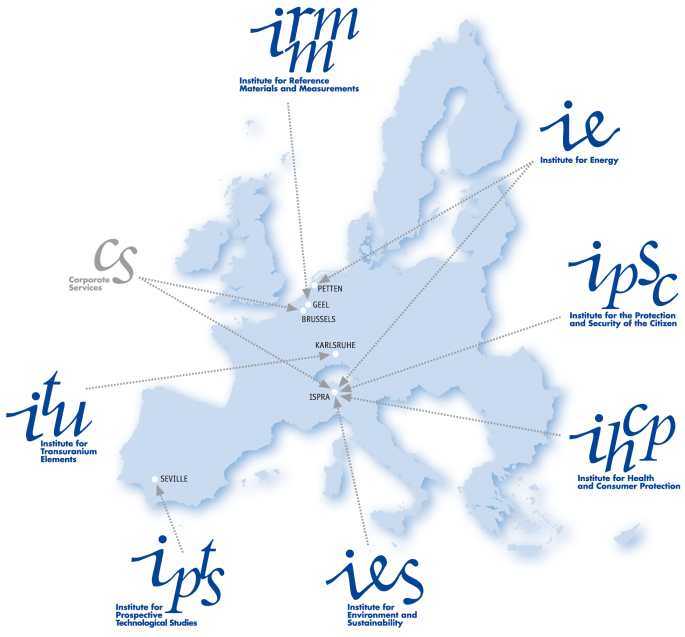
A4A

Review Methods data poor stocks



Chato Osio, Iago Mosqueira, Ernesto Jardim
Maritime Affairs-IPSC

Table of Contents

Introduction

- Alvaro Abella (GFCM 2011) revised and tested different approaches to assessment of data poor stocks which is a common problem in the Mediterranean Sea.
- Methods have been classified on the basis of data needs, input/output parameters, reference points, complexity and available software.
- Productivity-Susceptibility Analysis

Summary of Tools for the assessment of the exploitation status

Method	Data Sources	Input Parameters	Output Parameters	Reference Points	Software	Complexity
Statistical catch-at-age	Commercial data	Total catch by age M, terminal F	F vector, Numbers at age, Recruitment	Trends	XSA(Lowestoft) VPA (NOAA) others	High
Surplus Production Models	Commercial data	Catch and effort or Catch and Biomass	r, K, q, F per year etc	fMSY FMSY BMSY	ASPIC (NOAA) Spreadsheet (GFCM) CEDA (FAO)	Medium
Yield per Recruit S/R	Parameters derived from biological sampling studies	Linf, K to L/W, a and b, M, Lc or selectivity Lm or maturity ogive	Y/R vs F, SSB/R vs F	F0.1, Fmax, Fx%SSB	FISAT (FAO) YIELD (FAO) YPR length/age (NOAA)	Low
Life tables and Leslie matrices	Biological sampling	Fecundity at age, Survival at age, M	r net reproductive rate, generation time etc	Frepl (r=0)	CSIRO PopTools	Low

Summary of Tools for the assessment of the exploitation status

Method	Data Sources	Input Parameters	Output Parameters	Reference Points	Software	Complexity
Surplus Production Models (survey data)	Trawl surveys size structure by year and CPUE	M, Z and index of abundance	r, B' (index of Carrying capacity)	FMSY	Excel spreadsheets files	Low
Mortality estimates (trawl surveys)	Trawl surveys size distribution by year	Size distributions, M catchability at age	Z, tm, F, Recruitment per year, SSB per year	Trends	SURBA (C. Needle)	Low
LCA	Commercial catch	Size distribution of commercial catch, M, growth parameters	Vector of F, Numbers at sea, recruitment	Trends	VIT (Lleonart) FISAT (FAO) LFDA (CEFAS)	Low
Collie-Sissenwine method	Commercial catch and surveys data	Catch by age and abundance indices of trawl surveys separated by recruits and older inds.	Abundance and mortality rates	Trends	CSA (NOAA)	Medium

Productivity-Susceptibility Analysis

- The vulnerability of a stock to becoming overfished can be defined as a function of its productivity (the capacity of the stock to produce MSY and to recover if the population is depleted) and its susceptibility to the fishery (the potential for the stock to be impacted by the fishery, which includes direct captures, as well as indirect impacts to the fishery) (Stobutzki et al. (2001), Hobday et al. (2004) and Rosenberg et al.(2007)).
- PSA analysis combines these two aspects and is proving to be a useful tool in the real data poor stocks or in cases decisions need to be taken about prioritizing stocks to be assessed or put under some harvest control rule.

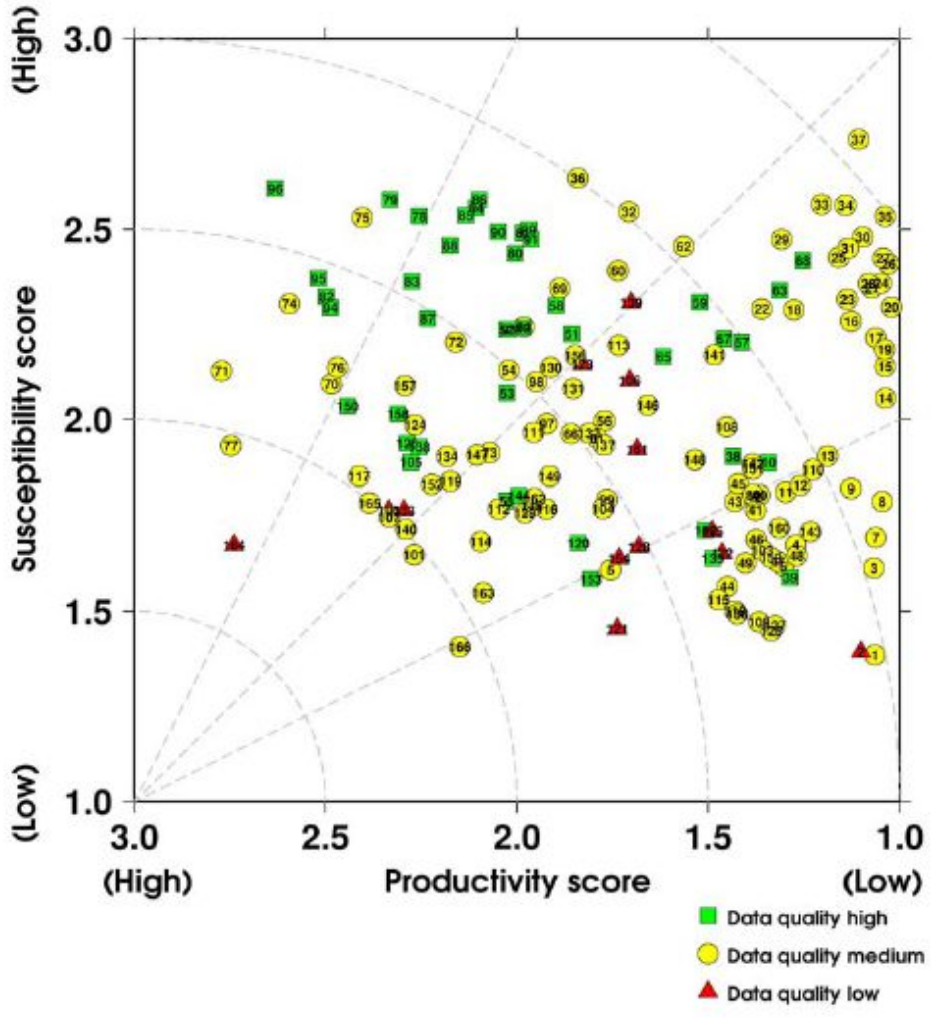
PSA-Susceptibility Scoring

Description	High	Moderate	Low
Management Strategy	Targeted stocks do not have catch limits or accountability measures; Non-target stocks are not closely monitored.	Targeted stocks have catch limits and reactive accountability measures	Targeted stocks have catch limits and proactive accountability measures; Non-target stocks are closely monitored.
Areal Overlap	$>$ 50% of stock occurs in the area fished	Between 25% and 50% of the stock occurs in the area fished	$<$ 25% of stock occurs in the area fished
Geographic Concentration	stock is distributed in $<$ 25% of its total range	stock is distributed in 25% to 50% of its total range	stock is distributed in $>$ 50% of its total range
Vertical Overlap	$>$ 50% of stock occurs in the depths fished	Between 25% and 50% of the stock occurs in the depths fished	$<$ 25% of stock occurs in the depths fished
Fishing rate relative to M	$>$1	0.5 - 1.0	$<$0.5
Biomass of Spawners (SSB) or other proxies	B is $<$ 25% of B0 (or maximum observed from time series of biomass estimates)	B is between 25% and 40% of B0 (or maximum observed from time series of biomass estimates)	B is $>$ 40% of B0 (or maximum observed from time series of biomass estimates)
Seasonal Migrations	Seasonal migrations increase overlap with the fishery	Seasonal migrations do not substantially affect the overlap with the fishery	Seasonal migrations decrease overlap with the fishery
Schooling/Aggregation and Other Behavioral Responses	Behavioral responses increase the catchability of the gear [i.e., hyperstability of CPUE with schooling behavior]	Behavioral responses do not substantially affect the catchability of the gear	Behavioral responses decrease the catchability of the gear
Morphology Affecting	Species shows high selectiv-	Species shows moderate se-	Species shows low selectiv-

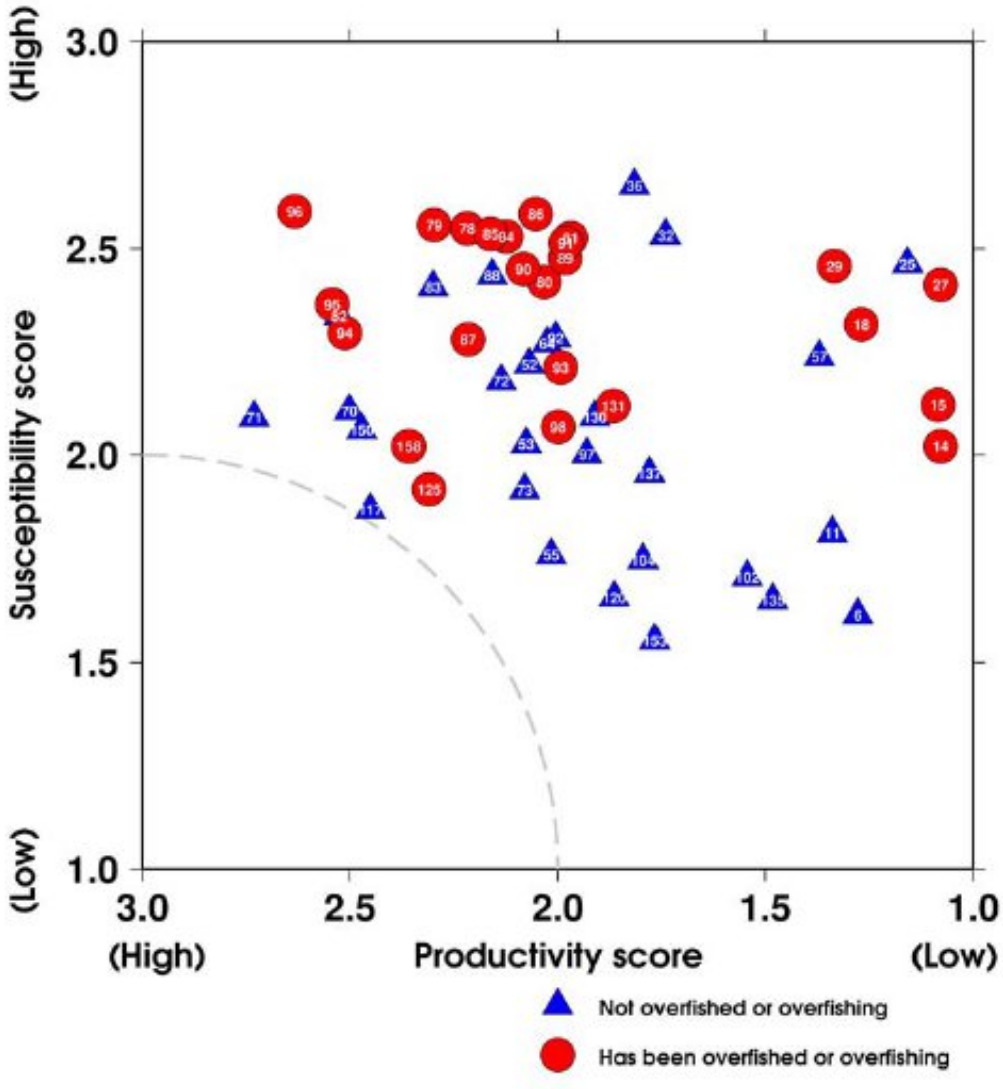
PSA-Productivity Scoring

Description	High	Moderate	Low
r	>0.5	0.5-0.16 (mid-point 0.10)	<0.16
Maximum Age		10-30 years (mid-point 20)	> 30 years
von Bertalanffy Growth Coefficient (k)	> 0.25	0.15-0.25 (mid-point 0.20)	< 0.15
Estimated Natural Mortality	> 0.40	0.20-0.40 (mid-point 0.30)	< 0.20
Measured Fecundity	> 10e4	10e2-10e3	< 10e2
Breeding Strategy	0	between 1 and 3	?4
Recruitment Pattern	highly frequent recruitment success	moderately frequent recruitment success	infrequent recruitment success
Age at Maturity	< 2 years	2-4 years (mid-point 3.0)	> 4 years
Mean Trophic Level	<2.5	2.5-3.5 (mid-point 3)	>3.5
Maximum Size	< 60 cm	60-150 cm (mid-point 105)	>150 cm

PSA Results for 166 US stocks



PSA Results for subset 50 US stocks



Conclusions

- In GFCM models description some methods have been tested, however no comparison across methods and validation was performed.
- General Agreement on use of PSA in real data poor situations.
- For not so poor data situations, need to compare performance across different methods to verify robustness and consistency.