Working Group (WG3) on related issues of the GFCM

Marseille, April 18, 2012

A specific case study on the assessment of the European hake shared stock in the South Adriatic sea as part of the activities of the STECF-EWG group on fish stock evaluation in the Mediterranean and of the Sub-Committee of Stock Assessment (SCSA-SAC) of GFCM

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COISPA Tecnologia & Ricerca
Stazione Sperimentale per lo Studio delle Risorse del Mare

Topics on STECF 2011 agenda

- Review of scientific advice
- Mediterranean Assessments
- …..

EWG-STECF initiated a more regular stock assessment activity since 2008

Commission Decision
of 26 August 2005 (2005/629/EC)

Scientific, Technical and Economic Committee for Fisheries - STECF

consulted at regular intervals on:
✓conservation and management of living aquatic resources
(including biological, economic, environmental, social and technical considerations).

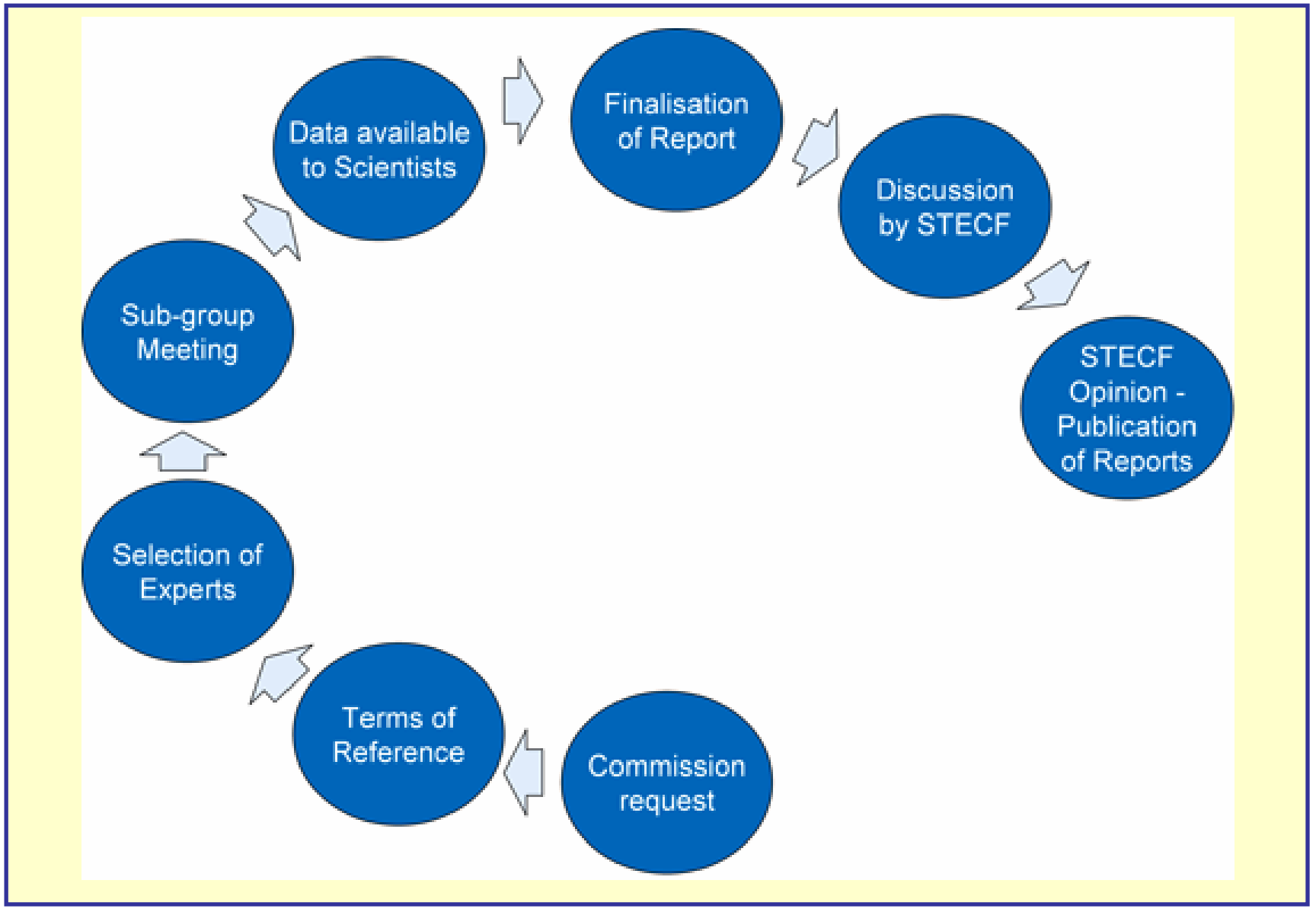
✓ members chosen by the Commission
✓ meets three times a year in Plenary Session

Expert Working Groups

✓ no fixed participation
- participants chosen according to issue to be discussed
- at least two Members of STECF

✓ Expert Working Group reports to the STECF
- usually at plenary sessions
- or by correspondence

Work flow


Commission request
Terms of Reference
Selection of Experts
Sub-group Meeting
Data available to Scientists
Finalisation of Report
Discussion by STECF
STECF Opinion - Publication of Reports

STECF Working Groups – DCR/F data calls

Some principles and rules

- ✓ Independence (e.g. scientists participate individually on their own capacity and do not as representative of institutions, etc..)
- ✓ Transparency (e.g. all the evaluation process should be documented and justified)
- ✓ Confidentiality (e.g. no use of data received at the WG can be done outside the WG)
- ✓ Any conflict of interest should be declared

STECF Working Groups – DCR/F data calls

Some principles and rules

✓EWG report has to be evaluated by the STECF before becoming official and be published (including the comments of the STECF).

✓all STECF Expert Working Group meetings are open to observers, except if the STECF board has previously expressed a different point of view.

✓The Expert Working Group is a working group of independent scientists that helps prepare the ground for an STECF opinion. Do not in any way imply that the opinion of the Expert Working Group is that of the STECF itself.

Final reports accessible through:

Dedicated STECF report section on web site (https://stecf.jrc.ec.europa.eu/reports)

Road map of the evaluation process

Analyses of the DCF data delivered through the Data call at the WG, using the more suitable and agreed methods, preferably in comparison

Discussion and evaluation of the results in the WG plenary

Endorsement of the analysis by the WG and preparation of the report

Endorsement of the report by the STECF

Presentation of the analysis performed within the Regional Projects (e.g. AdriaMed, etc…), or making the analysis using data delivered to the WG by filling in specific forms

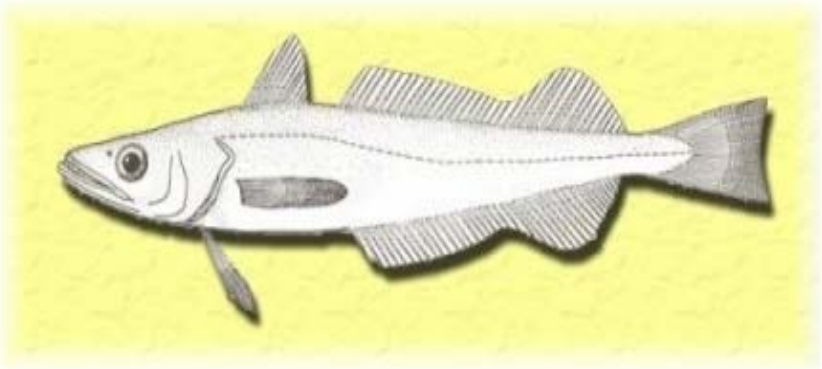
Discussion and evaluation of the results in the WG plenary

Endorsement of the analysis by the WG and preparation of the summary for the SCSA

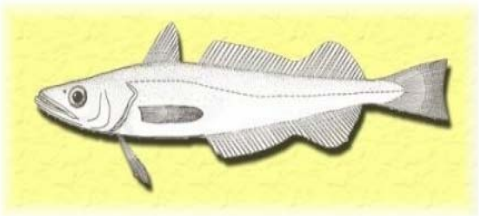
Endorsement of the analysis by the SCSA

Assessment conducted within AdriaMed, presented and approved at WG demersal, in October 2011 and endorsed by SCSA (GFCM) in January 2012

Assessment submitted also to the EWG_STECF discussed and approved by the WG and subsequently by STECF



Assessment and predictions of stock productivity and fisheries sustainability for M. merluccius in the GSA 18 –South Adriatic Sea

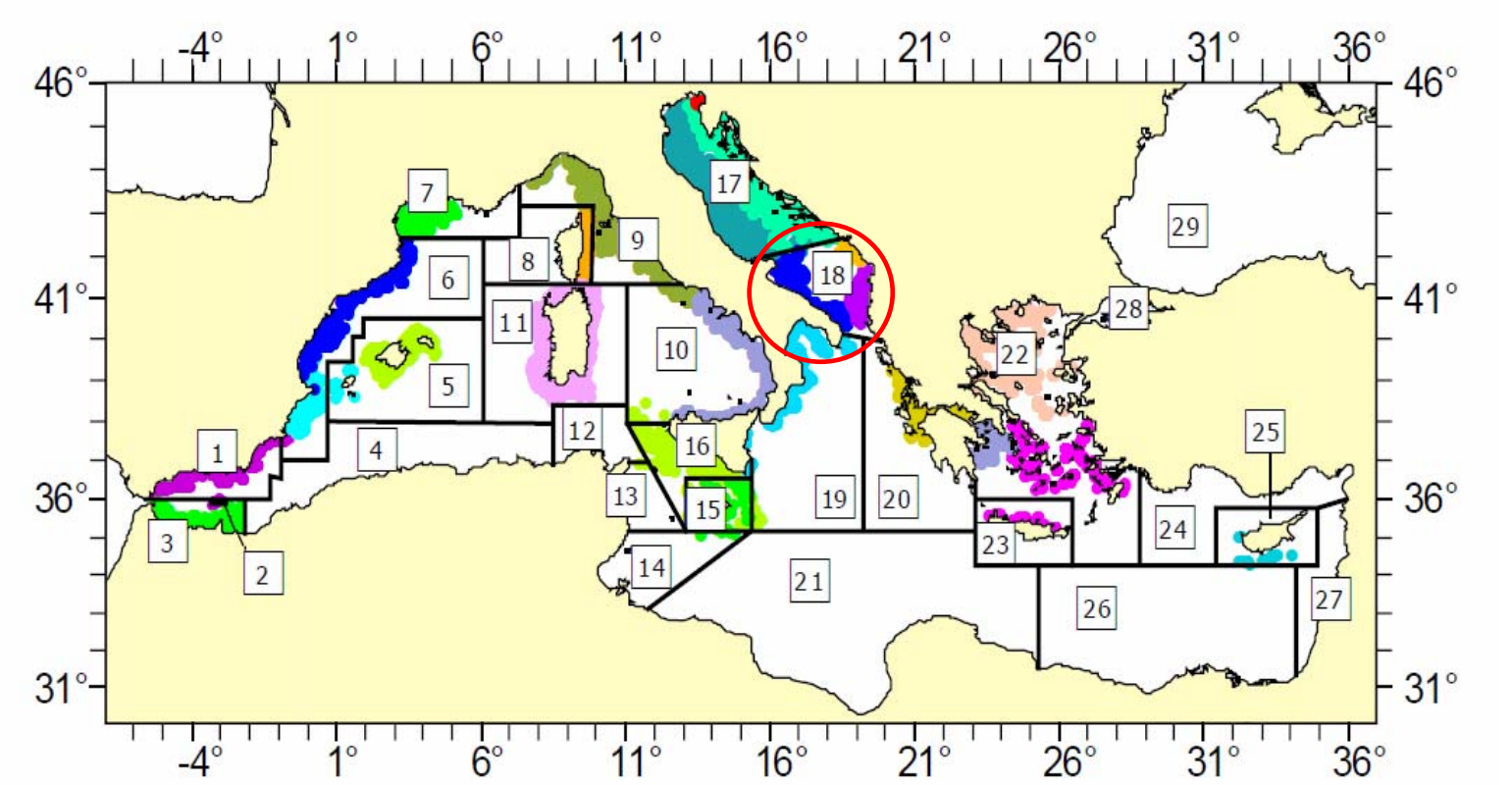


The joint assessment comes from a transnational collaboration within the framework of AdriaMed project.

Spedicato M.T.[1], Bitetto I.[1], Lembo G.[1], Carbonara P.[1], Casciaro L.[1], Facchini M.T.[1], Milone N.[2], Ceriola L.[2], Joksimovic A.[3], Ikica Z.[3], Kasalica O.[3], Kolitari J.[4], Gjurgji I.[4], Kroqi G.[4]

[1]COISPA Tecnologia & Ricerca, Bari, Italy
[2]ADRIAMED (FAO)
[3]Institute of Marine Biology, Kotor, Montenegro
[4]University of Agriculture, Tirana, Albania,

Study area – South Adriatic sea



The stock of European hake was assumed in the boundaries of the whole Geographical Sub Area 18 (GSA18) , where it inhabits depths from several meters in the coastal area down to 800 m in the South Adriatic Pit.

Fishery

European hake is one of the most important species in the GSA18 representing about 20% of landings from trawlers.

Trawling represents the most important fishery activity in the southern Adriatic Sea.

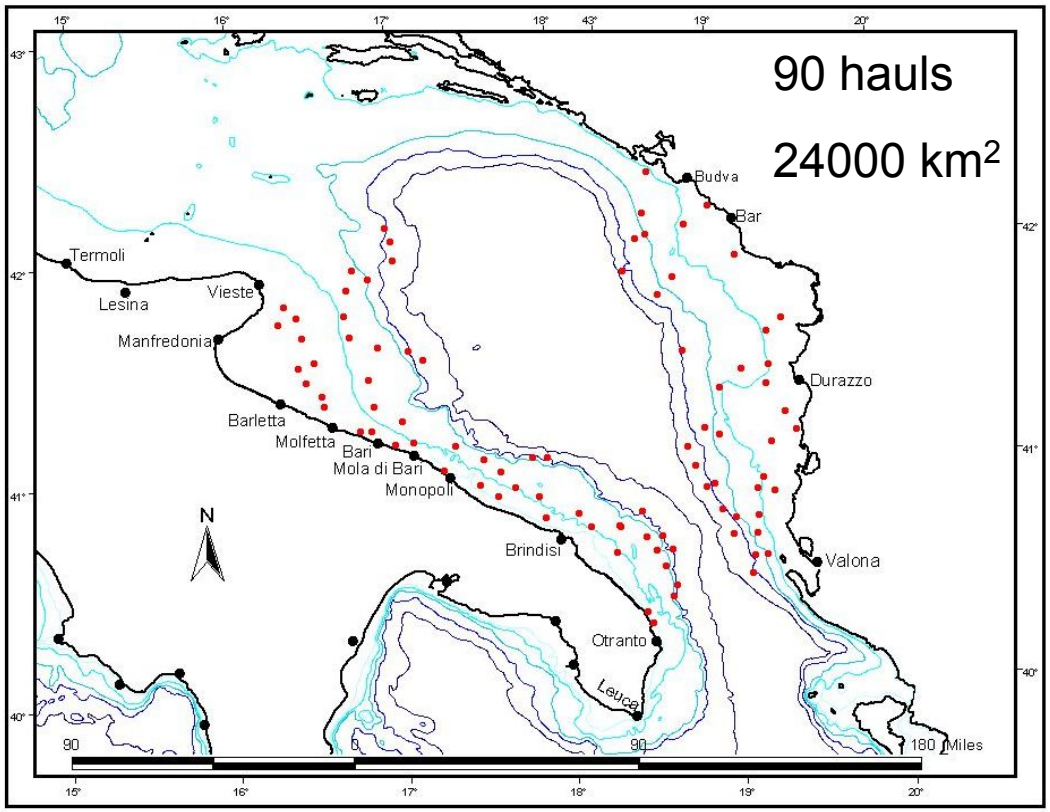
Kirinčić and Lepetić (1955) investigated the catch size structure from experimental bottom long-line fishery in the Southern Adriatic. The average total length of the European hake was 58.6 cm. The average catch rate was 5.6 specimens per 100 hooks.

Currently (2007-2010) average total length of long-liners is varying from: 47.5 cm of 2010 to 56 cm of 2008.

1

DATA SOURCE Western side and eastern sides
MEDITS EXPERIMENTAL TRAWL SURVEY

Time series
1996-2010



Fishing is accomplished according to a standardised sampling scheme. *By this way the population at sea is studied*

2

DATA SOURCE western side
COMMERCIAL LANDINGS AND DISCARDS

Total landings 2004-2010

Biological samplings (landing demography) 2007-2010

Discard 2009 - 2010

Eastern side:

Albania: total landings 2006-2010

Montenegro: total landings and demography 2010

The approach for assessment and for prediction in the medium-long term

Data

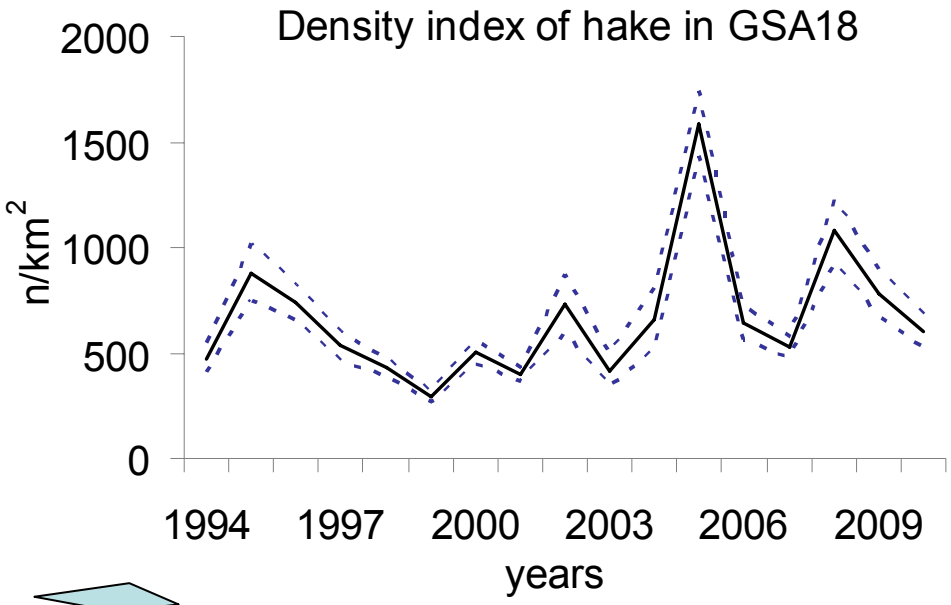
- **Standardized LFD abundance indices (N/km^2), whole GSA18 (MEDITS data1996-2010)**
- **Length structure of landings and production by fishing segment**

(for west side from DCF, for the east side within a pilot study in the framework of Adriamed project)

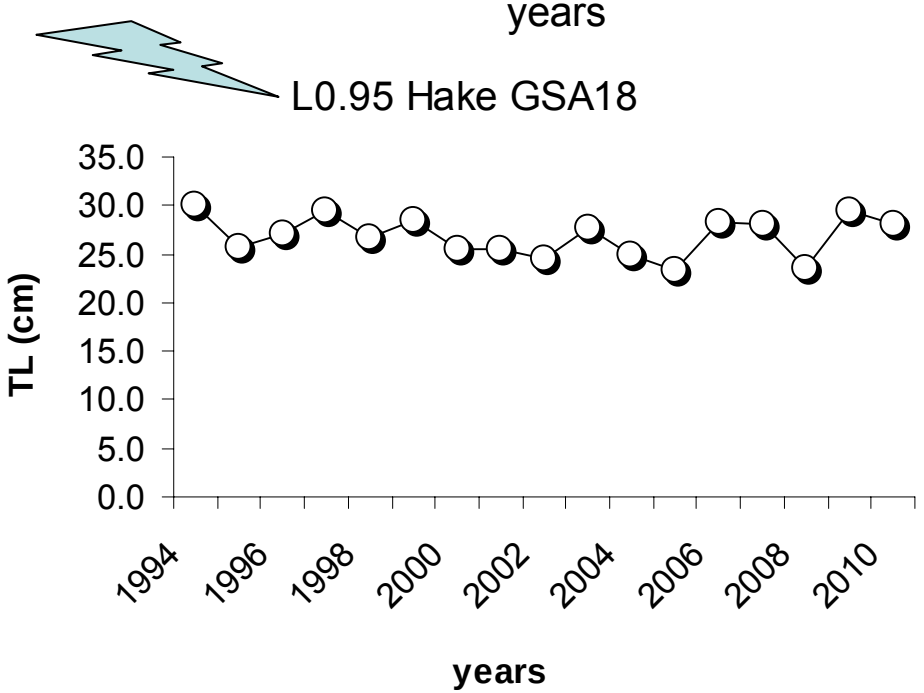
Models and software

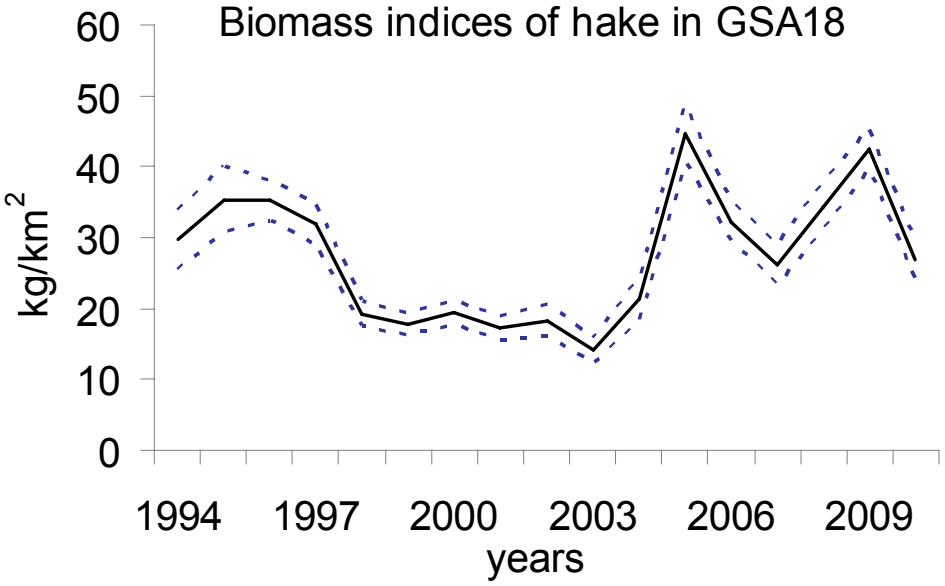
- **Direct methods: SURBA (Survey Based Assessment; Needle, 2003)**
- **Indirect methods: Length Cohort Aanalysis, Yield/Recruit (Vit, Lleonart and Salat, 1997);**
- **Prediction models: ALADYM (Lembo et al., 2009),**
- **Transition analysis (Vit),**
- **Medium term forecast (R-routine, SGMED,2010)**

MEDITS
Abundance and length structure indices GSA 18



No significant trends

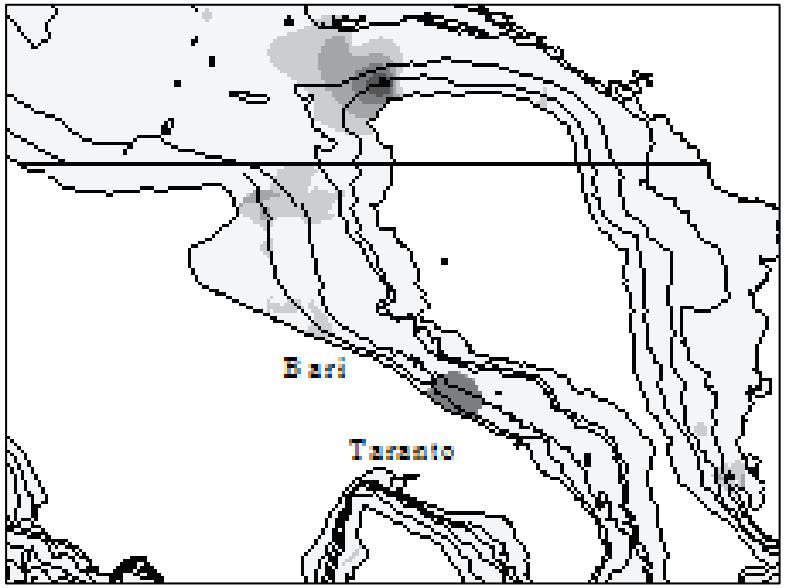


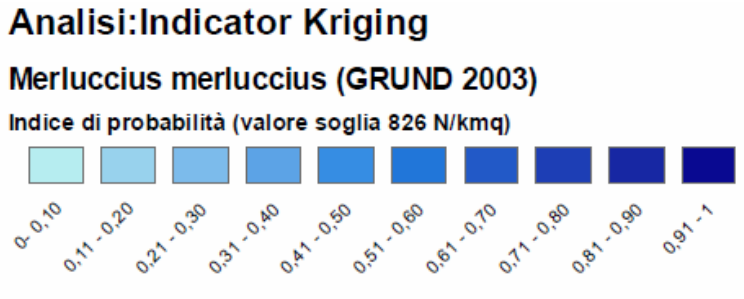


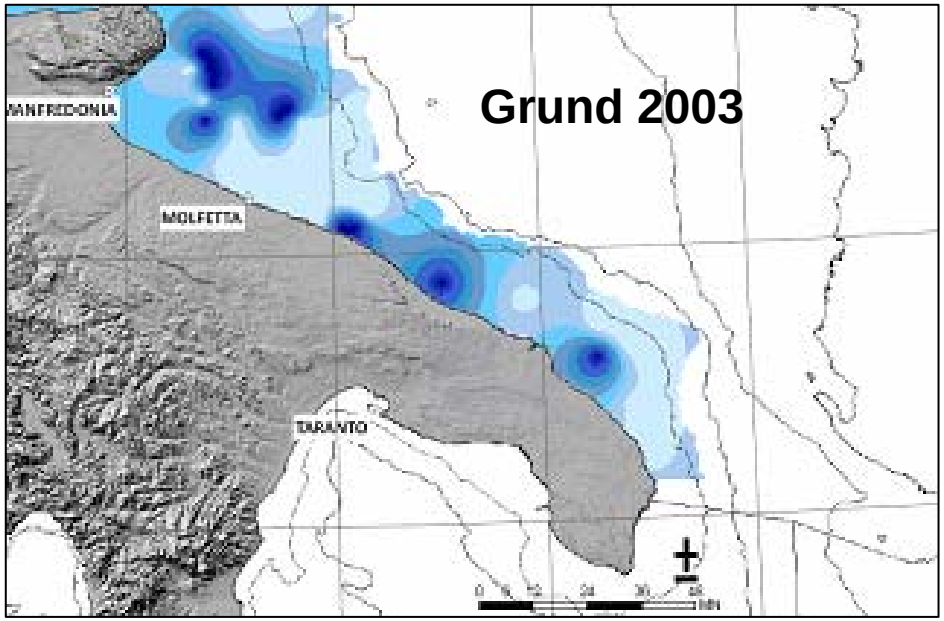
Distribution

Hake is most abundant at depths between 100 and 200 m
Juvenile distribution and concentration in nursery areas

Medits 1995-1996







Fishery

Italy				western	Montenegro	Albania	eastern	Total
Year	LLS	NETS	OTB	landing	OTB	OTB	landing	
2004	233	40	2932	3205				3205
2005	452	56	3276	3784				3784
2006	836	56	4613	5505		265	265	5770
2007	620	37	3498	4155		275	275	4430
2008	551	57	3641	4249		249	249	4498
2009	534	28	3536	4098		292	292	4390
2010	601	19	3400	4020	36	240	276	4296

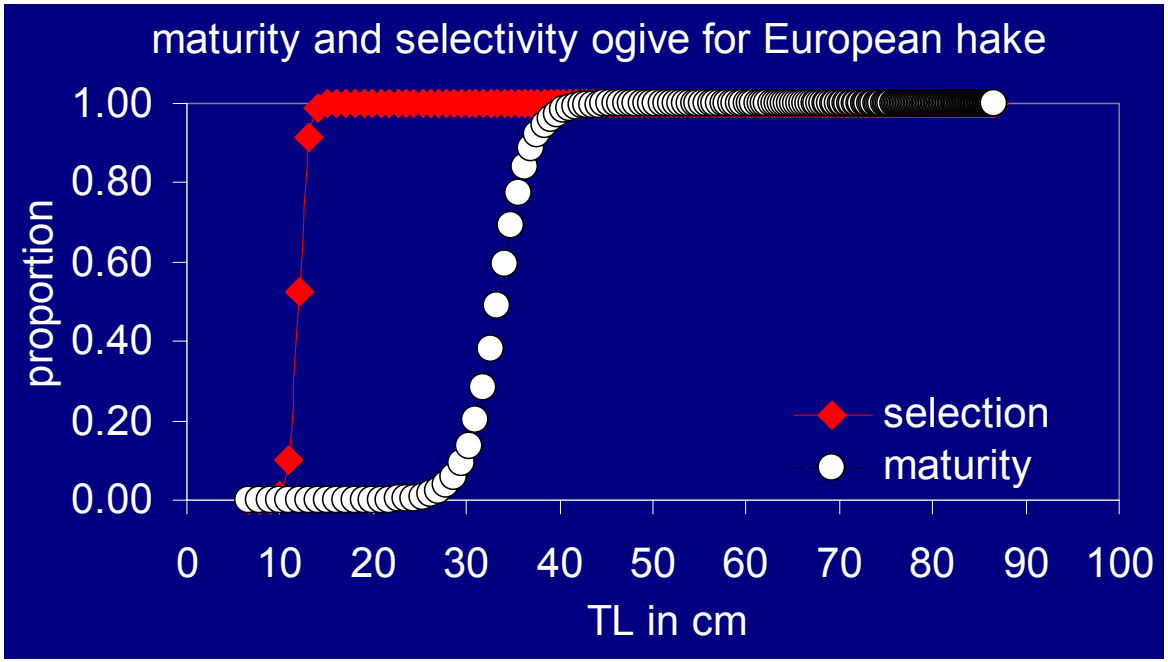
2010 - Total landing: 4296 tons split in 14% caught by Italian longlines, 79% by Italian trawlers, about 1% by Montenegrin trawlers and about 6% by Albania trawlers.

Operational unit	Number of boats in the whole GSA18
Minor gear with engine (6-12 m)	839
Long line (12-24 m)	37
Trawl (6-12 m)	40
Trawl (12-24 m)	579
Trawl (>24 m)	61

The fleet data are referred to the whole GSA and are related to the year 2007 (GFCM Statistical Bulletin 2008).

Other relevant life history traits for parameterization of the models

Age	0	1	2	3	4+
Natural Mortality rate	1.16	0.53	0.40	0.35	0.32
Proportion mature	0.008	0.248	0.887	1.000	1.000
Weight (kg)	0.01	0.14	0.53	1.15	2.35
Total length (cm)	10	27.1	41.0	52.5	~66



Maturity

Lm50%=33.4±0.15 cm

MR= 3.8 ±0.16 cm

Selection

L50%=12±0.15 cm

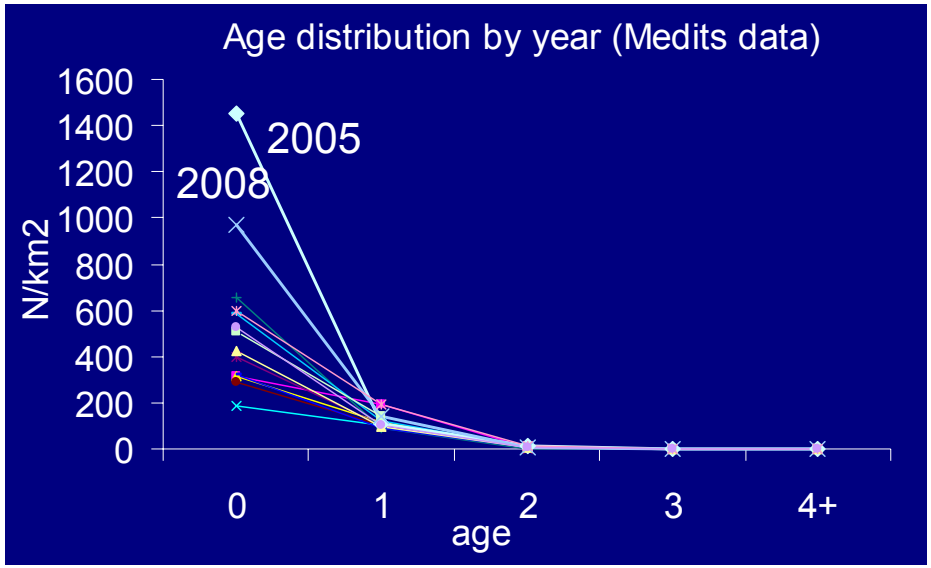
SR= 1±0.16 cm

SURBA - Input

Survey indices (N/km^2) by age

Age	0	1	2	3	4+
1996	499	223	6	1	1
1997	317	191	8	1	1
1998	316	118	4	1	1
1999	189	101	3	1	1
2000	399	104	3	1	1
2001	292	102	4	1	1
2002	654	89	3	0	1
2003	324	91	4	1	0
2004	582	123	4	2	0
2005	1451	111	10	1	1
2006	509	139	8	1	2
2007	423	98	7	2	1
2008	969	141	6	2	0
2009	595	190	15	2	1
2010	526	103	7	2	2

Fast growth (0-4+)

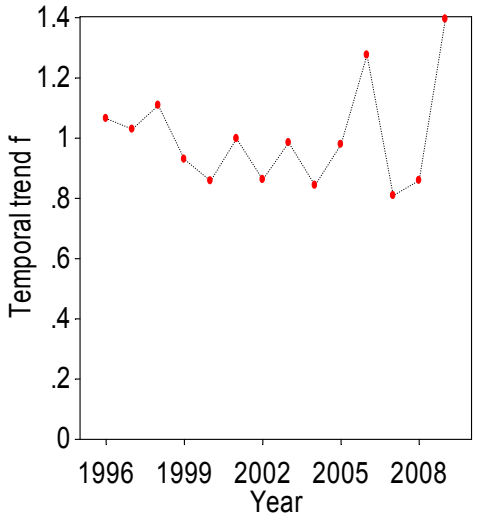


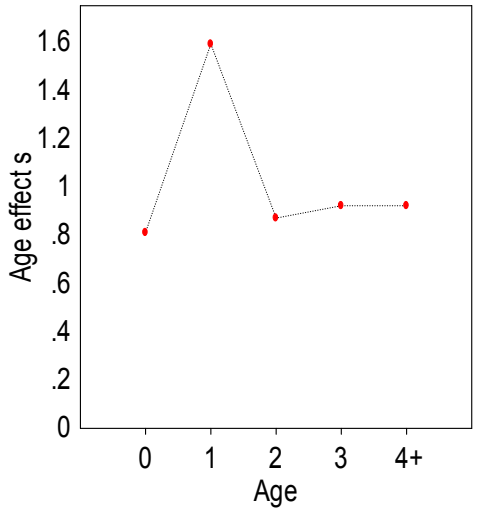
Age	Catchability 0	1	2	3	4
q (fast)	0.90	1.00	1.00	0.75	0.75

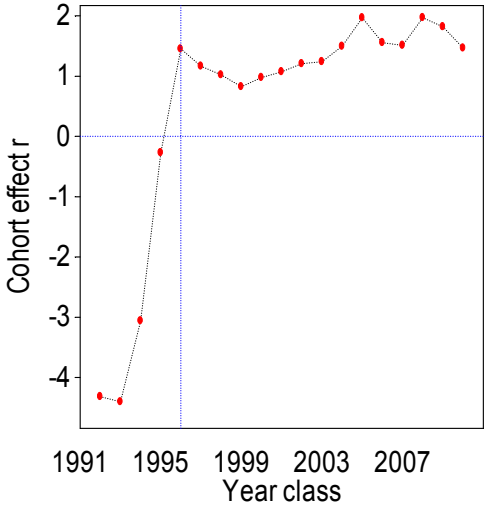
SURBA - Results

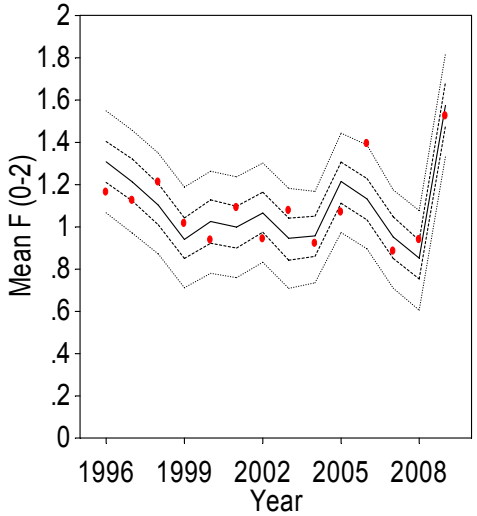
Trends in various stock parameters from SURBA, hake GSA18

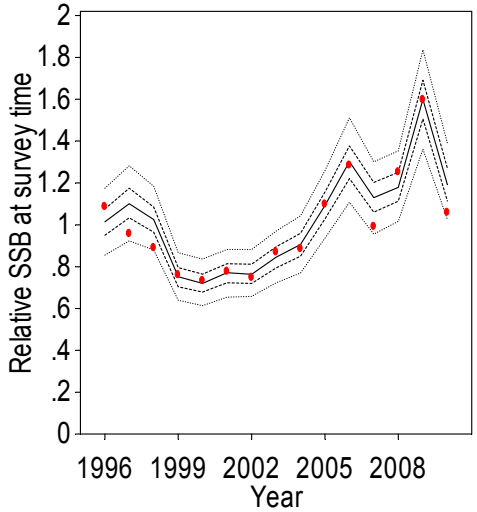
GSA18 hake W+E_M+F_ Mvect-growthfast_1996-2010□□□□□□□□□□□□

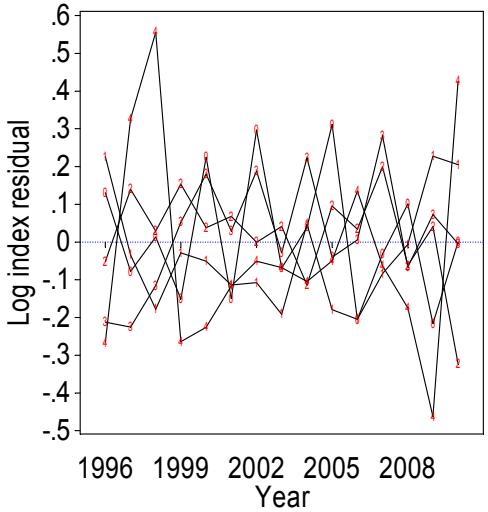








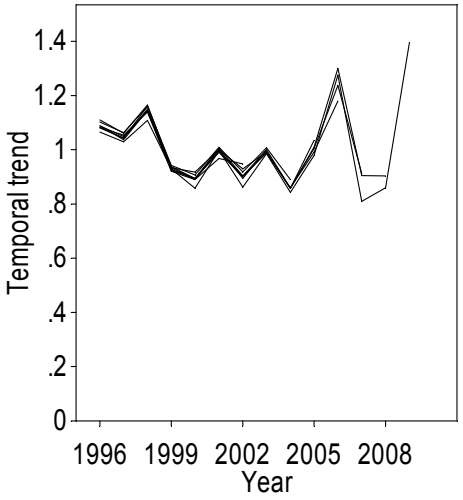


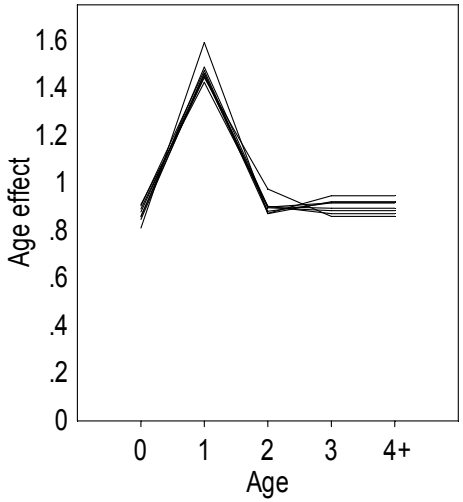


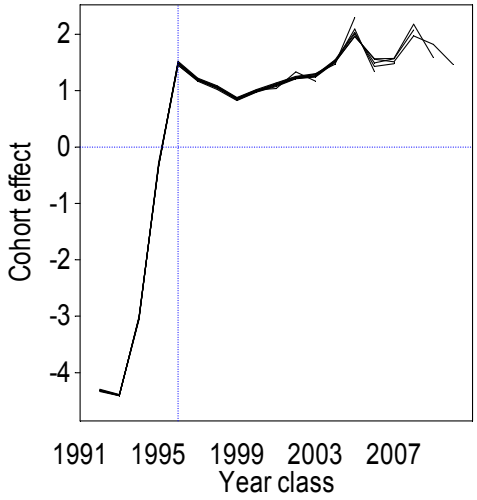
SURBA - Results

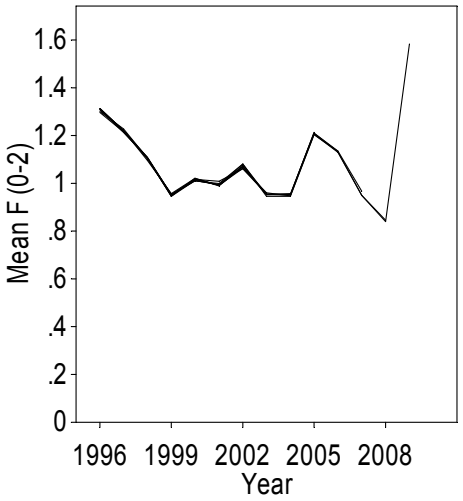
Retrospective analysis from SURBA, hake GSA18

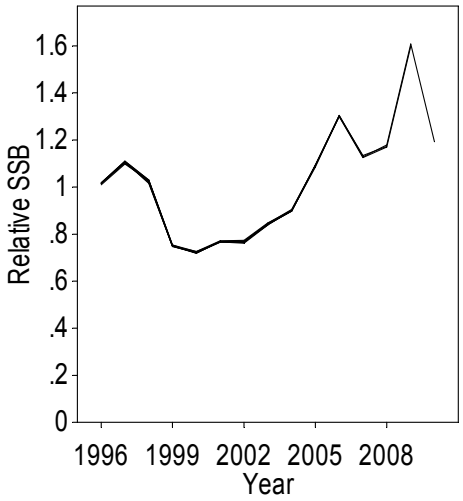
GSA18 hake W+E_M+F_ Mvect-growthfast_1996-2010

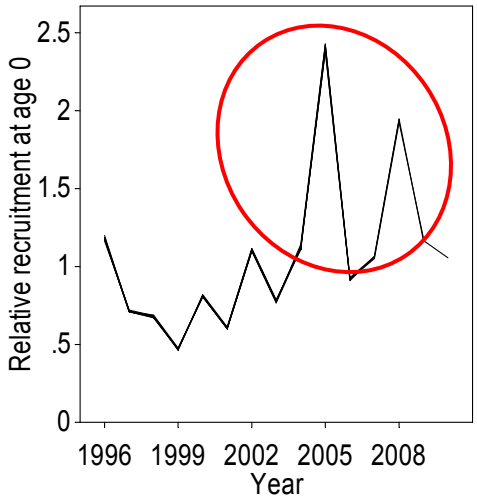






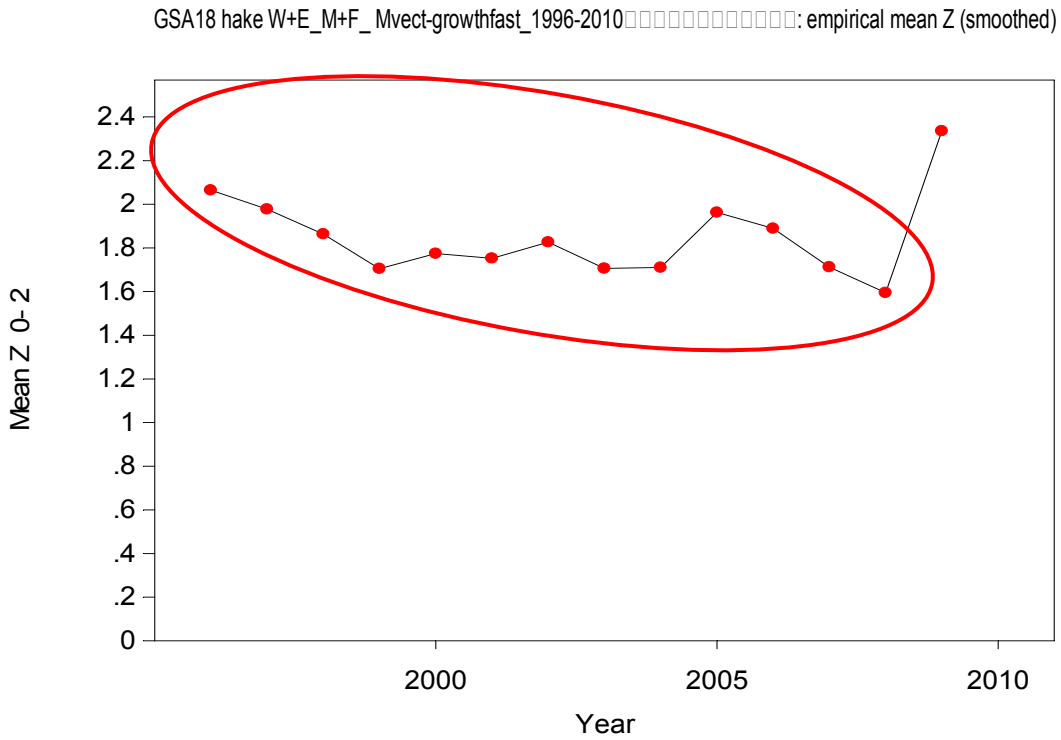






SURBA - Results

Total mortality



LCA (Vit)

- **Years 2007-2009 only italian commercial data (population structure and amount of landings (DCF)**
- **First exercise on 2010 data of the whole GSA18 (west and east sides)**

Input data for VIT

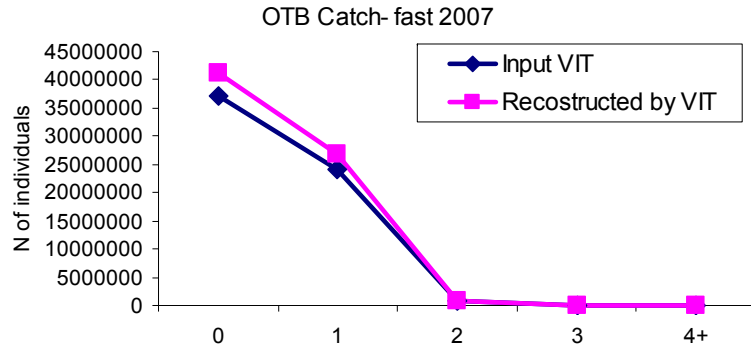
	2007		2008		2009	
Age	OTB	LLS	OTB	LLS	OTB	LLS
0	37063571	0	20247450	0	22137061	0
1	24112189	60105	28274930	12209	26096500	40901
2	772260	101180	883297	31826	807857	166541
3	43305	108870	134619	141812	58047	82740
4+	0	157257	46346	158883	44119	142543

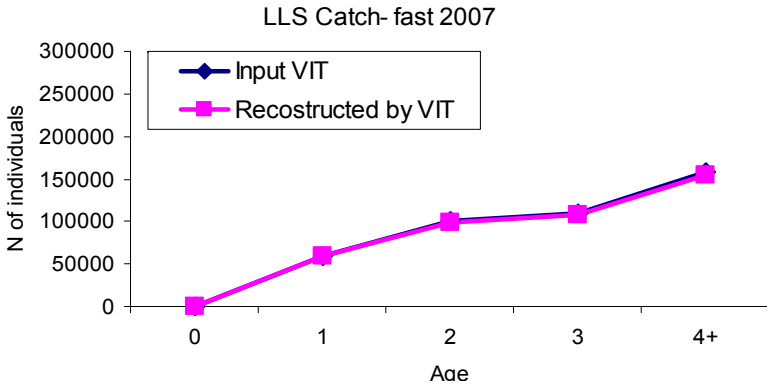
2010

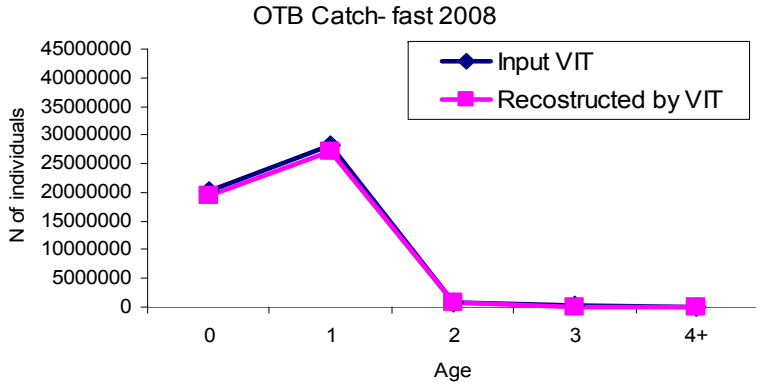
Age	LLS Italy	OTB Italy	OTB Montenegro	OTB Albania
0	0	24431218	377991	1726973
1	81330	19014072	172538	1344050
2	244912	763364	872	53960
3	95724	138384	0	9783
4+	137725	70035	0	4953

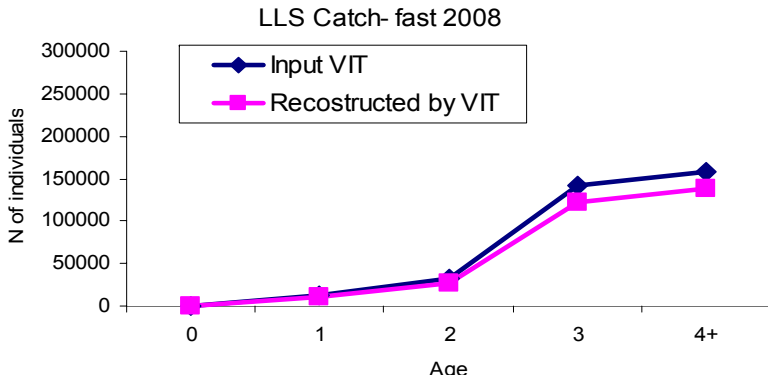
LCA (Vit) – consistency

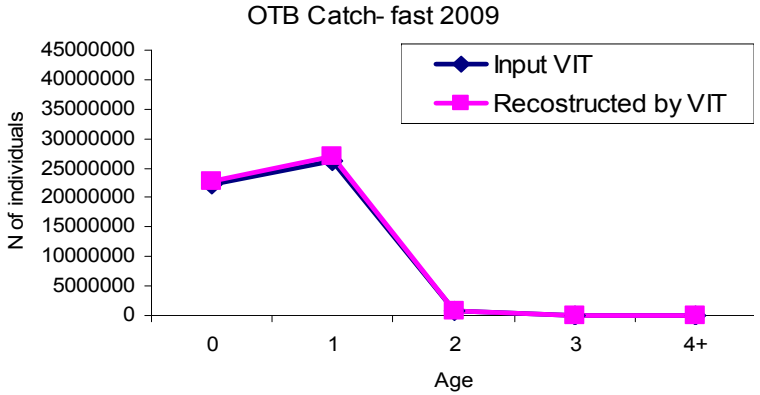
Comparison between input catch and reconstructed catch by age

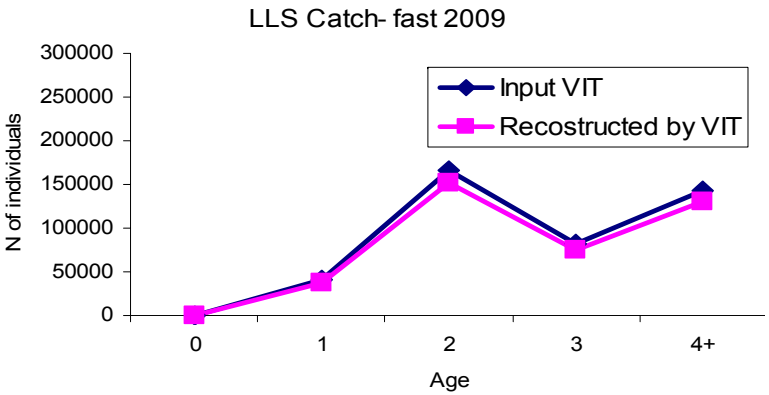










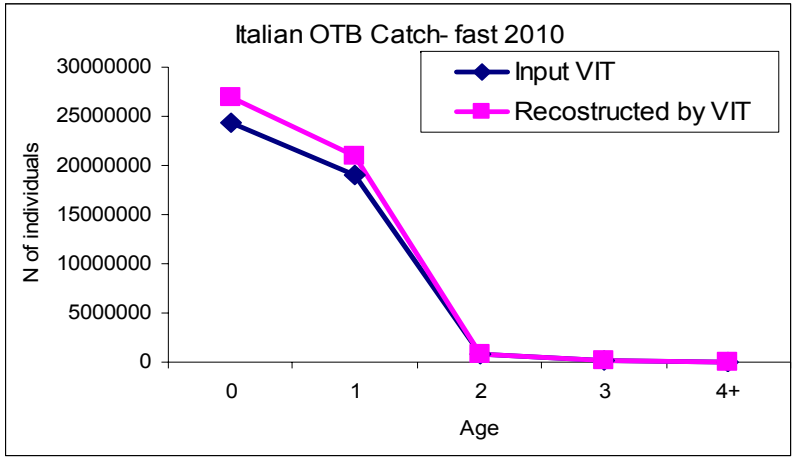


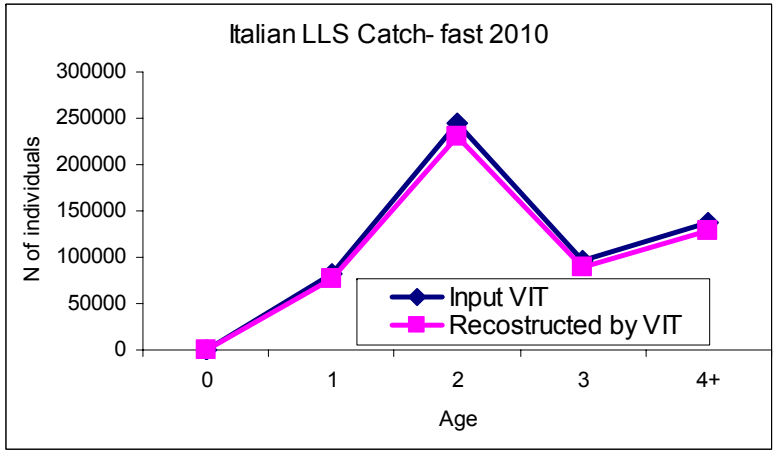
Comparison between catch data input in VIT and reconstructed catch by age, year and gear.

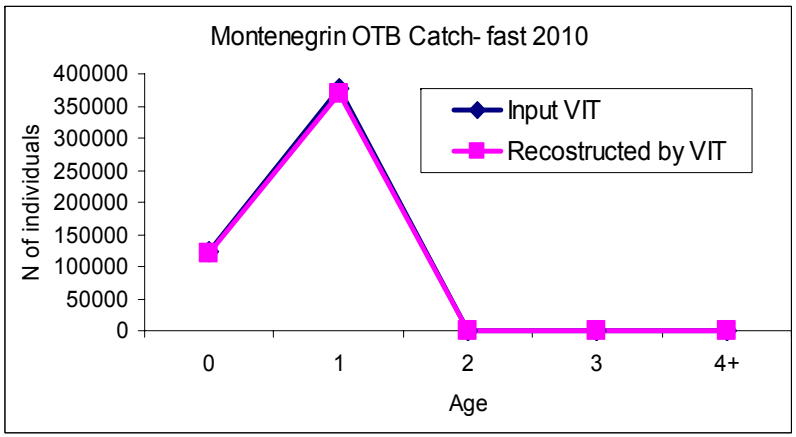
Years 2007-2009

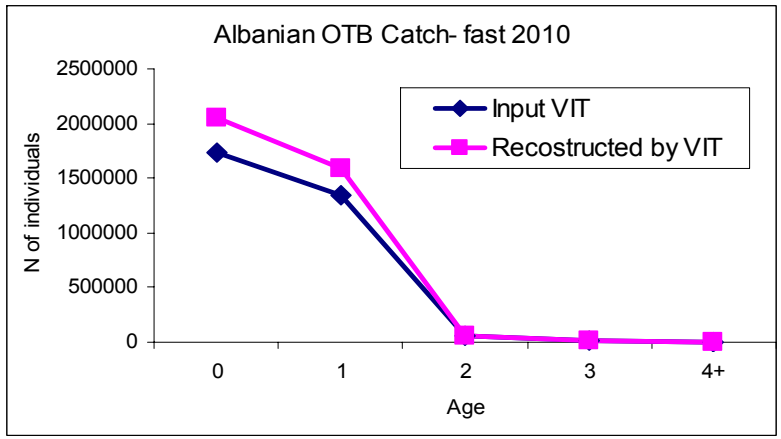
LCA (Vit) – consistency

Comparison between input catch and reconstructed catch by age







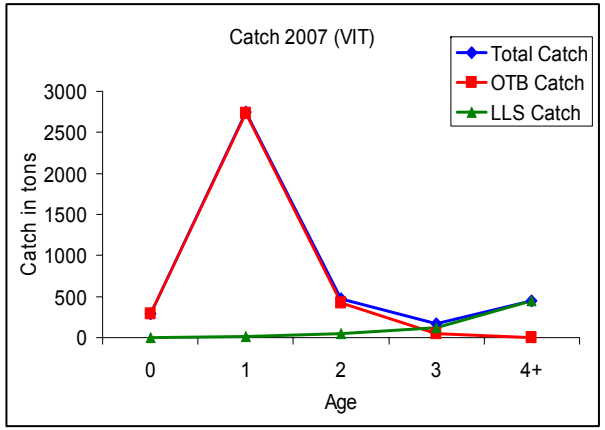


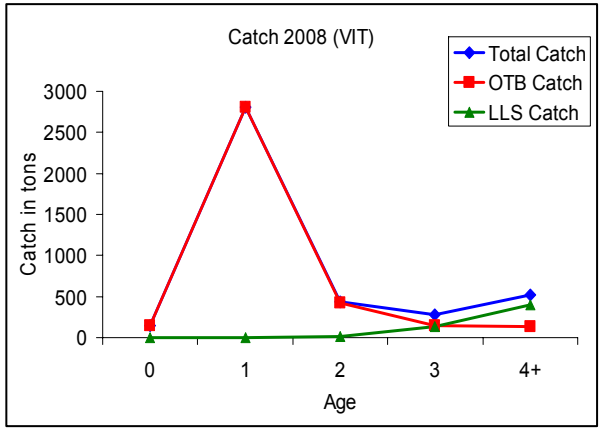
Comparison between catch data input in VIT and reconstructed catch by age, year and gear for fast growth scenario 2010

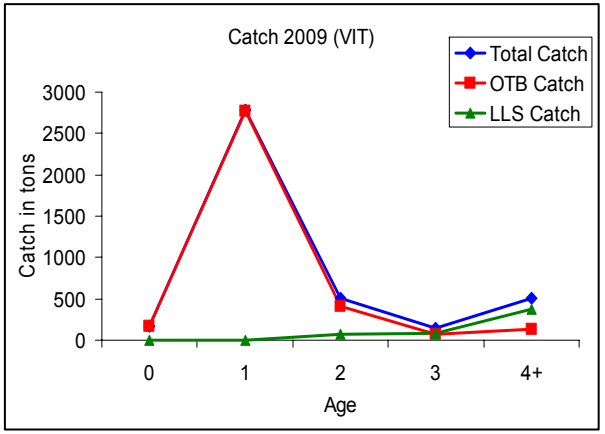
LCA (Vit) - Results

2007-2009 (italian data only)

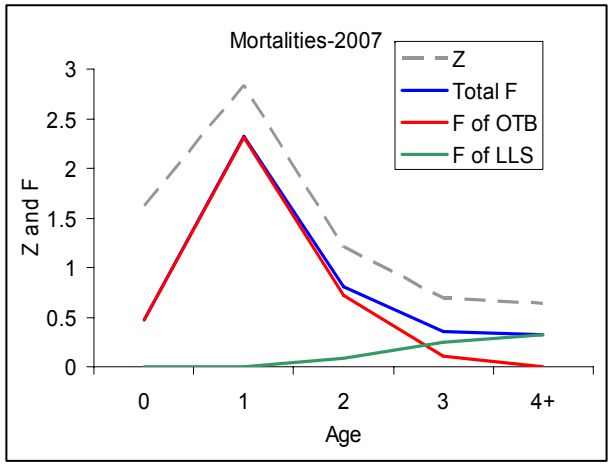
Reconstruction of catch

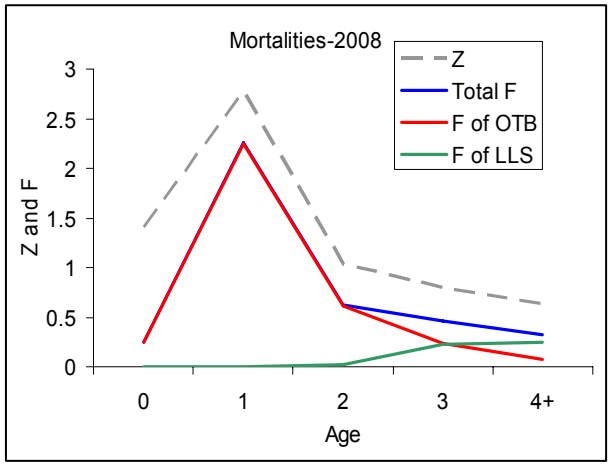


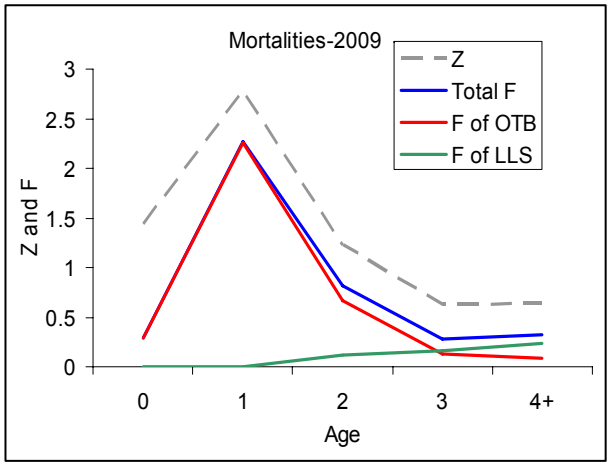




Estimates of mortalities

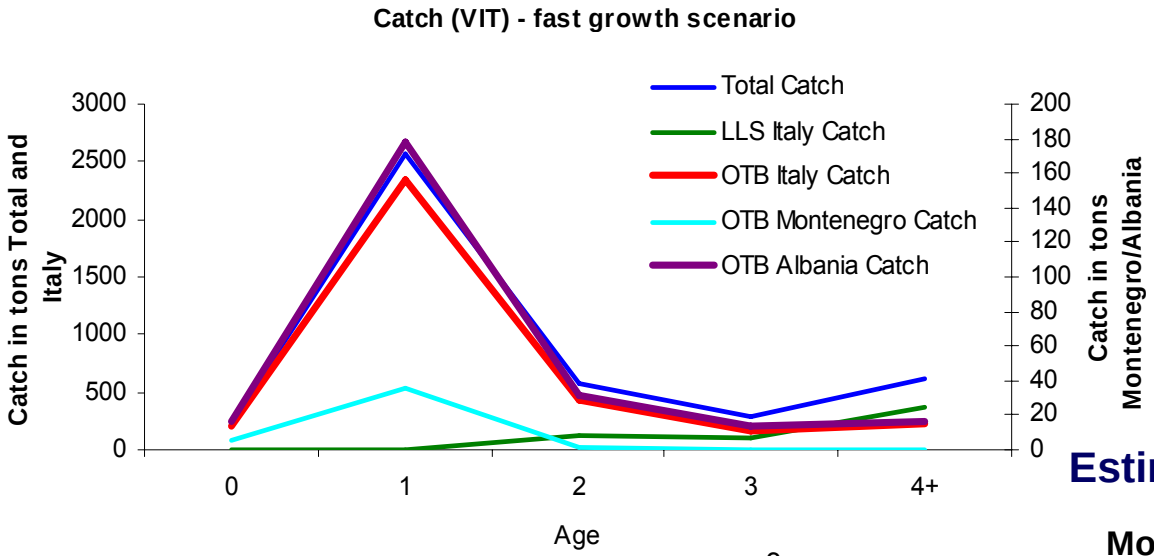






LCA (Vit) - Results

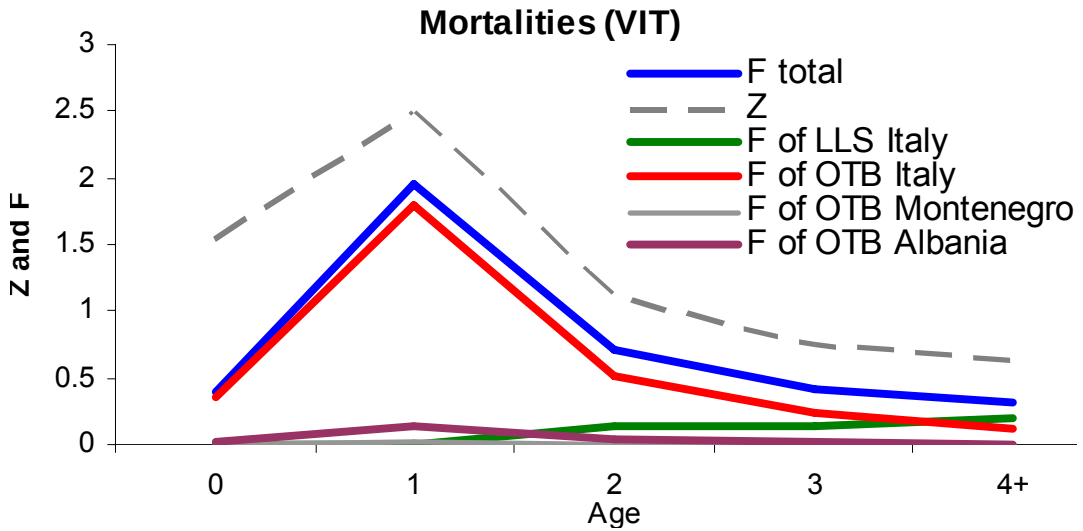
Reconstruction of catch



2010

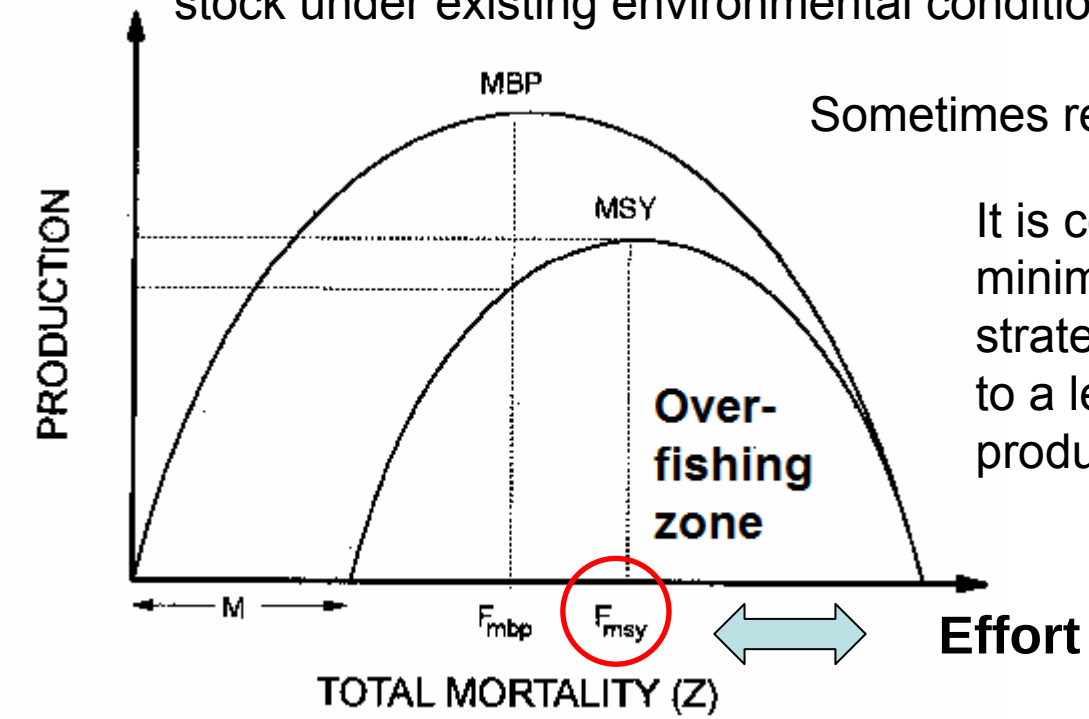
(west and east sides data)

Estimates of mortalities



Harvest and pressure limits, MSY and related concepts

MSY (and F_{msy} the fishing mortality at MSY) the highest theoretical equilibrium yield that can be continuously taken (on average) from a stock under existing environmental conditions and selectivity pattern.



Sometimes referred to as potential yield.

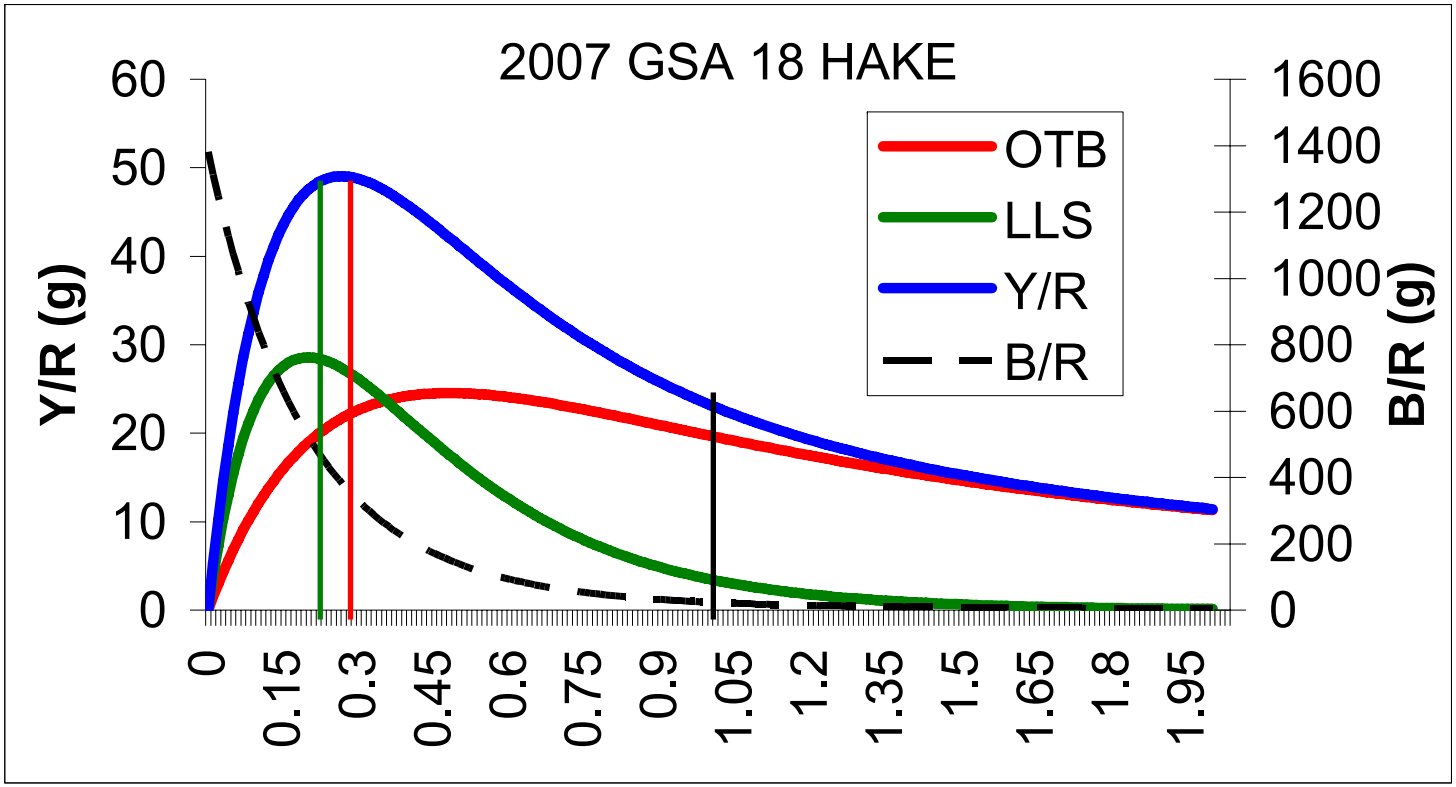
It is considered also an international minimum standard for stock rebuilding strategies (i.e. stock should be rebuilt to a level of biomass that could produce at least MSY.

Fishing at MSY levels would reduce costs and increase profits for the fishing industry, as the amount of effort (and associated costs, such as fuel) required per tonn. of fish caught decreases.

Y/R (Vit) - Results

2007-2009 (only italian data)

2007	Factor	F	Y/R	B/R	SSB	Y/R OTB	Y/R LLS
F(0)	0	0	0	1381.036	1339.336	0	0
F(0.1)	0.21	0.207323	48.021	495.671	467.101	19.486	28.535
Fmax	0.28	0.27643	49.036	375.719	349.897	21.816	27.22
Fcurr	1.01	0.98725	23.182	23.928	14.393	19.704	3.477
Fdouble	2	1.9745	11.424	4.625	0.513	11.296	0.129

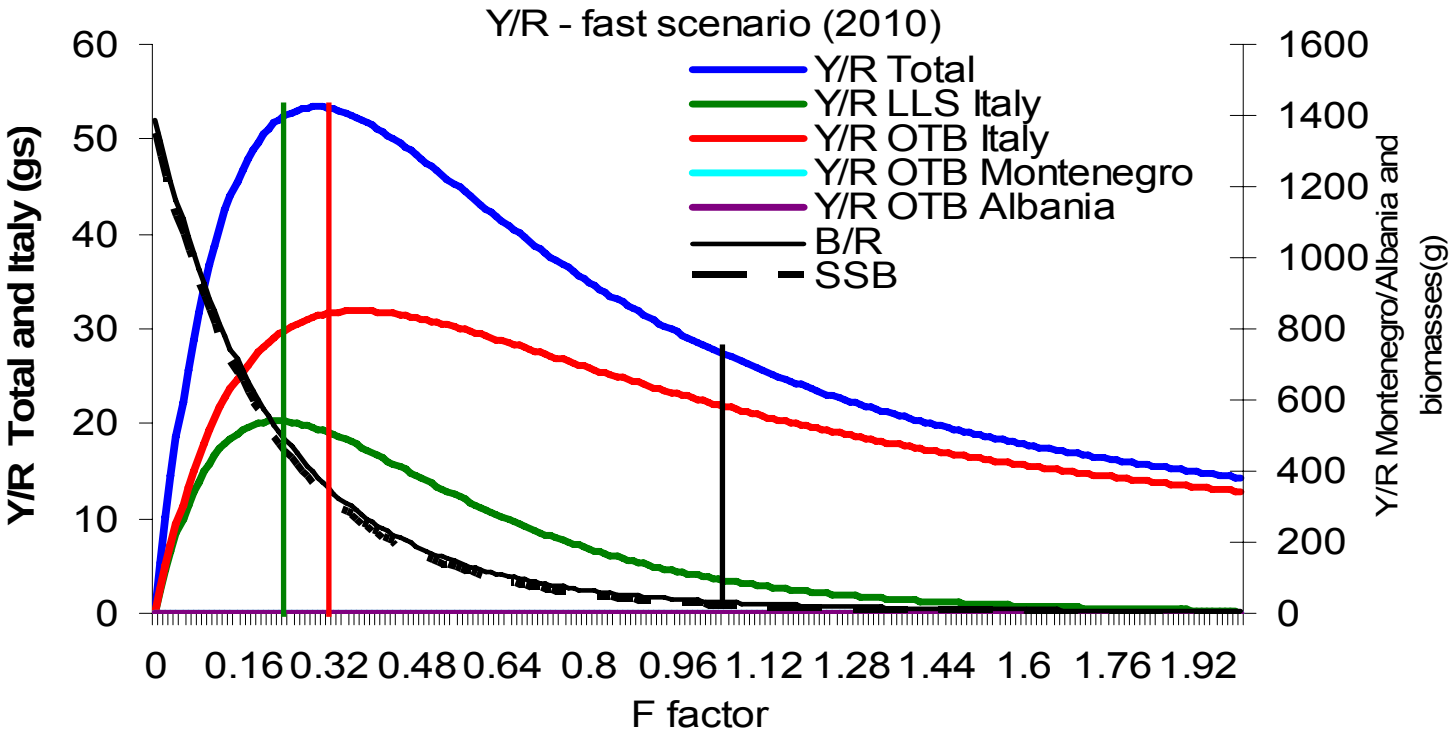


LCA (Vit) - Results

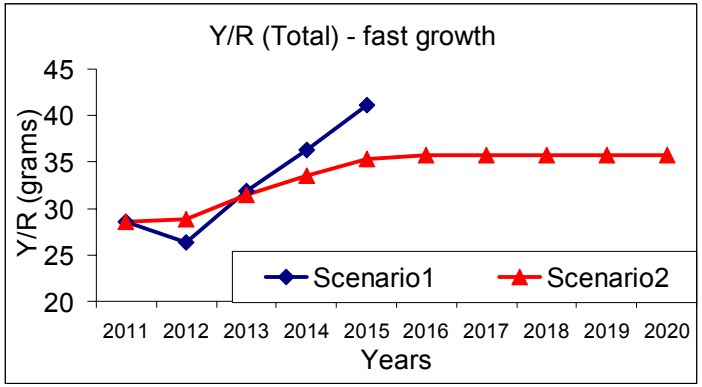
2010 (west and east sides)

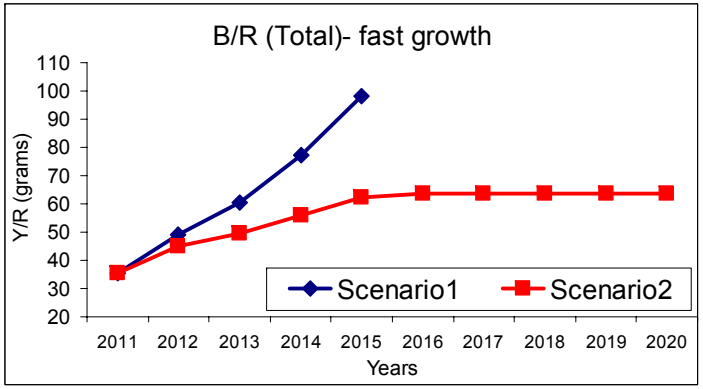
Y/R results

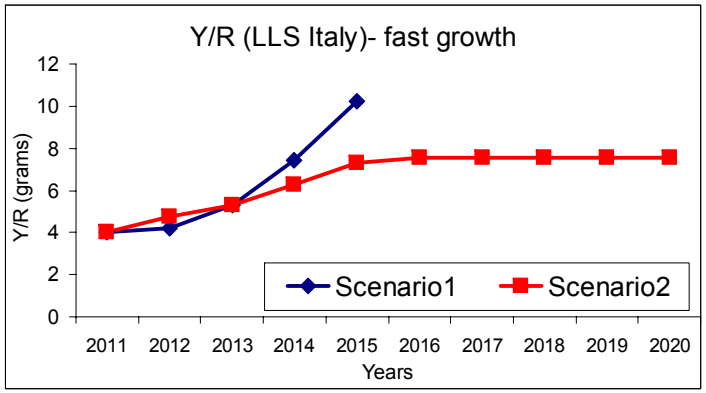
2010	Factor	F	Y/R	B/R	SSB	Y/R LLS Italy	Y/R OTB Italy	Y/R OTB Montenegro	Y/R OTB Albania
F(0)	0.00	0.00	0.00	1390.07	1346.76	0.00	0.00	0.00	0.00
F(0.1)	0.24	0.21	52.50	487.89	457.71	20.23	29.82	0.19	2.27
Fmax	0.31	0.27	53.39	381.80	354.07	19.46	31.33	0.22	2.38
Fcurr	1.01	0.87	28.55	35.65	23.58	4.00	22.56	0.29	1.71
Fdouble	2.00	1.73	14.32	6.62	1.11	0.29	12.85	0.22	0.98

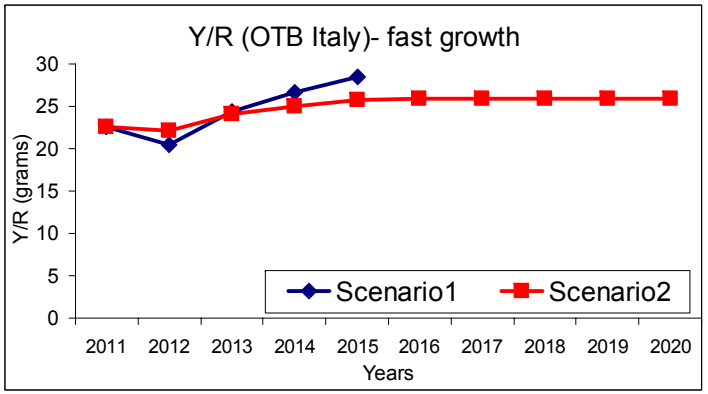


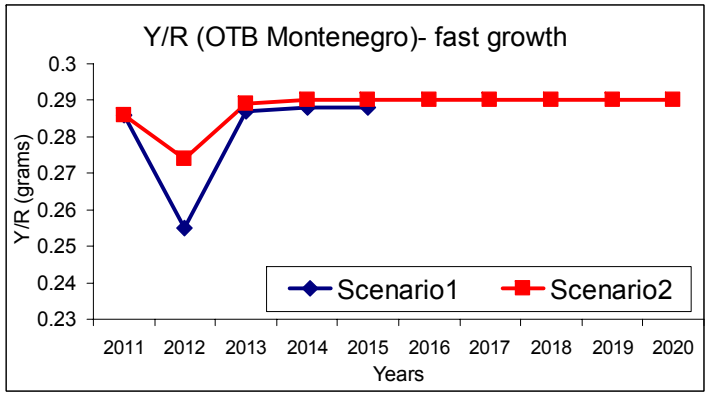
Transition Analysis – Vit

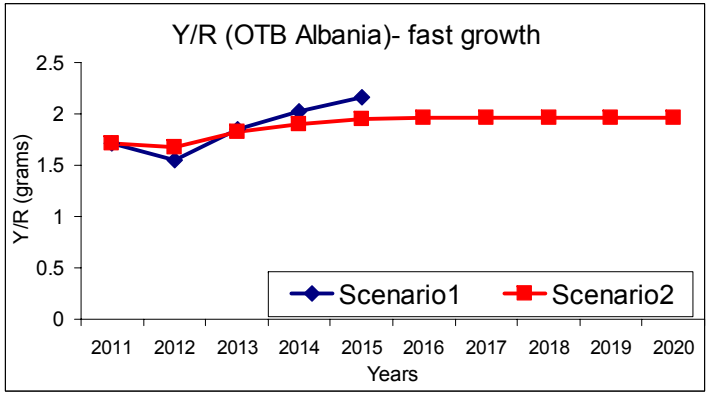












Scenario 1: Reduction to F_{msy} level until 2015, with a gradual annual decrease of F of 30%.

Scenario 2: Reduction to F_{msy} level until 2020, with a gradual annual decrease of F of 15%.

ALADYM – parameterization in the *status quo*

Long-term simulations

Total mortality and recruitment estimated by VIT for 2007-2010

- Estimate Z and recruitment in 2011 as a geometric mean among 2008-2010

Harvest pattern In Aladym

Fleet selection parameters

- ogive model with Lc=12cm; SR = 1 cm, from 1994 to 2010
- L50% 16 cm SR 1 cm from 2012 to 2030 (enforcement of 50 mm mesh size was assumed widely applied)
- deselection ogive with 50% deselection size at 50 cm

Fishing activity reduced in summer (reduced activity due to seasonal fishing ban of 30~45 days)

ALADYM – parameterization in the *prediction of the management measure*

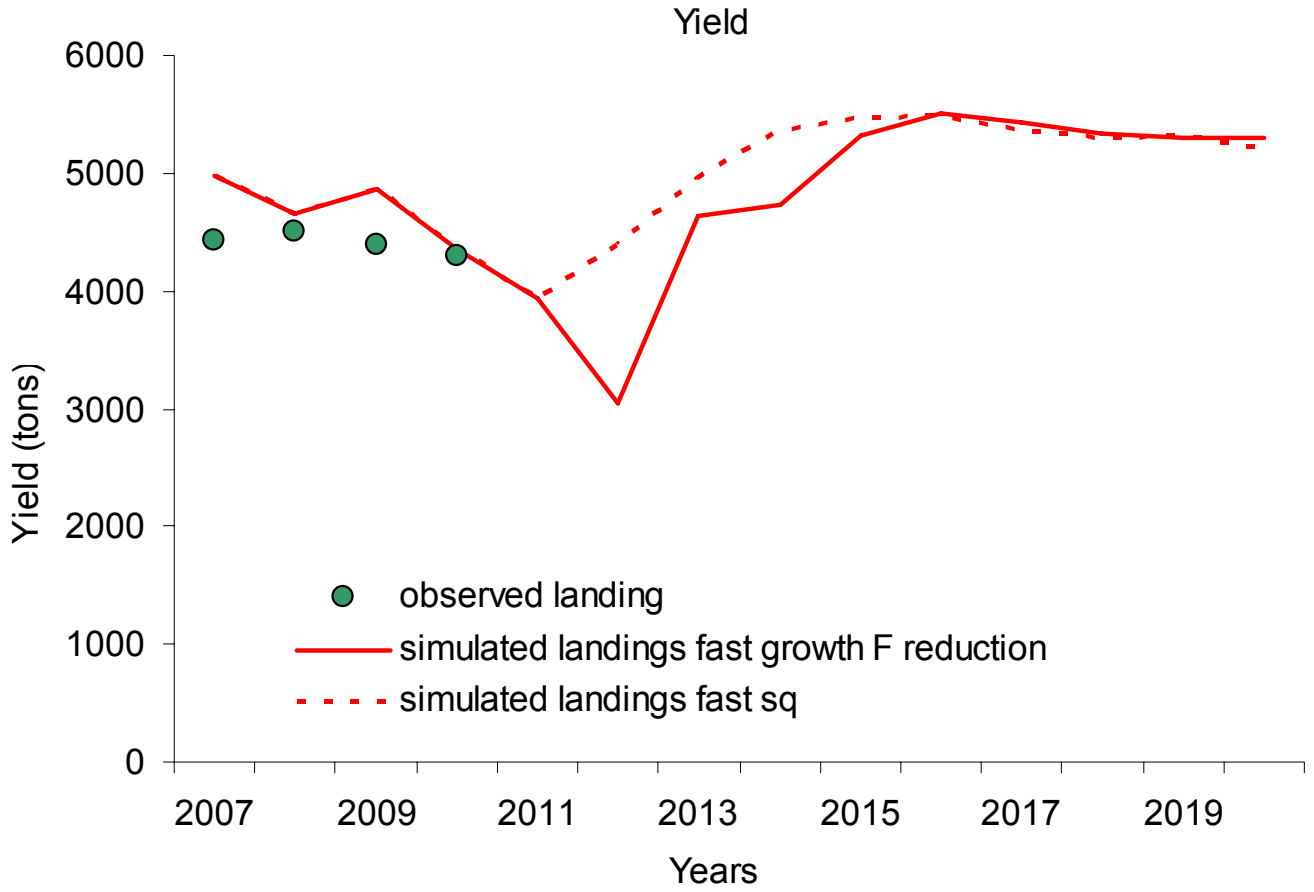
Harvest pattern In Aladym

Fleet selection parameters as in the *status quo*

- Reduction of the fishing activity (e.g. days at sea 0.6 of the current activity level and fishing ban for two months for trawlers; global reduction of activity=0.55) until ~F0.1-Fmax (~2020)
- In 2014 a further reduction of 15% of mortality

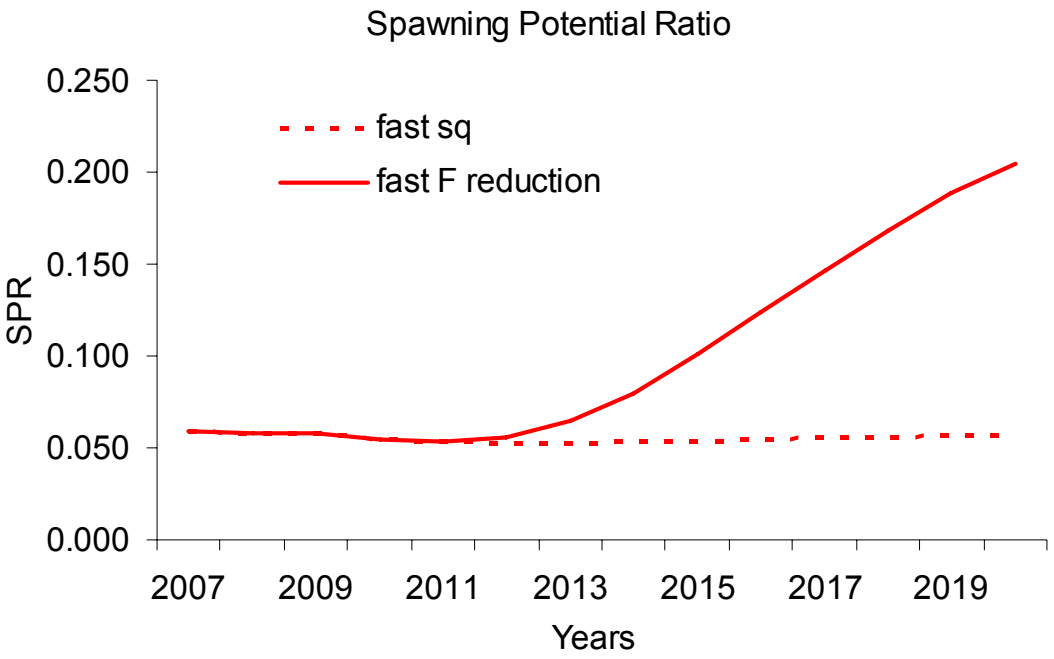
ALADYM - Results

Simulation from 2007 to 2020, slow and fast growth scenarios, with increase of Lc from 12 to 16 cm (status quo).



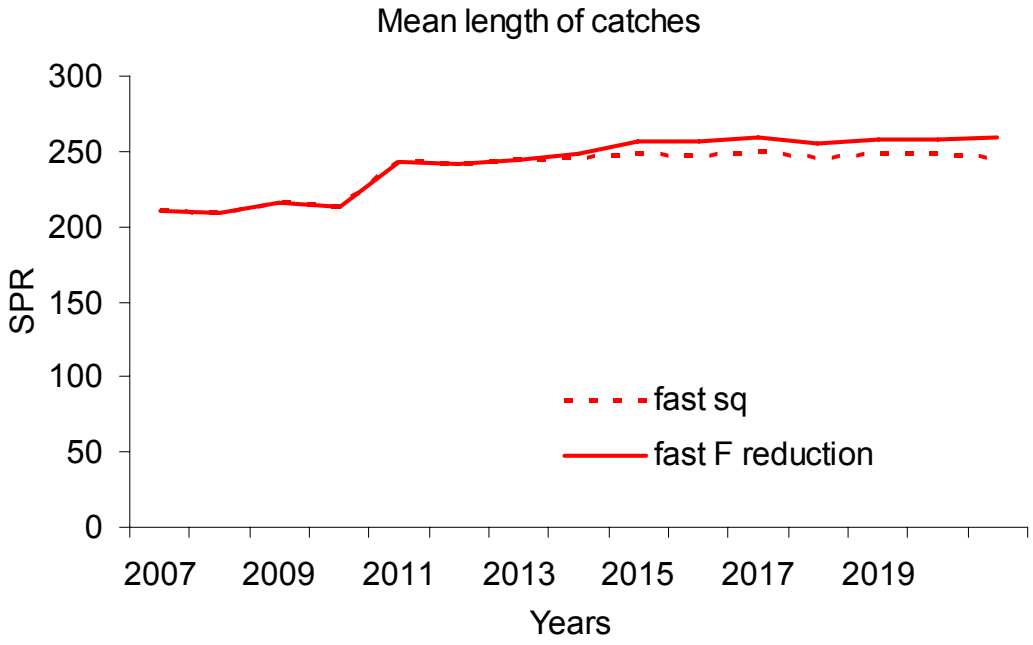
Simulation from 2007 to 2020, enforcing mesh size, reducing fishing activity by month and further reducing fishing mortality on 2014 (slow and fast growth scenario).

ALADYM - Results

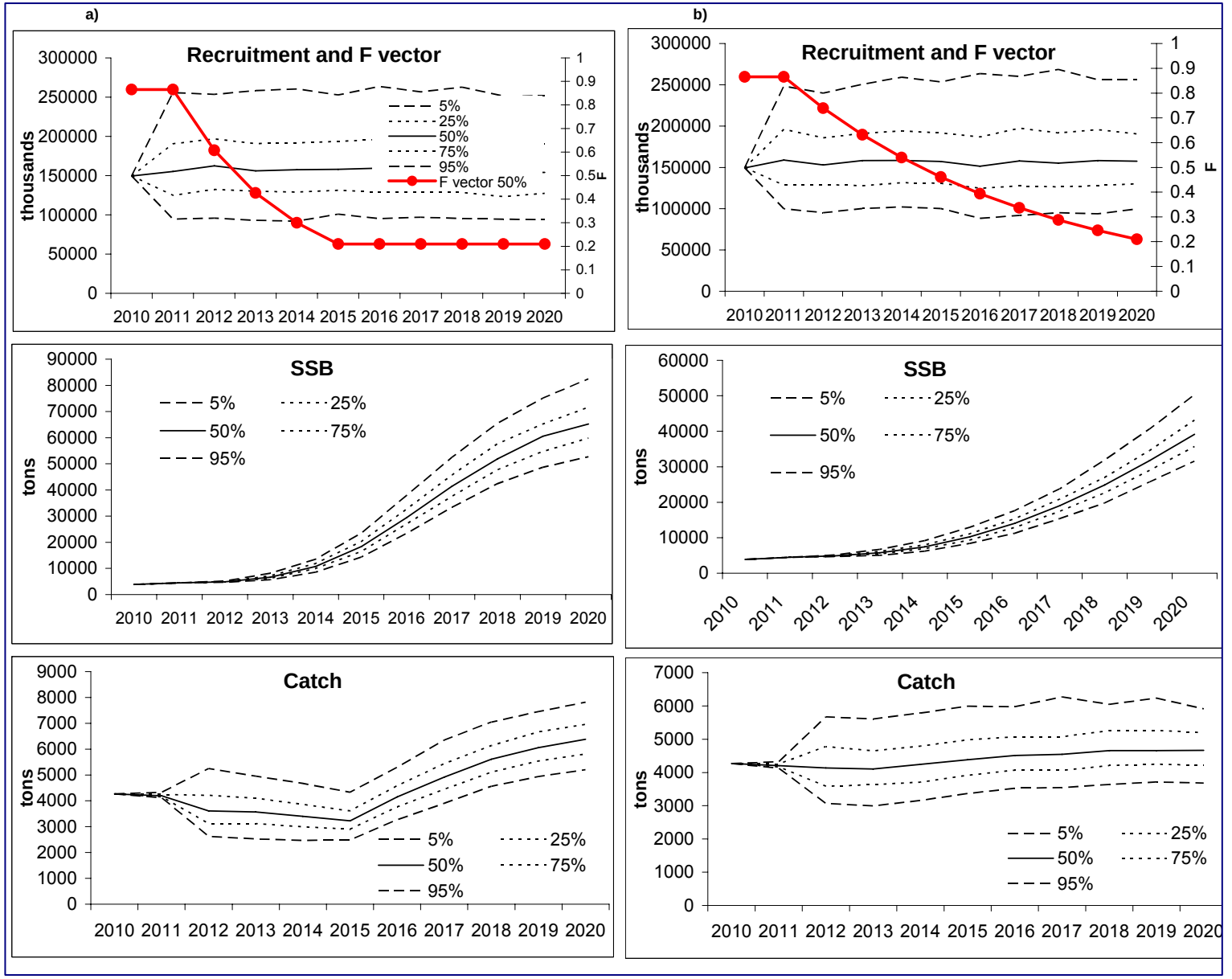


Simulation from 2007 to 2020, slow and fast growth scenarios, with increase of Lc from 12 to 16 cm (status quo).

Simulation from 2007 to 2020, enforcing mesh size, reducing fishing activity by month and further reducing fishing mortality on 2014 (slow and fast growth scenario).



Medium term forecast – Results



Medium term forecast using R routine reaching $F_{0.1}$ in 2015 (left) and 2020 (right).

Advice

Given the results from this analysis, based on the whole information from the area, it is necessary to consider that a remarkable reduction of the fishing mortality is necessary.

The target BRPs F_{msy} can be gradually achieved by multiannual management plans that will require a more sharp reduction in the short term than in the medium term.

Simulations also show that the objectives of a more sustainable harvest strategy could be achieved with a multiannual plan that foresees a reduction of fishing mortality through fishing activity limitations and possibly fishing capacity decreasing.

Advice

It is however necessary to consider that most of the fishing mortality is derived from the Italian bottom trawlers that represent about 85% of the total F in the GSA and that of the Italian longlines accounting for about 7-8%, with an overall percentage of about 92-93%, while Montenegrin trawlers account only for about 1% of the F exerted on the GSA and Albanian trawlers of about 6.5%.

Moreover, the production of hake in GSA 18 is split in 14% caught by Italian long-lines, 79% by Italian trawlers, about 1% by Montenegrin trawlers and about 6% by Albania trawlers.

F - proportion				
Growth	**LLS it**	**OTB it**	**OTB Mon**	**OTB Alb**
slow	0.069	0.854	0.011	0.065
fast	0.084	0.841	0.011	0.064