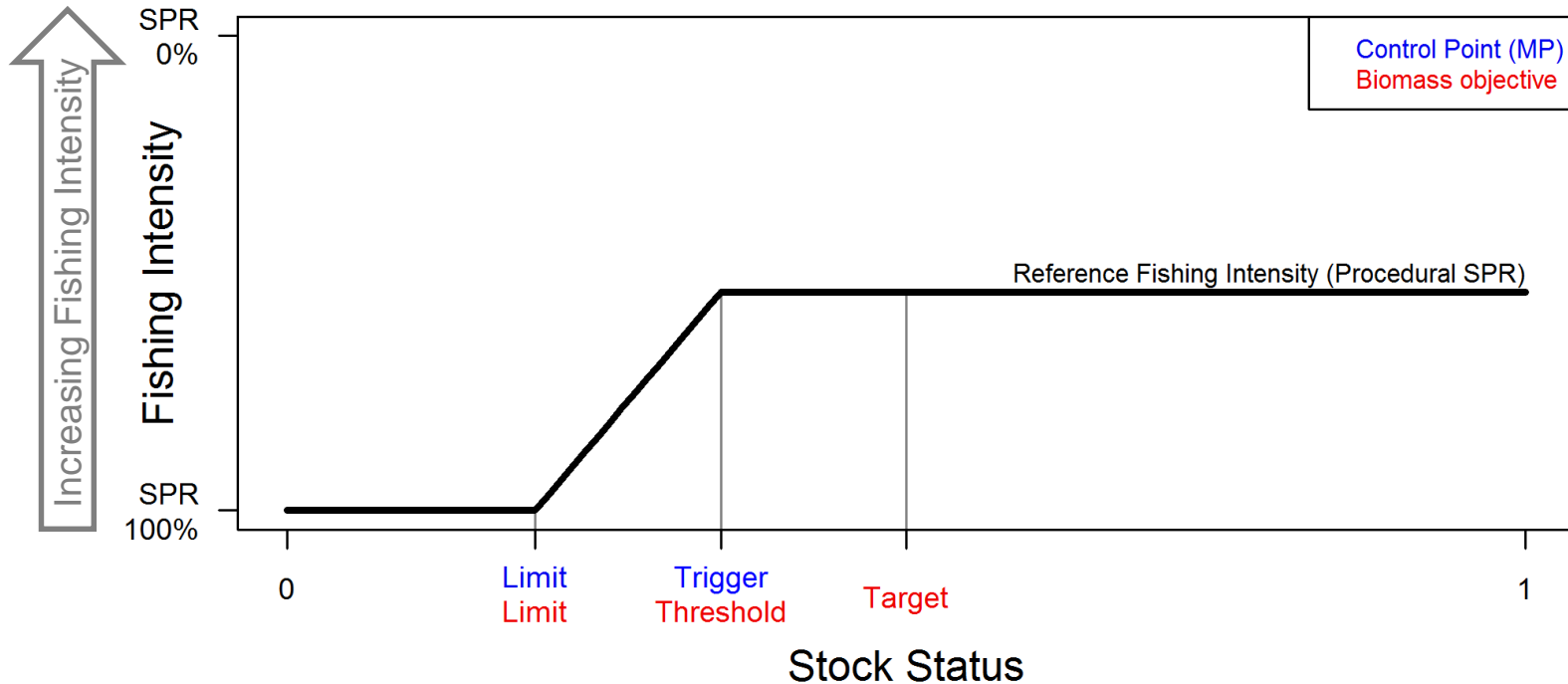
<https://www.iphc.int/the-commission/harvest-strategy-policy>



Reference Points and Control Points

There is a difference between the MP and objectives

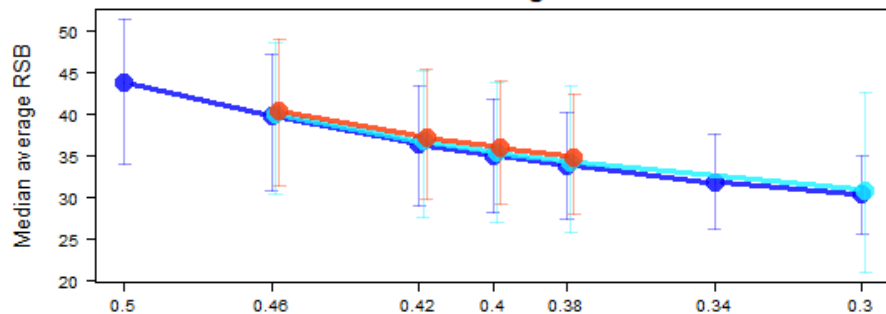
Harvest Control Rule



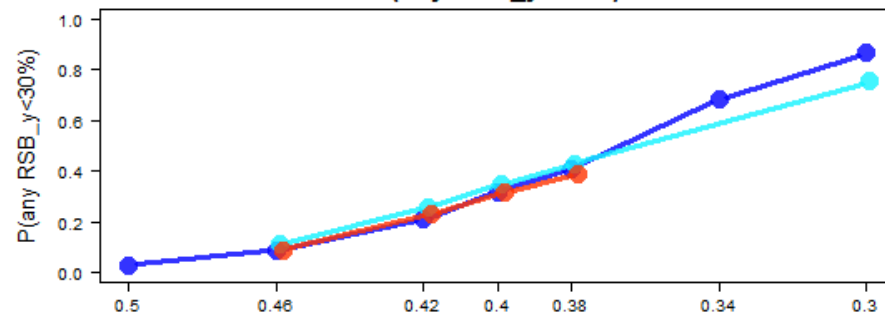
Coastwide simulation results

Input Control Rule_Constraint_--
 ● 30:20_NA
 ● 30:20_maxChangeBoth15
 ● 30:20_slowUpFastDown

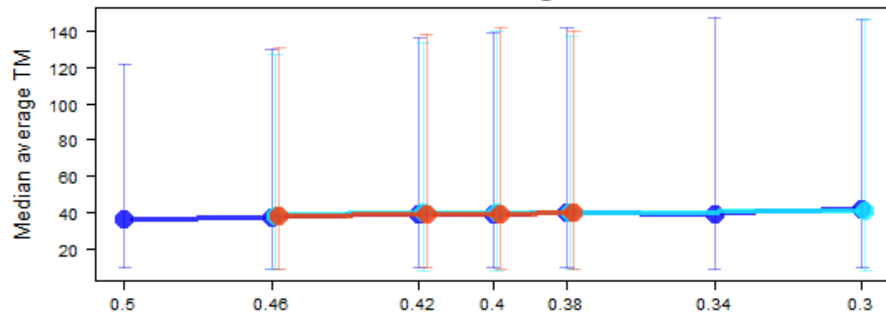
Median average RSB



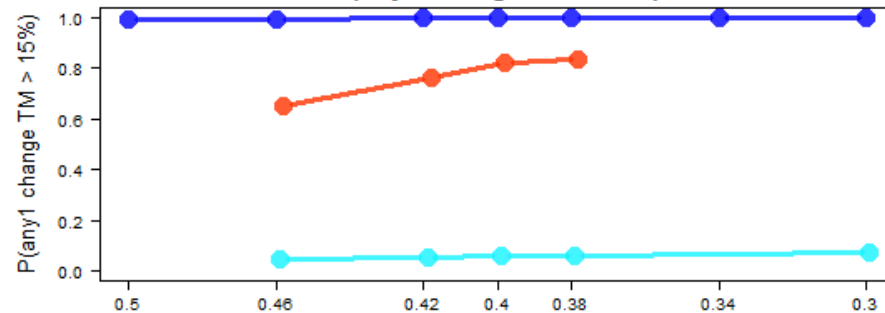
P(any RSB_y < 30%)



Median average TM



P(any1 change TM > 15%)



For next round of simulations:

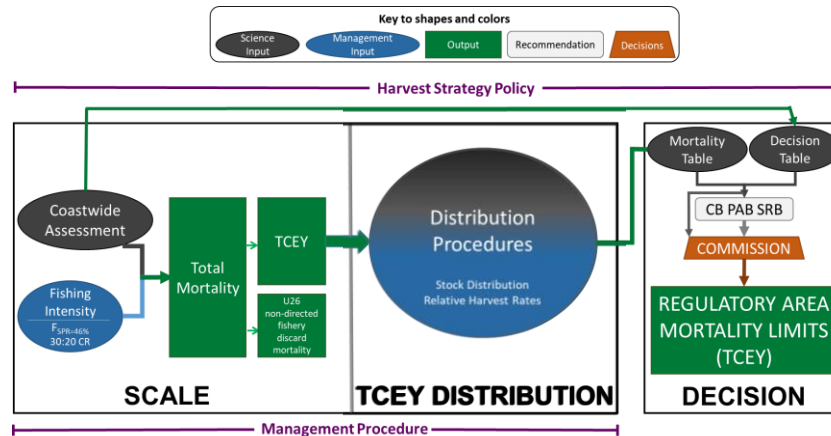
- SPRs: 7 values from 0.30 to 0.50
 - 0.30, 0.34, 0.38, 0.40, 0.42, 0.46, 0.50
- CR: 30:20
- Constraints: None, Max15%, SUFD, Multi-year
 - Combinations?

- 21+ Scenarios for coastwide component
 - Multiply that by number of distribution MPs
 - Possibly reduce SPRs for certain combinations
- Refocus MPs in May



A procedure for distributing the TCEY

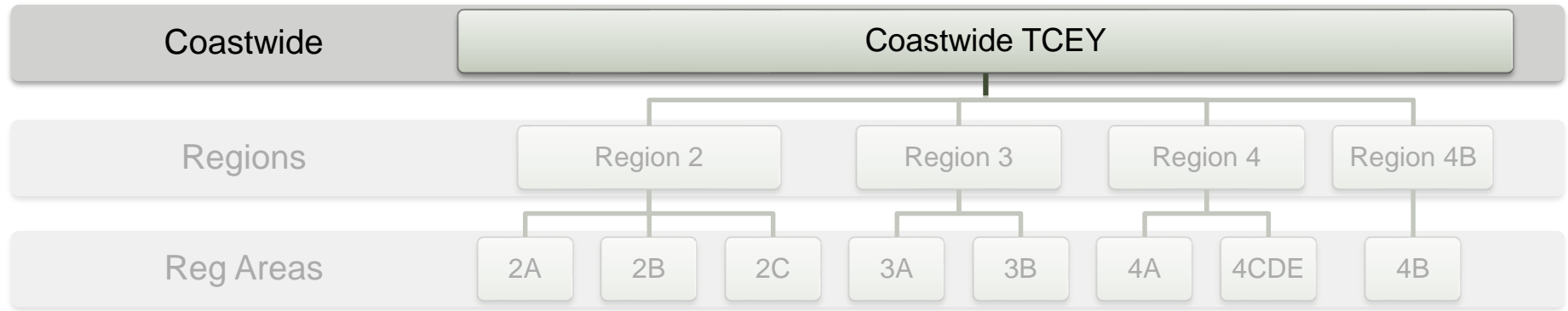
1. Coastwide target fishing intensity (science-based & management-derived)
2. Regional Stock Distribution (science-based)
3. Regional Fishing Intensity (science-based)
4. Regional Allocation Adjustment (management-derived)
5. Regulatory Area Allocation (management-derived)



A procedure for distributing the TCEY (1)

Coastwide Target Fishing Intensity

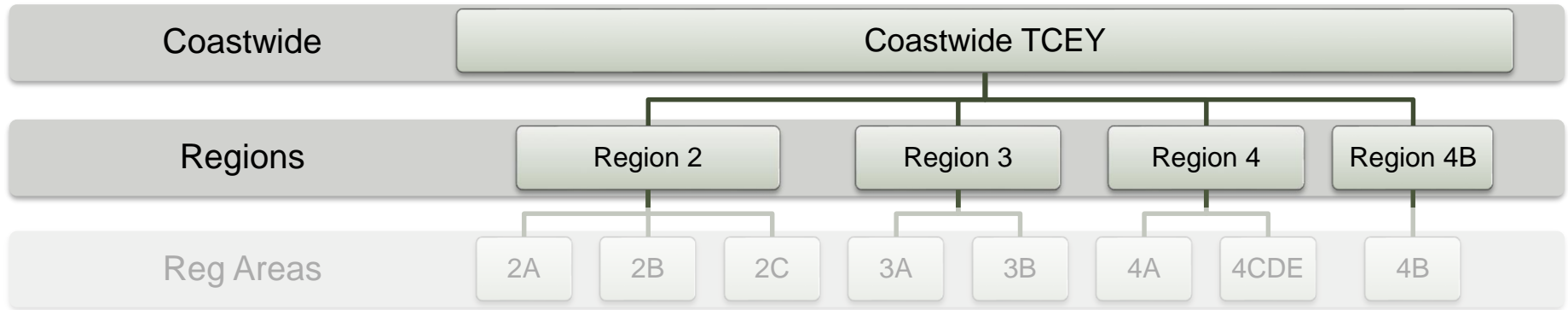
- Determine coastwide Total Mortality from Scale MP
- Separate TM into O26 (TCEY) and U26 components



A procedure for distributing the TCEY (2)

Regional Stock Distribution

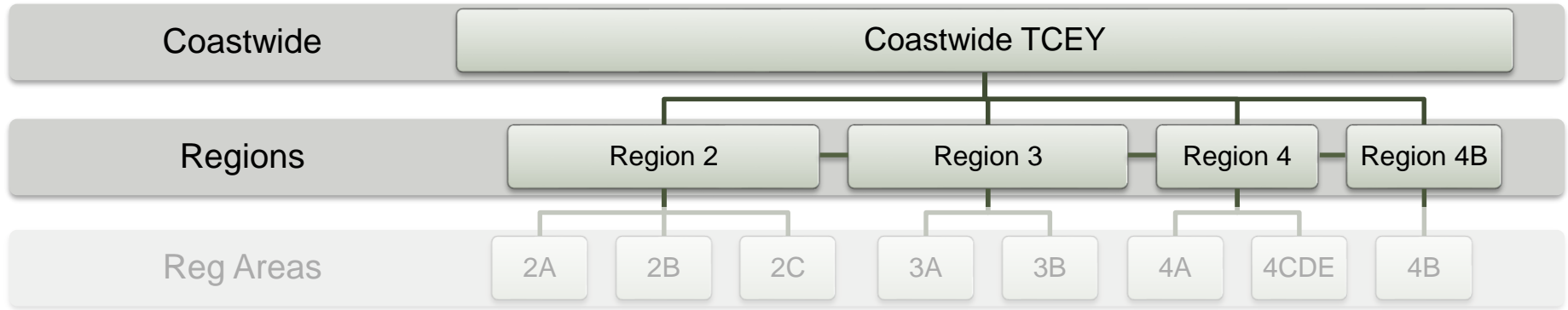
- Distribute the coastwide TCEY to biologically-based Regions
 - use proportion of the stock estimated from the “all sizes” WPUE index
- Biological Sustainability objectives



A procedure for distributing the TCEY (3)

Regional Relative Fishing Intensity

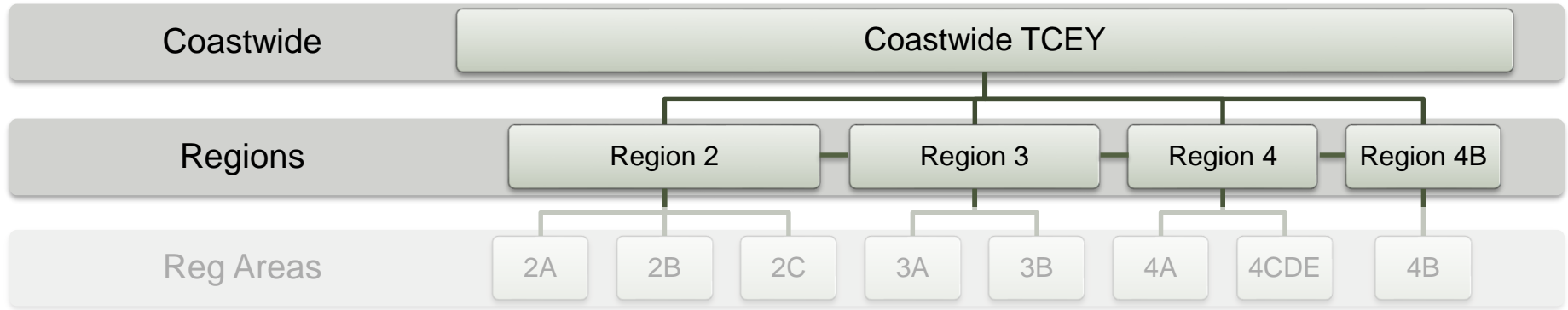
- Adjust the distribution of the TCEY among Regions
 - Relative target harvest rates by Region
 - Based on productivity, migration, other biological characteristics
- Biological Sustainability objectives



A procedure for distributing the TCEY (4)

Regional Allocation Adjustment

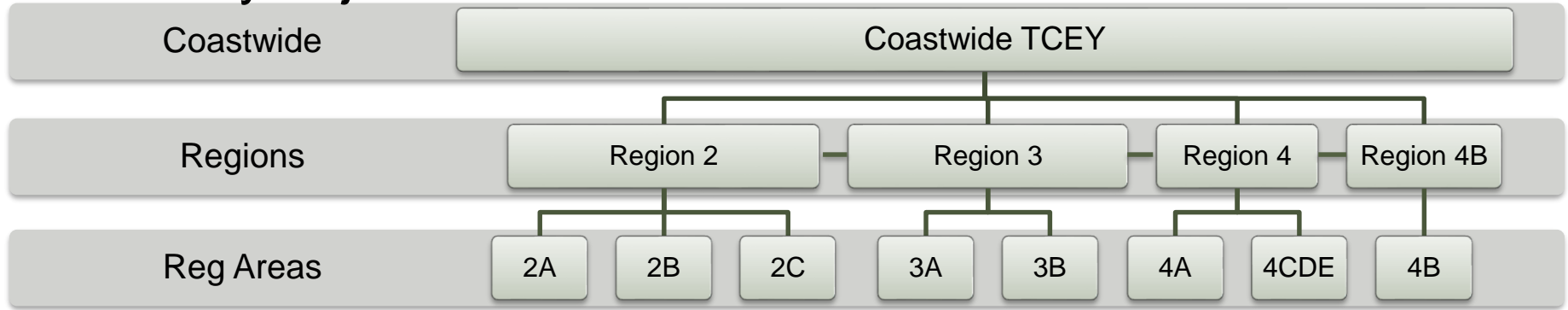
- Adjust the distribution of the TCEY among Regions
 - Management/policy based
 - Trends in data, historical observations, agreements
- Fishery objectives



A procedure for distributing the TCEY (5)

Regulatory Area Allocation

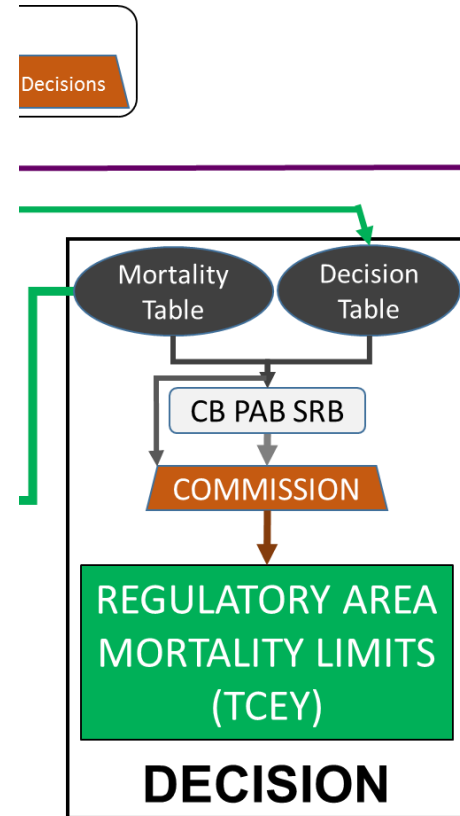
- Apply allocation percentages for each Regulatory Area within a Region
- Based on policy, data, observations, or agreement
- Fishery objectives



Decision-Making

Annual Regulatory Area Adjustment

- Adjust Regulatory Area TCEY's to account for other factors as needed
- May deviate from the management procedure
 - Will have unpredictable consequences



Interim MP: Stock Distribution

- Stock Distribution
 - Estimated from the space-time model mean O32 WPUE indices for each IPHC Regulatory Area
 - Linked to Biological Sustainability objectives
 - Specifically “Conserve Spatial Complexity”
- Changes for consistency
 - Use Biological Regions
 - Use All-sizes WPUE index (mostly O26)



Interim MP: Relative Harvest Rates

- Shift stock distribution from west to east
 - Past estimated productivity in each area
 - Past estimated biomass trends in each area
 - Differences in emigration and immigration
 - Presence of small fish
 - Uncertainty in past data and analyses
 - “Rates” of 16.125% in 3B, 4A, 4B, 4CDE and 21.5% 3A, 2A, 2B, 2C
- Using coastwide SPR, only relative harvest rates needed
 - The intensity of fishing in an area relative to other areas
 - Areas 3B, 4A, 4B, and 4CDE were 3/4 the target in other areas



Changes to Relative Harvest Rates

- Apply by Biological Region
- Separate into two components
 - Science-based and management-based
- Conduct research on productivity in each Region
- Enumerate uncertainty of data in each Region
- Consider other factors

- Evaluate MPs against objectives with MSE



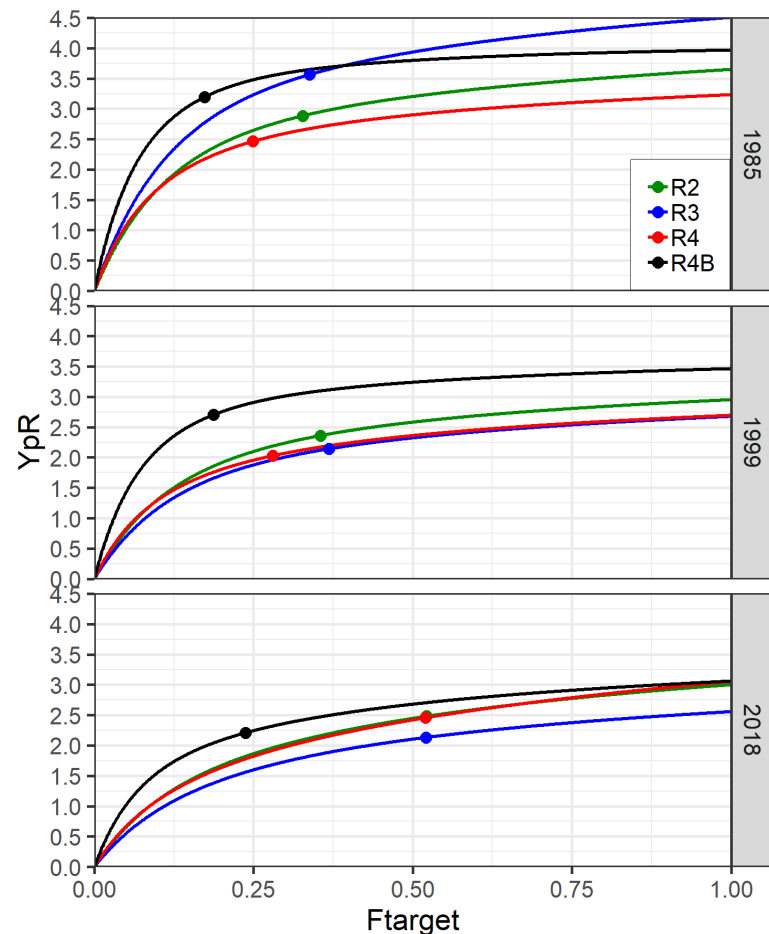
Productivity analysis by Biological Region

- Yield per Recruit (YpR) analysis
- Each region analysed separately (2,3,4,4B)
- Specifications: 1 fleet, 2 sexes
- Scenarios tested: weight-at-age and selectivity in 1985, 1999 and 2018.
- Sensitivity: shift selectivity curve to lower ages.
- Comparison of $F_{0.1}$ results relative to Region 3



Productivity by region

- Region 2 and 3
 - similar harvest rates for all scenarios.
- Region 4B
 - very different harvest rate for all scenarios.
- Region 4
 - in 2018 get harvest rate similar to region 3 and 2.



Relative productivity by region

		Biological Region			
Weight-at-age	Selectivity	2	3	4	4B
1985	1985	1.0	1.0	0.7	0.5
1999	1999	1.0	1.0	0.8	0.5
2018	2018	1.0	1.0	1.0	0.5
1985	Shift younger	0.8	1.0	0.8	0.5
1999	Shift younger	0.8	1.0	0.8	0.5
2018	Shift younger	0.9	1.0	1.1	0.5

- Supports lower relative HR in western areas in the past
- Changes in productivity over time may affect appropriate relative harvest rates



MPs: hands on

- Form 3-4 groups;
- Time: from 12:00 to 14:00;
- Use template provided (paper and ppt).

- From 14:00 to 15:00 → IPHC to summarize proposals and present in plenary.
- Discussion to identify MPs to be tested in May.



Some tools for use in the development of MPs

IPHC FISS Survey

- Relative biomass estimates by IPHC Regulatory Area, biological regions, or multi-area management zones;
- O32:O26 ratios, O32 WPUE, or other proxies to represent discard mortality in directed fisheries;
- Trends in WPUE/NPUE by IPHC Regulatory Area, biological regions, or multi-area management zones;
- WPUE to determine a maximum SPR with catch distribution by IPHC Regulatory Area.

Fishery Dependent Data

- Trends in CPUE by IPHC Regulatory Area, biological regions, or multi-area management zones.

Practical tools

- Smoothing algorithms on area-specific catch limits;
- Percentage allocation to an IPHC Regulatory Area;
- A floor on the TCEY;
- Coastwide TCEY target and maximum calculated; distribution by target, but with ability to adjust TCEY up to the maximum;
- Stair-steps to modify the TCEY at specific trigger reference points;
- Relative harvest rates.

Additional Tools

- Be creative



Tools for use in the development of management procedures

	Coastwide	Biological Region	Regulatory areas	Other scale
SPR	X			
30:20 CR; 25:10 CR; 40:20 CR; ...	X			
Constraints to CRs	X	X	X	X
Relative Biomass estimates from FISS survey		X	X	X
O32:O26 ratios, O32 WPUE or other proxies	X	X	X	X
Trends in WPUE/NPUE from FISS survey	X	X	X	X
Trends in CPUE	X	X	X	X
Area specific catch limits		X	X	X
Percentage allocation		X	X	X
Floor on the TCEY	X	X	X	X
Stair steps to modify TCEY at specific trigger ref points	X	X	X	X
Relative harvest rate		X	X	X
...				

Possible scale, but not relevant/desirable

Appropriate scale



Template for management procedures development: interim MP

Management Procedures	MP 1 (current interim)	MP 2	MP 3	MP 4	MP 5
Coastwide TCEY	SPR 30:20 CR No constraint				
Biological Region stock distribution	X				
Regulatory Area allocation	FISS O32 WPUE; Relative harvest rate (0.75 for reg area 3B, 4A, 4CDE, and 4B); share-based allocation for area 2B; fixed TCEY for area 2A.				



Examples of MPs: MP2

- Stock Distribution from coastwide to biological regions:
 - Estimated from the space-time model mean all sizes WPUE indices for each Biological region
 - Adjusted to account for different harvest rate between regions (0.75 for regions 4 and 4B).
- Stock distribution from biological region to regulatory areas:
 - Historical percentages of mortality limit



MP2:

Management Procedures	MP 1 (current interim)	MP 2	MP 3	MP 4	MP 5
Coastwide TCEY	SPR 30:20 CR No constraint	SPR 30:20 CR maxChange15%			
Biological Region stock distribution		FISS all sizes WPUE; Relative harvest rate (0.75 for regions 4 and 4B).			
Regulatory Area allocation	FISS O32 WPUE; Relative harvest rate (0.75 for reg area 3B, 4A, 4CDE, and 4B); share-based allocation for area 2B; fixed TCEY for area 2A.	Historical percentages of mortality limit			

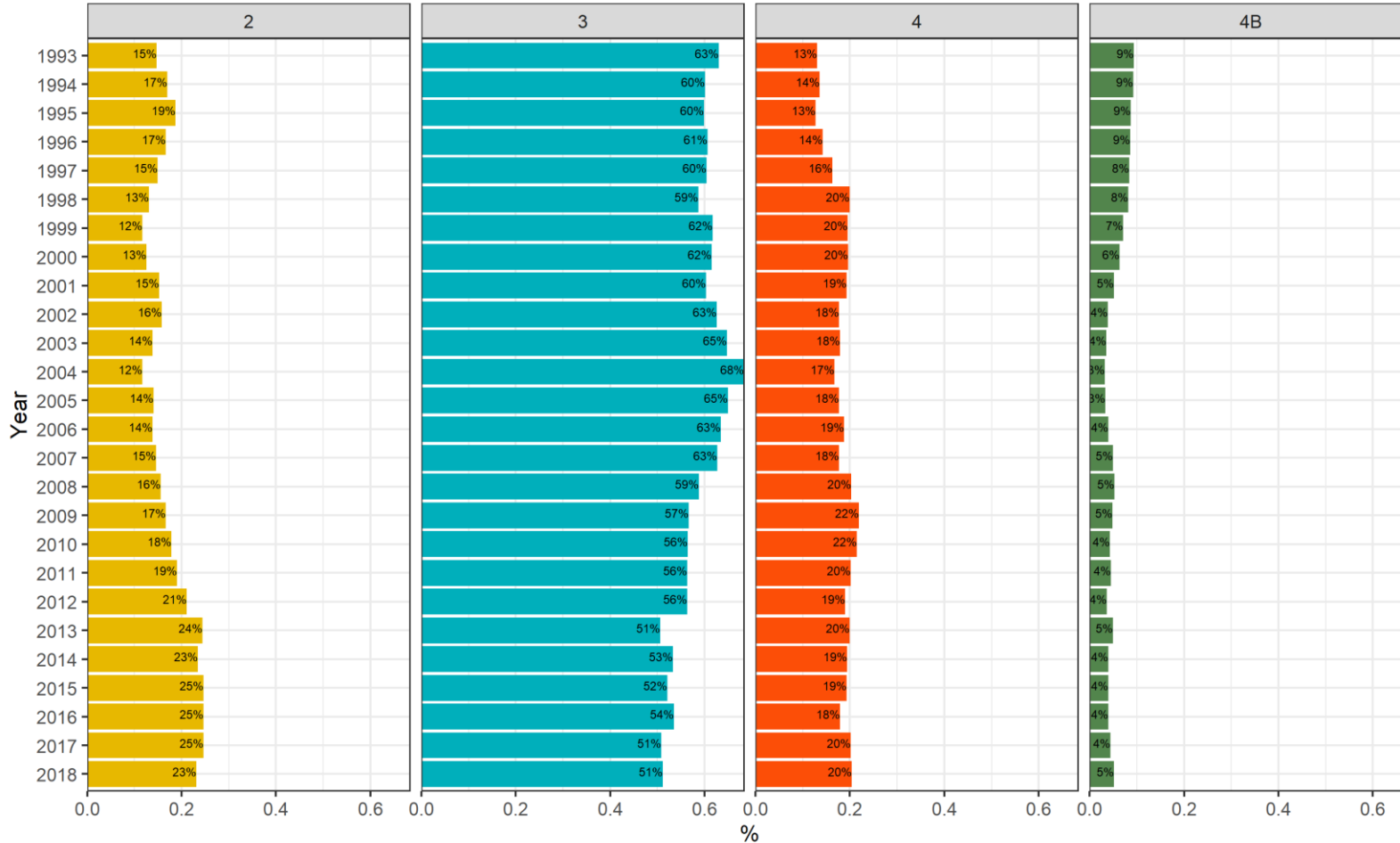


Examples of MPs: MP3

- Stock Distribution from coastwide to biological regions:
 - Estimated from the space-time model mean all sizes WPUE indices for each Biological region: average of last 5 years.



Historical perspective: WPUE all sizes by region



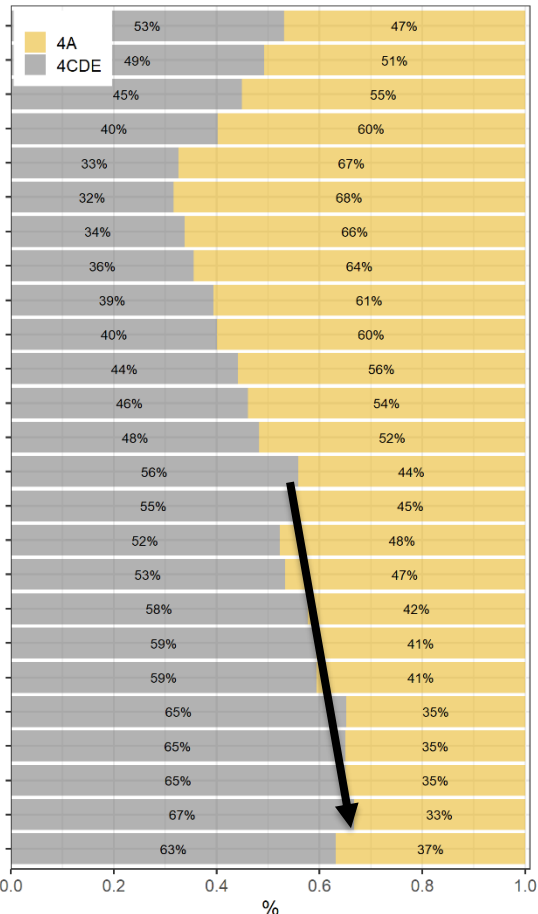
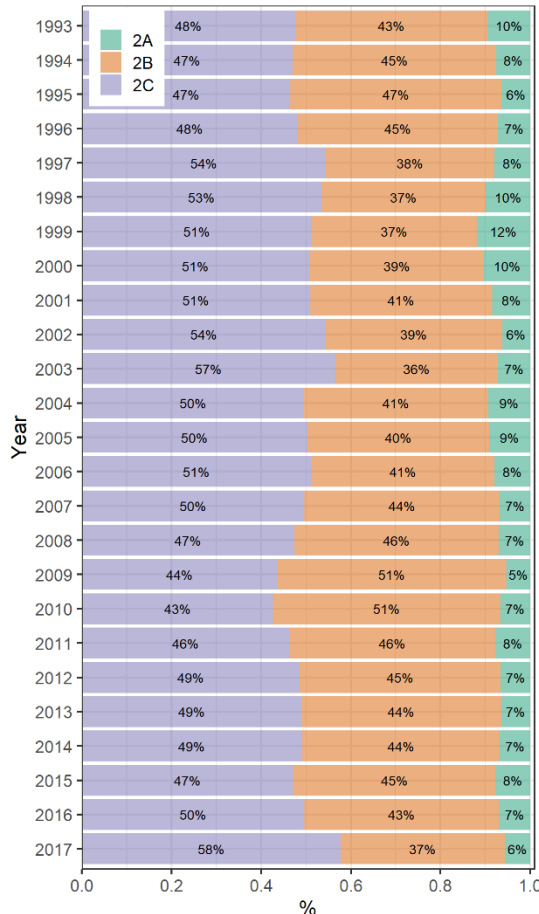
Mean last 5
R2=24%
R3=52%
R4=19%
R4B=4%

Examples of MPs: MP3

- Stock Distribution from coastwide to biological regions:
 - Estimated from the space-time model mean all sizes WPUE indices for each Biological region: average of last 5 years.
- Stock Distribution from biological regions to regulatory areas:
 - Trends in survey WPUE (last 10 years) from all sizes WPUE indices by regulatory area relative to region.



Historical perspective: WPUE all sizes by reg area relative to each biological region



2A=7%
 2B=45%
 2C=48%

3A=80%
 3B=20%

4A=30%
 4CDE=70%

MP3

Management Procedures	MP 1 (current interim)	MP 2	MP 3	MP 4	MP 5
Coastwide TCEY	SPR 30:20 CR No constraint	SPR 30:20 CR maxChange15%	SPR 30:20 CR with SUFD		
Biological Region stock distribution	X	FISS all sizes WPUE; Relative harvest rate (0.75 for regions 4 and 4B).	Estimated from the space-time model mean all sizes WPUE indices for each Biological region: average of last 5 years		
Regulatory Area allocation	FISS O32 WPUE; Relative harvest rate (0.75 for reg area 3B, 4A, 4CDE, and 4B); share-based allocation for area 2B; fixed TCEY for area 2A.	Historical percentages of mortality limit	Trends in WPUE (last 10 years) from all sizes WPUE indices by regulatory area relative to region.		

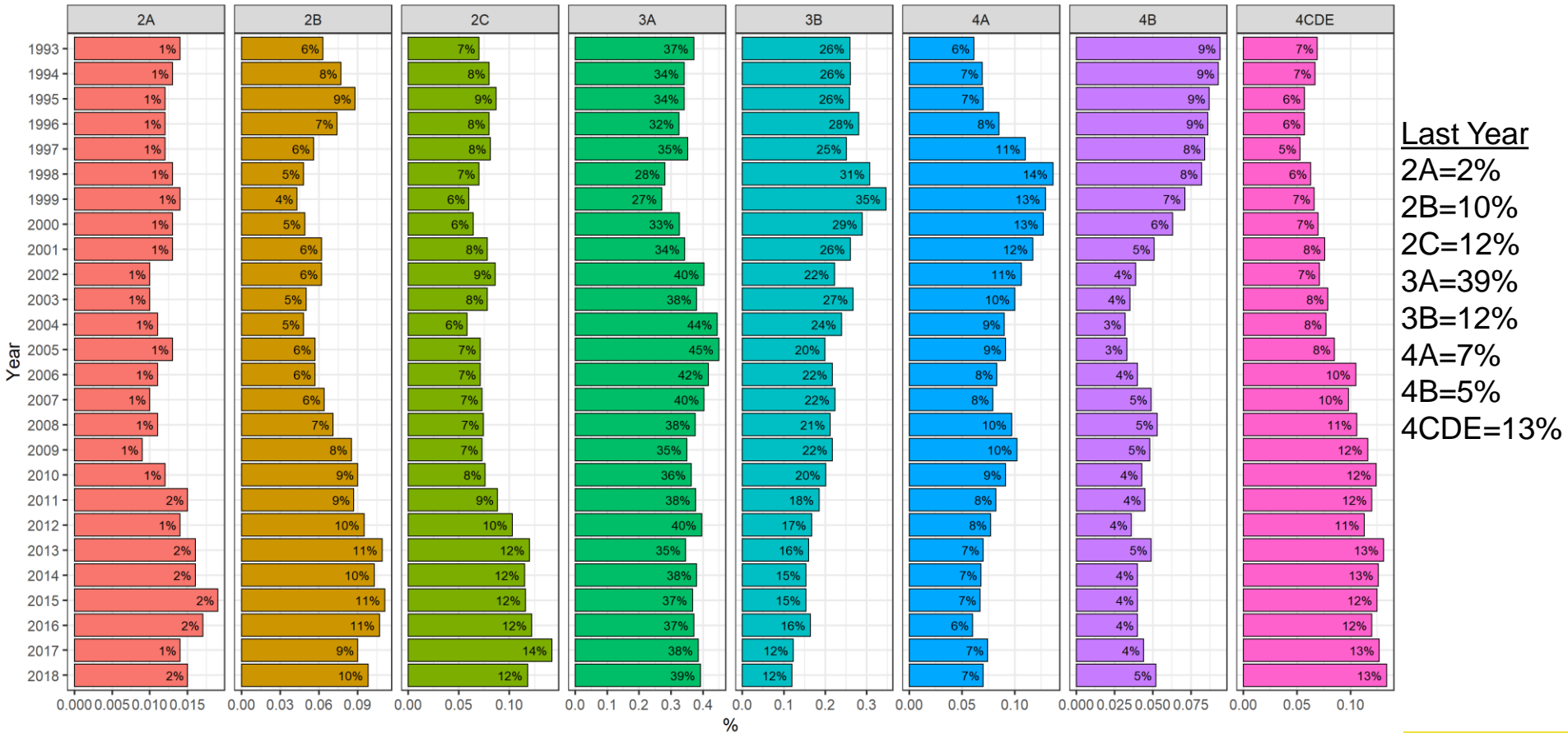


Examples of MPs: MP4

- Stock Distribution from coastwide to IPHC Regulatory Areas:
 - Percentage allocation for each regulatory area based on WPUE all sizes by reg area.
 - Adjusted to satisfy the stability objective of max increase/decrease of 15% for each regulatory area.
 - Not to exceed maximum coastwide FI adjusted by CR.



Historical perspective: WPUE all sizes by reg area


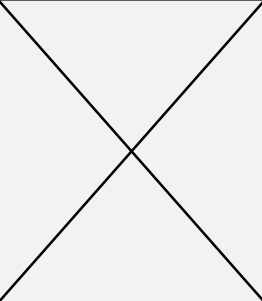



MP4:

Management Procedures	MP 1 (current interim)	MP 2	MP 3	MP 4	MP 5
Coastwide TCEY	SPR 30:20 CR No constraint	SPR 30:20 CR maxChange15%	SPR 30:20 CR SUF D	SPR Max FI (SPR _{MSY}) 30:20 CR No constraint	
Biological Region stock distribution		FISS all sizes WPUE; Relative harvest rate (0.75 for regions 4 and 4B).	Estimated from the space-time model mean all sizes WPUE indices for each Biological region: average of last 5 years		
Regulatory Area allocation	FISS O32 WPUE; Relative harvest rate (0.75 for reg area 3B, 4A, 4CDE, and 4B); share-based allocation for area 2B; fixed TCEY for area 2A.	Historical percentages of mortality limit	Trends in WPUE (last 10 years) from all sizes WPUE indices by regulatory area relative to region.	% allocation for each Reg Area based on all-sizes WPUE; Adjusted to max change of 15% in any given year; Not to exceed maximum coastwide FI adjusted by CR	

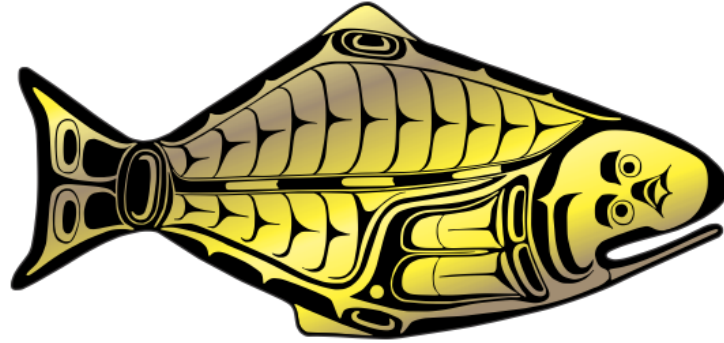


Template for management procedures development

Management Procedures	MP 1 (current interim)	MP 2	MP 3	MP 4	MP 5
Coastwide TCEY 	SPR 30:20 CR No constraint	SPR 30:20 CR maxChange15%			
Biological Region stock distribution		FISS all sizes WPUE; Relative harvest rate (0.75 for regions 4 and 4B).			
Regulatory Area allocation 	FISS O32 WPUE; Relative harvest rate (0.75 for reg area 3B, 4A, 4CDE, and 4B); share-based allocation for area 2B; fixed TCEY for area 2A.	Historical percentages of mortality limit			



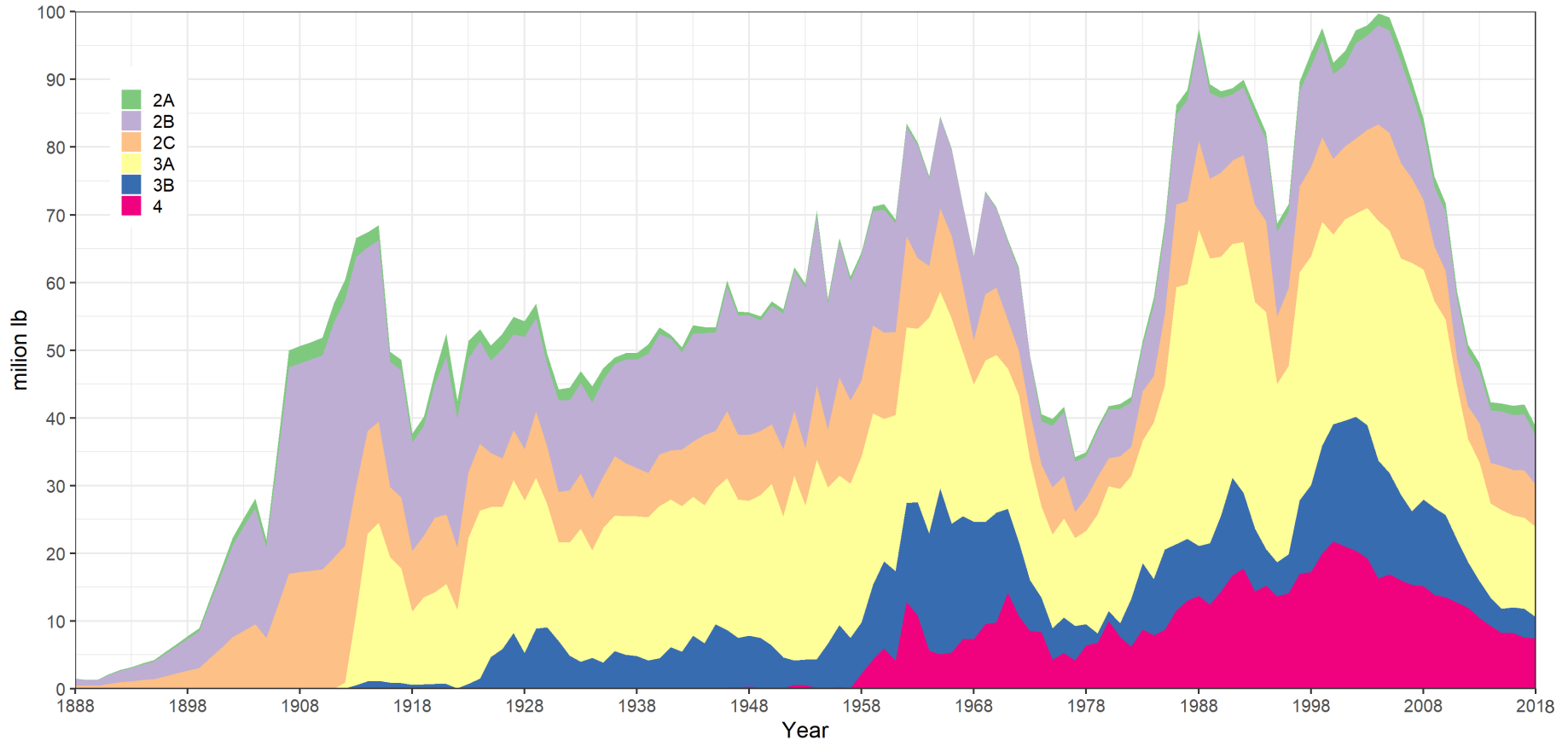
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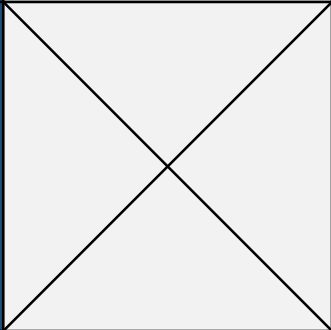



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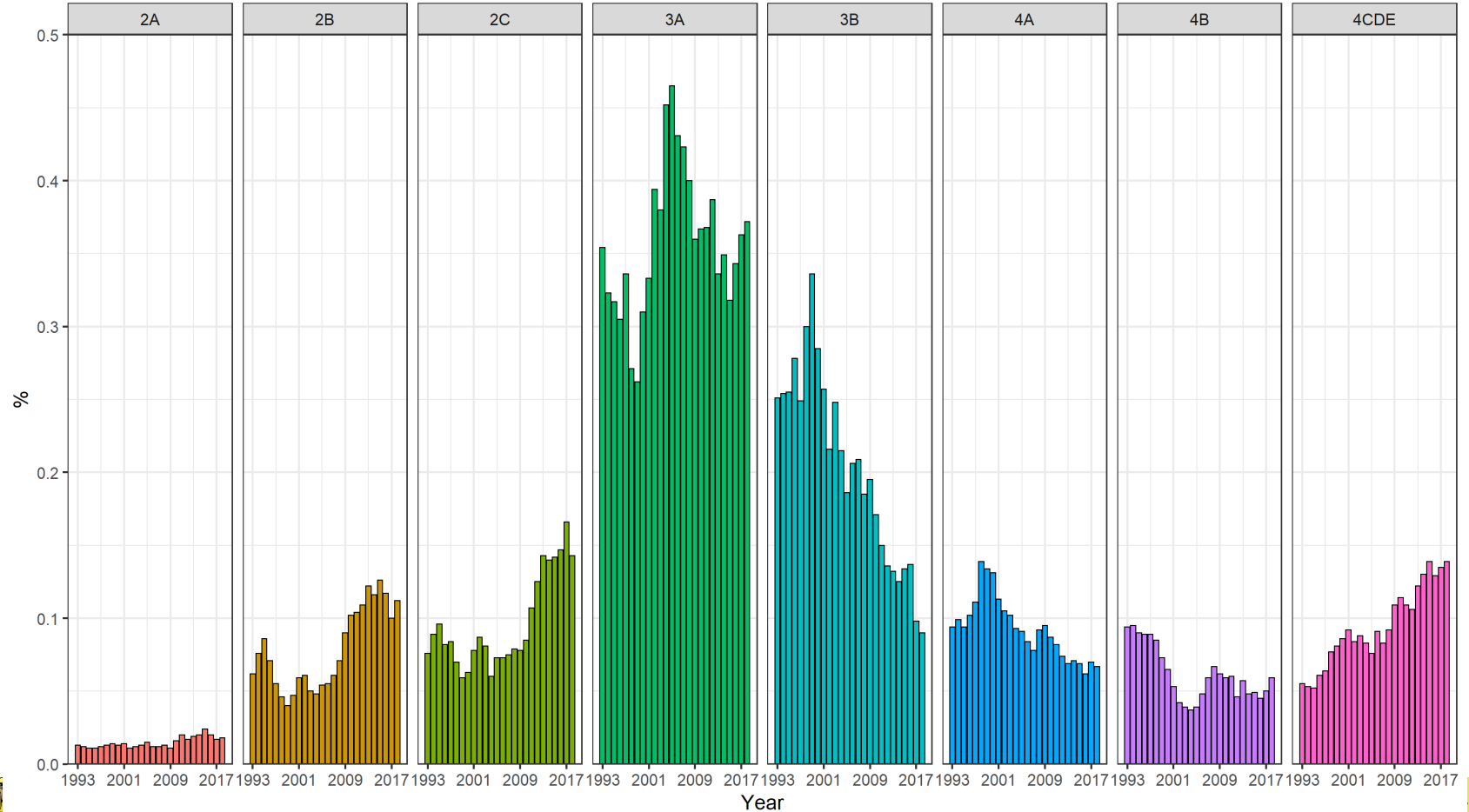


Historical perspective: total removal by reg area

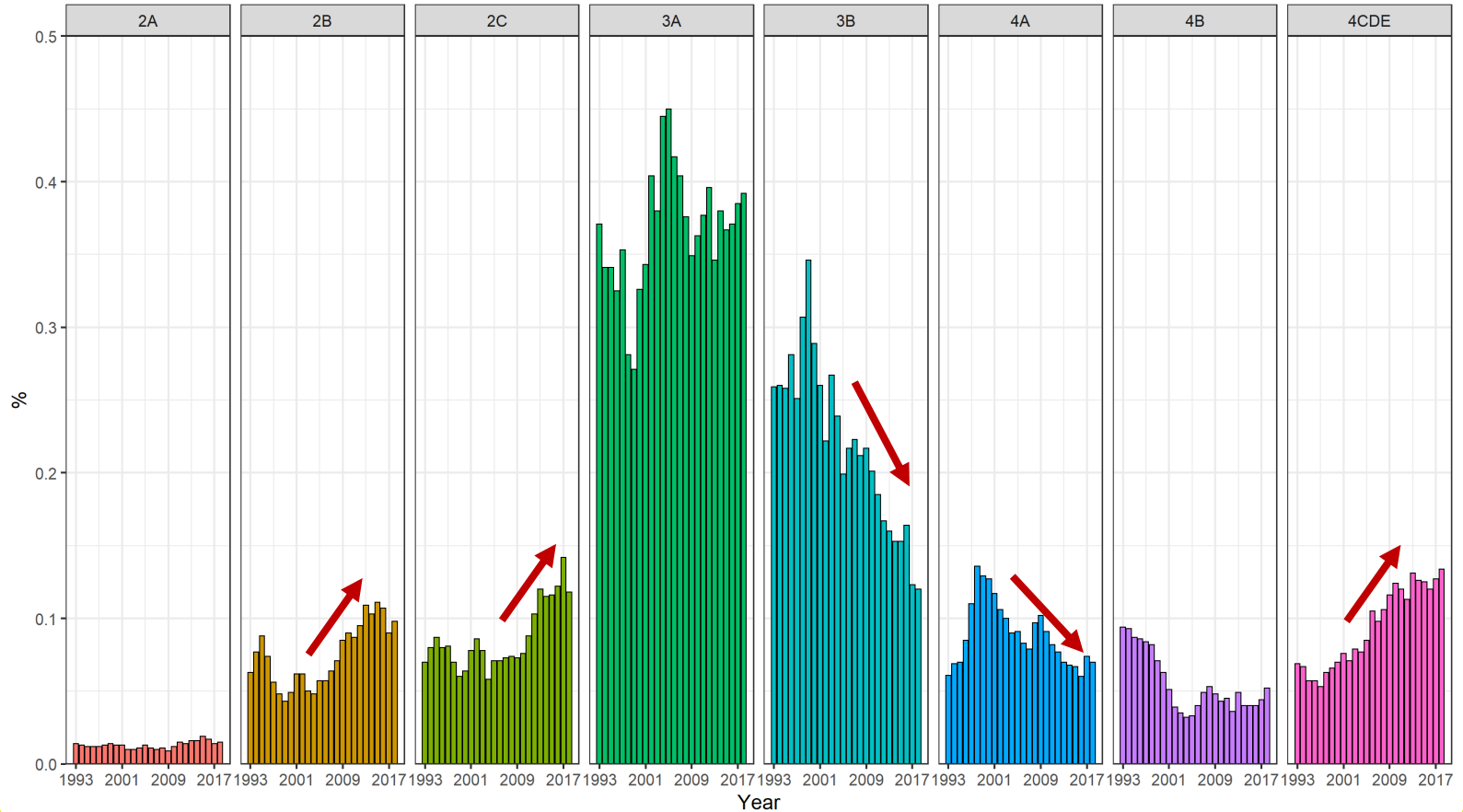


Management Procedures	MP 1 (current interim)	MP 2	MP 3	MP 4	MP 5
Coastwide TCEY 	SPR 30:20 CR No constraint	SPR; 30:20 CR maxChange15%			
Biological Region stock distribution		FISS all sizes WPUE; Relative harvest rate (0.75 for regions 4 and 4B).			
Regulatory Area allocation 	FISS O32 WPUE; Relative harvest rate (0.75 for reg area 3B, 4A, 4CDE, and 4B).	Historical percentages of mortality limit.			

Historical perspective: WPUE O32 by reg area



Historical perspective: WPUE all sizes by reg area



Historical perspective: WPUE all sizes by region

