Reference points

fish5109pa Principles of utilization: The precautionary approach

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Background to Reference Points

Reference points are designed to give indications of appropriate fishing mortality or biomass levels, whether target values or values to be avoided.

Figure : Role of limit reference points (Limit RP) and precautionary reference points (Prec. RP) in relation to over fishing.

Types of Reference Points

3 major types of reference points:

- Limit reference points
- Precautionary reference points
- Target reference points

Statistical Background to Reference Points

Reference points are calculated based off of:

- size of fish caught
- natural mortality rate (M)
- total mortality rate (Z)
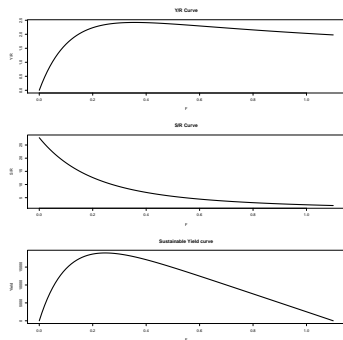- recruitment (R)
- economic considerations

Figure : Yield per recruit curve
(Y/R Curve), stock per recruit curve
(S/R Curve), and sustainability yield
curve from simulated data.

Limit reference points

The most common limit reference point is F_{crash}:

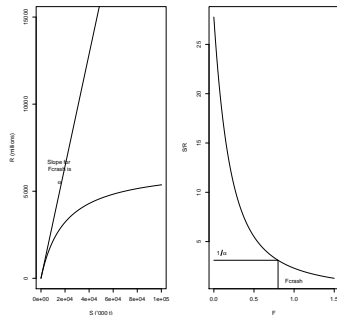F_{crash}=fishing mortality corresponding to stock collapse

Figure : Simulated stock-recruitment curve with the replacement live for F_{crash}.

Precautionary reference points

Precautionary reference points are set to ensure that annual fishing mortality should, on average, not exceed F_{PA}.

$$F_{PA} = F_{lim} \times e^{(-1.645 \times \sigma)}$$

|	Double danger: Overfished and overfishing	Overfishing and danged of overfished	Overfishing
Flim			
	Danger of overfishing and overfished	Danger of overfishing and of overfished	Danger of overfishing
Fpa			
	Overfished		Acceptable region, in accordance with PA
	Blim		Bpa

Figure : The relationship between F_{PA} and F_{lim}. If the fishing mortality associated with F_{PA} is exceeded the fish stock is in danger of being overfished.

Target Reference Points

The most common target reference points are $F_{0.1}$ and F_{MSY}:

$F_{0.1}$ = 10% of the slope of the Y/R curve at its origin
F_{MSY} = the F at which, if sustained, would result in maximum sustained yield
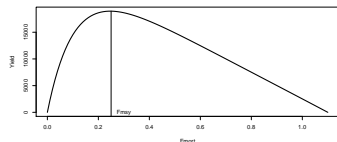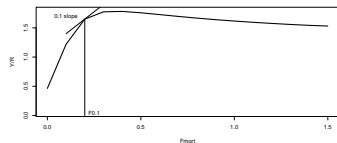
Reference Points in Advice

Management should choose F_{target}!
But, what if they do not?
What if management does not choose F_{PA}?
Advice needs to be in accordance with the PA!