

Marine Strategy Framework Directive Consultation: UK Initial Assessment and proposals for Good Environmental Status

Impact Assessment Annex D

Western Channel sole

Stock and recruitment

Figure 1 presents the sole time series of recruitment at age 1 used by the ICES WGCSE working group. Recruitment throughout the assessed time series has been relatively stable with occasional improved year classes. Figure 2 presents the stock and recruitment paired estimates; there is no clear relationship of recruitment with stock abundance although historically high abundance year classes were more frequent at higher stock size.

Fishing mortality scenarios

Fishing mortality for Western Channel sole is currently ($F = 0.247$) below F_{MSY} (0.27). Consequently, fishing mortality for Western Channel sole could be increased to meet the MSY target. In the Western Channel, sole are caught in a mixed-fishery with plaice. Western Channel plaice mortality rates currently ($F = 0.45$) exceed the F_{MSY} target ($F = 0.19$) by a factor of more than 2. Consequently, it could be envisaged that the fishing effort exerted on sole is driven by the management used to control the mortality rates of the lower value plaice. Three alternative fishing mortality scenarios are explored (Figure 3):

- 1) No change in the sole exploitation level – status quo fishing mortality at the current level (the black line)
- 2) An increase in fishing mortality to the current ICES F_{MSY} framework target mortality of $F = 0.27$ (the purple line)
- 3) Within its F_{MSY} advice, ICES has a target for Western Channel plaice mortality of $F = 0.19$. Consequently, the impact of reductions in the plaice mortality rate on sole mortality is represented by a 10% decrease in fishing mortality per annum until the target for Western Channel plaice is achieved (the green line)

Discarding scenarios

Discarding of Western Channel sole is negligible, consequently, no projections of discarding are presented for this stock.

Output

Percentiles of fishing mortality, spawning biomass, recruitment and landings for a run of the model for 30 years are included for the options:

- a. Status quo fishing mortality in the future
- b. F_{MSY} framework mortality of $F = 0.27$
- c. A 10% annual reduction in fishing mortality until the Western Channel plaice F_{MSY} target of $F = 0.19$ is reached

Figures 3 – 5 present the realised fishing mortality, spawning stock biomass and landings outcomes for each scenario.

Discussion

Historically, the stock achieved a relatively higher spawning stock biomass at the average level of recruitment as fishing mortality was lower during the early 1970's before effort increased with the advent of beam trawling. Consequently, there is potential for the stock to rebuild to high levels if fishing mortality is reduced to the value that corresponds to the F_{MSY} of Western Channel plaice.

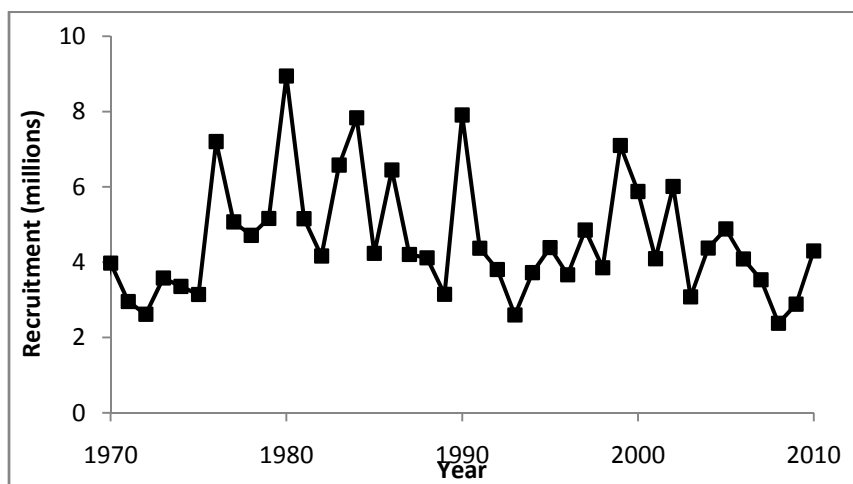


Figure 1. The time series of Western Channel sole recruitment at age 1, illustrating the sporadic nature of recruitment for this stock. Recruitment has been fluctuating without a distinct temporal trend.

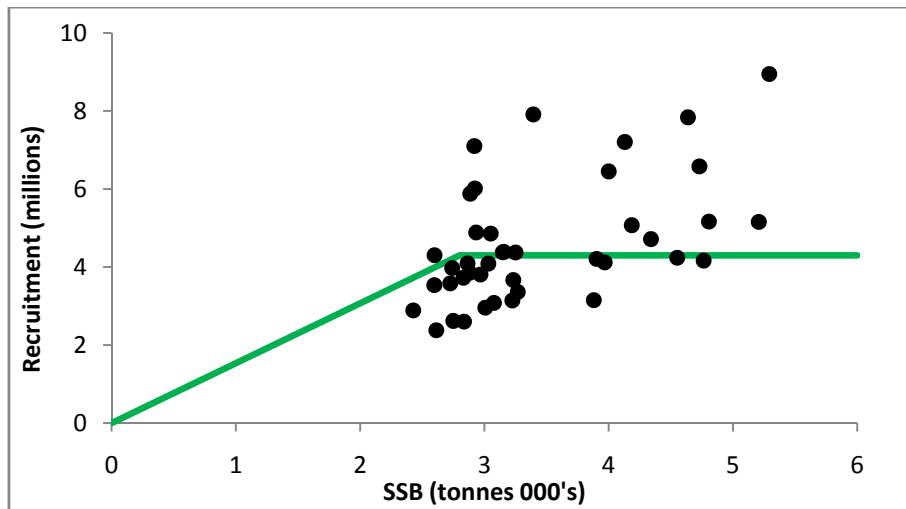


Figure 2. Stock-recruitment estimates for Western Channel sole. Recruitment and spawning stock biomass were positively related between 1969 and 2010 ($r^2 = 0.26$; $P = 0.0003$; $n = 41$). Note that the green reference line indicates geometric mean recruitment and $MSY B_{trigger}$.

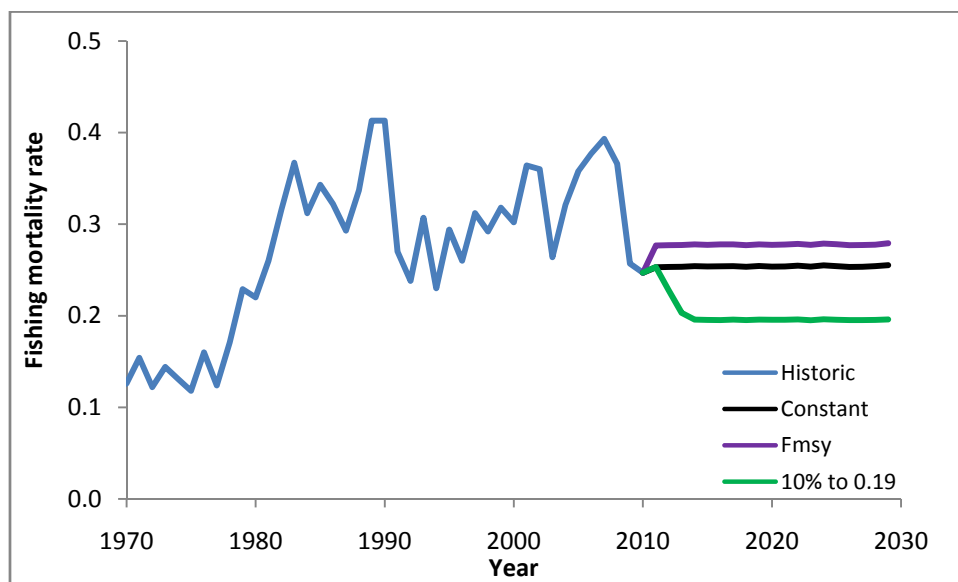


Figure 3. Western Channel sole historic and representative future fishing mortality scenarios; black line – continued exploitation at the current level, purple line – an increase in fishing mortality to reach the F_{MSY} target of $F = 0.27$, green line – 10% reductions in fishing mortality per annum to achieve the Western Channel plaice F_{MSY} target of $F = 0.19$.

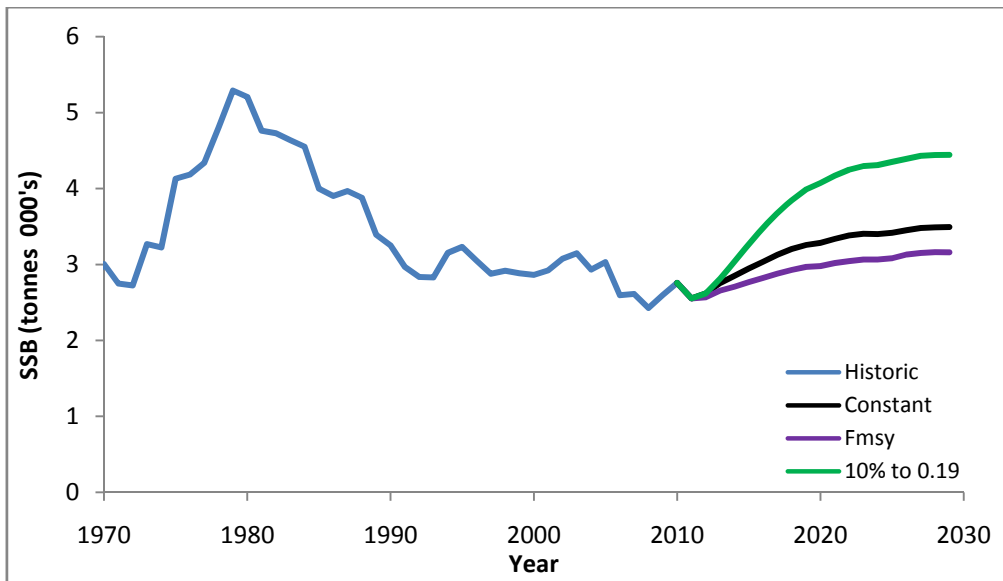


Figure 4. Western Channel sole historic and projected spawning stock biomass; black line – continued exploitation at the current level, purple line – an increase in fishing mortality to reach the F_{MSY} target of $F = 0.27$, green line – 10% reductions in fishing mortality per annum to achieve the Western Channel plaice F_{MSY} target of $F = 0.19$.

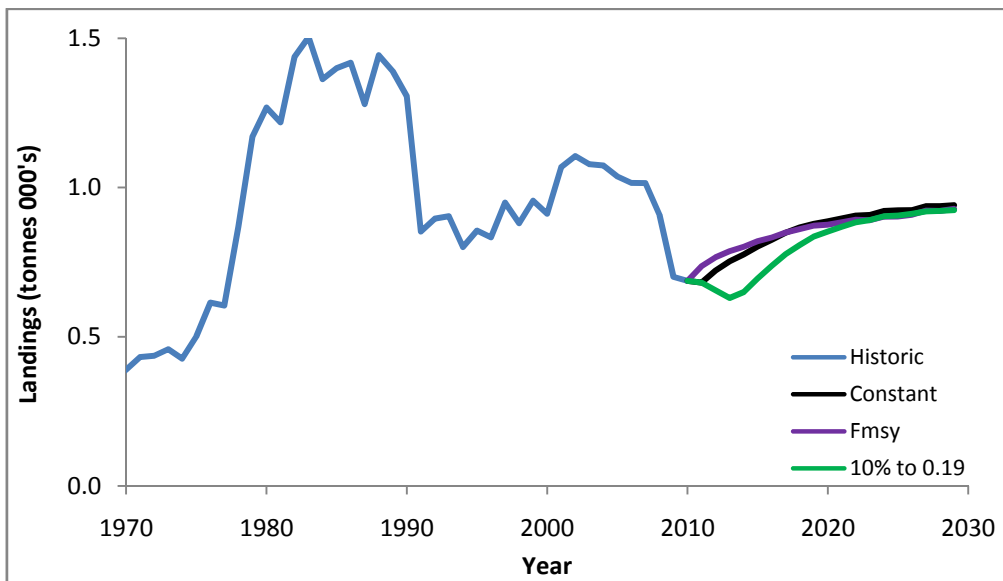


Figure 5. Western Channel sole historic and projected landings; black line – continued exploitation at the current level, purple line – an increase in fishing mortality to reach the F_{MSY} target of $F = 0.27$, green line – 10% reductions in fishing mortality per annum to achieve the Western Channel plaice F_{MSY} target of $F = 0.19$.