

47th ANNUAL MEETING OF NAFO - SEPTEMBER 2025

Revised NAFO Precautionary Approach Framework

The Revised NAFO Precautionary Approach Framework is set out below. When implementing this Framework, the Commission should consider a gradual approach, for example if substantial TAC changes are indicated by the Revised Framework or if the required reference points have not yet been established. Further, the Commission and the Scientific Council, through WG-RBMS, should also consider potential refinements of the Framework that may become apparent over time, for example upon application across the NAFO stocks.

NAFO should apply this Precautionary Approach Framework in its fisheries management decision making. This framework defines three Zones (Healthy, Cautious, and Critical) to characterize the status of the stock. These zones are defined by two biomass reference points (B_{lim} and $B_{trigger}$). Within this framework, the limit fishing mortality is defined as $F_{lim}=F_{msy}$, and F_{target} as a fraction of F_{msy} (Fig. 1).

Reference Points could be set as a function of the type of stock being managed. As a first step in the initial implementation of the PAF, the reference points or their best proxies, in the context of Figure 1 are set as follows:

$$F_{target}=0.85 \cdot F_{msy}.$$

$$B_{lim} = 0.30 \cdot B_{msy}$$

$$B_{trigger} = 0.75 \cdot B_{msy}$$

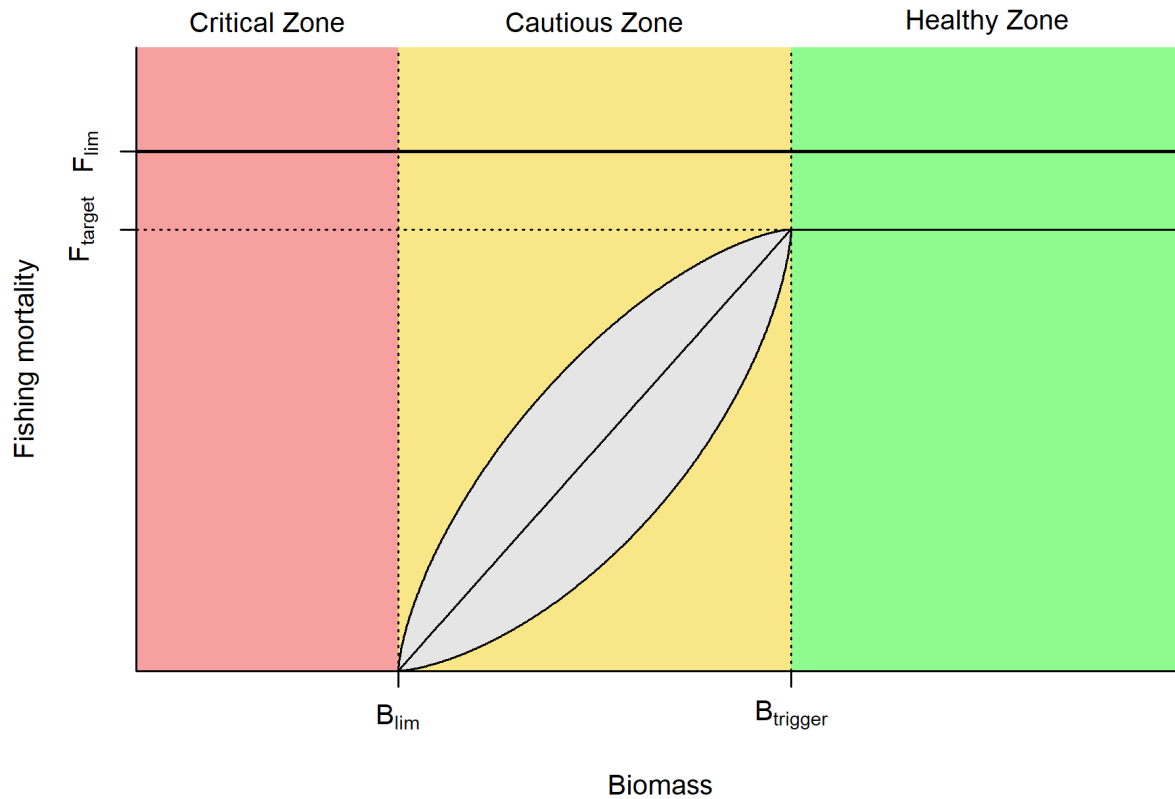


Figure 1. Schematic representation of the NAFO Precautionary Approach, including the leaf space to define fishing levels within the Cautious Zone.

Commission

Management decisions by the Commission within these zones will be informed as follows:

Healthy Zone:

In establishing an F for a stock in the Healthy Zone, the Commission should be informed by a range of options at, above, and below F_{target} , and associated risks, provided by the Scientific Council (Table 2) aimed at keeping the stock in the healthy zone.

Cautious Zone:

F should be generally managed within the boundaries of the leaf space defined by the structure of the PAF (Figure 1, Appendix 1).

Generally, the Commission should adopt an F that achieves the following policy objectives depending on stock trajectory and relative position in the cautious zone (Table 1).

Table 1.

Focus of management action within Cautious Zone		Stock status in the Cautious Zone	
		Low level	High level
Stock trajectory in the Cautious Zone	Decreasing Trend	Reduce risk of further stock decline	Mitigate stock decline
	Increasing Trend	Promote stock growth with high certainty	Promote stock growth

These focal elements for management actions are intended to articulate an increasing risk avoidance in management actions as the stock gets closer to B_{lim} . Overall, the intent is to avoid falling below B_{lim} .

Critical Zone:

F should be set as low as possible. In establishing F, the Commission should be informed by the range of options and associated risks provided by the Scientific Council (Table 2). The primary focus of management should be to rebuild the stock out of the Critical Zone.

Scientific Council

The role of Scientific Council is to inform Commission's decision of where F should be set by characterizing the consequences of alternative management actions. These consequences would be typically described in terms of the status of the stock and F levels as:

- Probability of $B > B_{trigger}$ within e.g. 1,2,3 years (depending on the stock)
- Probability of $B < B_{lim}$ within e.g. 1,2,3 years (depending on the stock)
- Probability of $B_{future} > B_{current}$ ($B_{future} = 1,2,3$ years depending on stock) including indication of magnitude of this growth.
- Probability of $F > F_{lim}$
- Probability of $F > F_{target}$

To inform the Commission's decision, SC would also provide:

- Current stock status and confidence intervals
- Recent trajectory of the stock

Whenever deemed necessary by the Scientific Council, interpretations of the consequences of fishing options and/or any additional considerations and advice that may be relevant for the management decision should also be provided. SC should not be prescriptive among the options in its advice.

SC should provide the Commission with a risk-based table that would indicate the risks/probabilities associated with the items indicated above, based on available information. The F levels to consider would depend on the Zone where the stock status falls, and generally would follow the template table indicated below.

Table 2. The Revised NAFO Precautionary Approach Framework risk table.

y current year (year in which the assessment is made, data until year *y*-1)

	Yield			P(F>F _{lim})			P(B<B _{lim})				P(F>F _{target})			P(B<B _{trigger})				P(By+3 > By)	(By+3-By)/By
F in <i>y</i> +1 and following years	Yield <i>y</i> (50%)	Yield <i>y</i> +1 (50%)	Yield <i>y</i> +2 (50%)	<i>y</i>	<i>y</i> +1	<i>y</i> +2	<i>y</i>	<i>y</i> +1	<i>y</i> +2	<i>y</i> +3	<i>y</i>	<i>y</i> +1	<i>y</i> +2	<i>y</i>	<i>y</i> +1	<i>y</i> +2	<i>y</i> +3		
Critical Zone																			
F=0	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
F=X% current*	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
F current	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Cautious Zone																			
F lower edge leaf	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
F midrib leaf	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
F upper edge leaf	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Healthy Zone																			
F=0.75F _{msy}	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
F _{target} =0.85F _{msy}	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
F _{lim} =F _{msy}	t	t	t	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%

*X% may vary stock by stock. In the future, this framework may be modified to include F bycatch.
The number of years in the risk projections table will be the same as the years of advice.

Appendix 1. Implementation of the leaf HCR

The Leaf HCR represents a space within the Cautious Zone of the NAFO Precautionary Approach Framework (PAF) that bounds the F levels to be considered by Scientific Council in its advice to the Commission.

The Leaf HCR space is defined by a generalized formulation for the edges of the leaf, where the upper or lower edges of the leaf HCR can be obtained by defining $F_t = f(B_t)$ as:

$$F_t = \frac{a^*(B_t - B_{lim})}{(B_x^* - B_{lim}) + (B_t - B_{lim})} \quad \text{Eq. 1}$$

where B_x^* is defined for the upper (B_x^{up}) and lower leaf (B_x^{low}) functions as:

$$B_x^* = B_{lim} + \left[\frac{(B_{50}^* - B_{lim})(B_{trigger} - B_{lim})}{(B_{trigger} - B_{lim}) - 2(B_{50}^* - B_{lim})} \right] \quad \text{Eq. 2}$$

where B_{50}^* , defined for the upper (B_{50}^{upper}) and lower (B_{50}^{lower}) leaf edge functions, controls the width of the leaf. In order to maintain a symmetric leaf shape B_{50}^* needs to be set in a “complementary” way in the upper and lower edge functions.

To facilitate the setup of the leaf width, B_{50}^* has been implemented as determined by X_{50}^* , i.e. $B_{50}^* = X_{50}^*(B_{trigger} - B_{lim}) + B_{lim}$, where X_{50}^* represents the fraction within the $B_{lim} - B_{trigger}$ range where the B_{50}^* is located. For the upper leaf edge function, X_{50}^{upper} must fall between 0 and 0.5, while for the lower leaf edge function X_{50}^{lower} must fall between 0.5 and 1. As mentioned above, to maintain the symmetry of the NAFO Leaf HCR the two X_{50}^* must be “complementary” in the sense that $X_{50}^{lower} = 1 - X_{50}^{upper}$.

Using B_x^* from Eq. 2, a^* can then be calculated for both the upper (a^{up}) and lower (a^{low}) leaf edge functions as:

$$a^* = \frac{F_{target} [(B_x^* - B_{lim}) + (B_{trigger} - B_{lim})]}{(B_{trigger} - B_{lim})}. \quad \text{Eq. 3}$$

The Revised NAFO PAF has adopted a middle width leaf for its initial implementation, corresponding to:

$$X_{50}^{lower} = 0.75$$

$$X_{50}^{upper} = 0.25$$