COMMISSION
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REFERENCE DOCUMENT FOR THE REVIEW OF CMM 2015-02 AND DEVELOPMENT OF HARVEST STRATEGIES UNDER CMM 2014-06 (South Pacific Albacore Tuna)

WCPFC15-2018-08
6 November 2018

Paper prepared by the Secretariat

A. INTRODUCTION

1. The purpose of this paper is to provide a quick reference guide to the recommendations of the Scientific Committee (SC) and Technical and Compliance Committee (TCC) of relevance to the discussions in support of the review of the CMM 2015-02. This paper includes stock status and management advice, and recommendations for the development of a harvest strategy framework for the South Pacific albacore stock.

B. SCIENTIFIC COMMITTEE RECOMMENDATIONS

Stock status and management advice (SC14 paragraphs 236 – 246; see **Annex A** for the details)

2. SC14 noted that the preliminary estimate of total catch of south Pacific albacore (within the WCPFC Convention Area south of the equator) for 2017 was 75,707mt, which was a 33% increase from 2016 and a 13% increase over 2012-2016. Preliminary catch for longliners in 2017 (72,785mt) was 34% higher compared with 2016 and a 14% increase over 2012-2016. Preliminary other gear (primarily troll) catch in 2017 (2,896t) was 17% higher compared with 2016 but a 1% decrease over 2012-2016. (see SC14-SA-WP-02).

3. Based on the uncertainty grid adopted by SC14, the South Pacific albacore tuna spawning biomass is very likely to be above the biomass LRP and recent F is very likely below F_{MSY}, and therefore the stock is not experiencing overfishing (100% probability $F < F_{MSY}$) and is not in an overfished condition (100% probability $SB_{recent} >$ LRP).

4. SC14 recalled its previous advice from SC11, SC12, and SC13 that longline fishing mortality and longline catch be reduced to avoid decline in the vulnerable biomass so that economically viable catch rates can be maintained, especially for longline catch of adult albacore. SC14 recommends that this advice be taken into consideration when the TRP for South Pacific albacore is discussed at WCPFC15.

Development of a harvest strategy framework

Target reference points – South Pacific albacore tuna (Paragraphs 403 – 405, SC14 Summary Report)

5. SC14 noted that WCPFC14 deferred the possible adoption of an interim TRP for the South Pacific albacore stock, which had originally been agreed to take place in 2015 under the Harvest Strategy Work Plan, until December 2018 at the latest. Recalling that it had previously reviewed a number of working papers and provided advice to the WCPFC over the past three years on this issue, SC14 reaffirms the previous recommendations made by SC13. In particular, SC14:

- notes that FFA CCMs have communicated their objectives for the south Pacific albacore stock as taken by the southern longline fishery at various times, and have proposed (in WCPFC14-DP13) a TRP that would maintain or restore average longline albacore CPUE to 10% above its 2013 value by 2028, and to 17% above its 2013 level by 2038.
- encourages other CCMs to describe their objectives for the fishery as specified in the Roadmap to implement the elements needed for the effective conservation and management for South Pacific albacore adopted by WCPFC14;
- draws the attention of WCPFC15 to the Limit Reference Point already adopted by the Commission for south Pacific albacore and the need to maintain the stock well above that limit; and,
- draws attention to the need to identify a TRP at a level which best achieves the fisheries management objectives of CCMs with a real interest in this stock.

6. SC14 also draws the attention of WCPFC15 to the updated assessment for south Pacific albacore reviewed by SC14 (described in SC14-SA-WP-05) which indicates that the current status of this stock is well above the LRP (with the median value of $SB_{latest}/SB_{F=0}=0.52$). To assist CCMs in the identification and evaluation of an appropriate TRP for south Pacific albacore SC14 also recommends that the Scientific Services Provider provides to CCMs an updated analysis using an approach similar to working paper HSW-WP-05 as presented to the WCPFC Harvest Strategy Workshop held in late November 2015.

7. In view of the decision by WCPFC14 that "CCMs will work together in advance of WCPFC15 to develop TRP proposals" this analysis may need to be provided and discussed at a meeting of the WCPFC South Pacific Albacore Roadmap Working Group in the margins of TCC14 or in conjunction with WCPFC15.

Performance indicators, monitoring strategies and harvest control rules, including a Roadmap for the management of South Pacific albacore tuna (Paragraph 420, SC14 Summary Report)

8. In support of the development of a Roadmap for the management of south Pacific albacore tuna, SC14 reviewed potential elements of the harvest strategy for this species, primarily reference points, the estimation method, and harvest control rules (SC14-MI-WP-02). SC14 endorsed an initial focus on empirical-based estimation methods, using CPUE as the biomass signal, with a secondary focus on model-based approaches. It also endorsed the use of longline CPUE as the primary information source for the estimation method, noting that empirical measures such as CPUE may better align with economic objectives, and they may be easier for some stakeholders to understand. SC14 also reviewed the required criteria for selecting appropriate candidate 'reference' longline fleets that may provide the required CPUE series, and provided feedback to the Scientific Services Provider on additional issues which should be considered in progressing this work. SC14 recommends that WCPFC15 use this working paper to inform development of the Roadmap for improving south Pacific albacore management and requests guidance from WCPFC15 on 1) the south Pacific albacore fisheries to be included in the MSE (e.g. longline and

troll) and 2) the potential management control method for the fisheries (e.g. through catch, fishing effort, etc.). SC14 also recommends that WCPFC15 note the need for ongoing review of monitoring strategy requirements as the harvest strategy develops, ongoing efforts to gather key economic data on the southern longline fishery, and endorse the proposed work plan for development of scientific aspects of a south Pacific albacore harvest strategy.

C. TECHNICAL AND COMPLIANCE COMMITTEE RECOMMENDATIONS

9. TCC14 recommends to WCPFC15 that INFO paper WCPFC-TCC14-2018-IP14 (*An assessment of the number of vessels fishing for south Pacific albacore south of 20S*) be updated and made available on an annual basis and that it includes the following information to the extent possible based on available data:

i. the level of longline observer coverage in the Convention area south of 20°S;
ii. catch and effort information for both the area south of 20°S and the entire Convention area south of the equator from the year 2000 onwards (as the reference years used in south Pacific albacore measures to date); and
iii. the total number of longline vessels fishing in the Convention area south of the equator, since 2000.

(TCC14 draft summary report, para 321)

Annex A

SOUTH PACIFIC ALBACORE TUNA (*SC14 Paragraphs 236 – 246*)

Provision of scientific information

1. SC14 accepted as SC14-SA-WP-05 as providing the best available scientific information for the purpose of stock assessment determination.

Stock status and trends

2. The median, 10 percentile and 90 percentile values of recent (2013-2016) spawning biomass ratio ($SB_{recent}/ SB_{F=0}$) and recent fishing mortality in relation to F_{MSY} (F_{recent}/F_{MSY}) over the structural uncertainty grid were used to characterize uncertainty and describe the stock status.

3. A description of the structural sensitivity grid used to characterize uncertainty in the assessment is set out in Table SPA-1. The regional structure used within the assessment is presented in Figure SPA-1, and the time series of total annual catch by fishing gear for the diagnostic case model over the full assessment period is shown in Figure SPA-2 for the total assessment region, and Figure SPA-3 by model region. Estimated annual average recruitment, spawning potential, juvenile and adult fishing mortality and fishing depletion for the diagnostic case model are shown in Figures SPA-4 – SPA-7. Figure SPA-8 displays Majuro plots summarising the results for each of the models in the structural uncertainty grid, while Figure SPA-9 shows equivalent Kobe plots for SB_{recent} and SB_{latest} across the structural uncertainty grid. Figure SPA-10 provides estimates of reduction in spawning potential due to fishing by region, and over all regions attributed to various fishery groups (gear-types) for the diagnostic case model. Table SPA-2 provides a summary of reference points over the 72 models in the structural uncertainty grid. Figure SPA-11 presents the history of the annual estimates of MSY for the diagnostic case model, compared with annual catch by the main gear types. Finally, Figure SPA-12 presents the estimated time-series (or 'dynamic') Kobe plots for four example models from the assessment (one from each of the combinations of growth types, and natural mortality M set to 0.3 or 0.4)

4. SC14 noted that the median level of spawning biomass depletion from the uncertainty grid was $SB_{recent}/SB_{F=0}$ = 0.52 with a probable range of 0.37 to 0.63 (80% probability interval). There were no individual models where ($SB_{recent}/SB_{F=0}$) < 0.2 which indicated that the probability that recent spawning biomass was below the LRP was zero. SC14 noted that the grid median F_{recent}/F_{MSY} was 0.20, with a range of 0.08 to 0.41 (80% probability interval) and that no values of F_{recent}/F_{MSY} in the grid exceeded 1.

5. SC14 also noted that there was a 0% probability (0 out of 72 models) that the recent fishing mortality had exceeded F_{MSY}.

6. SC14 noted that the structural uncertainty grid for the south Pacific albacore had changed since the 2015 assessment, with the 2018 assessment examining additional axes of uncertainty including assumptions on growth and CPUE standardization approach. As a consequence, the uncertainty identified is higher than in previous assessments.

7. SC14 also noted that the assessment results show that while the stock depletion ($SB/SB_{F=0}$) has exhibited a long-term decline (Figure SPA-7) the stock is not in an overfished state and overfishing is not taking place.

Management Advice and implications

8. SC14 noted that the preliminary estimate of total catch of south Pacific albacore (within the WCPFC Convention Area south of the equator) for 2017 was 75,707mt, which was a 33% increase from 2016 and a 13% increase over 2012-2016. (see SC14-SA-WP-02).

9. Preliminary catch for longliners in 2017 (72,785mt) was 34% higher compared with 2016 and a 14% increase over 2012-2016. Preliminary other gear (primarily troll) catch in 2017 (2,896t) was 17% higher compared with 2016 but a 1% decrease over 2012-2016. (see SC14-SA-WP-02).

10. Based on the uncertainty grid adopted by SC14, the South Pacific albacore tuna spawning biomass is very likely to be above the biomass LRP and recent F is very likely below F_{MSY}, and therefore the stock is not experiencing overfishing (100% probability $F < F_{MSY}$) and is not in an overfished condition (100% probability $SB_{recent} >$ LRP).

11. SC14 recalled its previous advice from SC11, SC12, and SC13 that longline fishing mortality and longline catch be reduced to avoid decline in the vulnerable biomass so that economically viable catch rates can be maintained, especially for longline catch of adult albacore. SC14 recommends that this advice be taken into consideration when the TRP for South Pacific albacore is discussed at WCPFC15.

Table SPA-1. Description of the structural sensitivity grid used to characterize uncertainty in the 2018 south Pacific albacore assessment. Levels used within the diagnostic case are starred.

Axis	Levels	Option
Steepness	3	0.65, 0.80*, 0.95
Natural mortality	2	0.3*, 0.4
Growth	2	Estimated* (K, L_∞) or fixed (Chen-Wells)
Size frequency weighting	3	Sample sizes divided by 20, 50* or 80
CPUE	2	Geostatistical*, Traditional

Table SPA-2. Summary of reference points over all the 72 individual models in the structural uncertainty grid.

	Mean	Median	Min	10%	90%	Max
C_{latest}	61719	61635	60669	60833	62704	63180
MSY	100074	98080	65040	70856	130220	162000
$YF_{recentt}$	71579	71780	56680	62480	80432	89000
fmult	6.2	4.96	1.89	2.44	12.05	17.18
F_{MSY}	0.07	0.07	0.05	0.05	0.09	0.1
F_{recent}/F_{MSY}	0.23	0.2	0.06	0.08	0.41	0.53
SB_{MSY}	71407	68650	26760	39872	100773	134000
SB_0	443794	439800	308800	353870	510530	696200
SB_{MSY}/SB_0	0.16	0.17	0.07	0.1	0.21	0.23
$SB_{F=0}$	469004	462633	380092	407792	534040	620000
$SB_{MSY}/SB_{F=0}$	0.15	0.15	0.06	0.09	0.2	0.22
SB_{latest}/SB_0	0.55	0.56	0.33	0.42	0.69	0.74
$SB_{latest}/SB_{F=0}$	0.53	0.52	0.3	0.37	0.69	0.77
SB_{latest}/SB_{MSY}	4	3.42	1.45	1.96	7.07	10.74
$SB_{recent}/SB_{F=0}$	0.51	0.52	0.32	0.37	0.63	0.72
SB_{recent}/SB_{MSY}	3.88	3.3	1.58	1.96	6.56	9.67

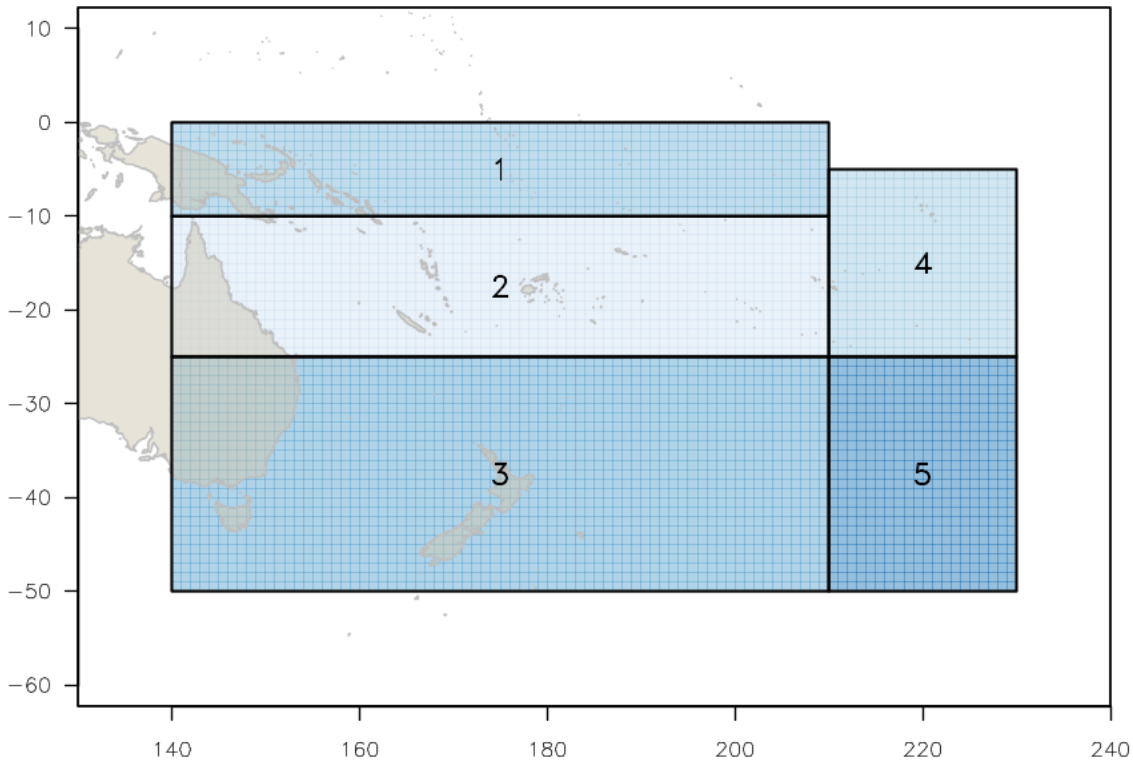

Figure SPA- 1. The geographical area covered by the stock assessment and the boundaries for the 5 regions under the "updated 2018 regional structure".

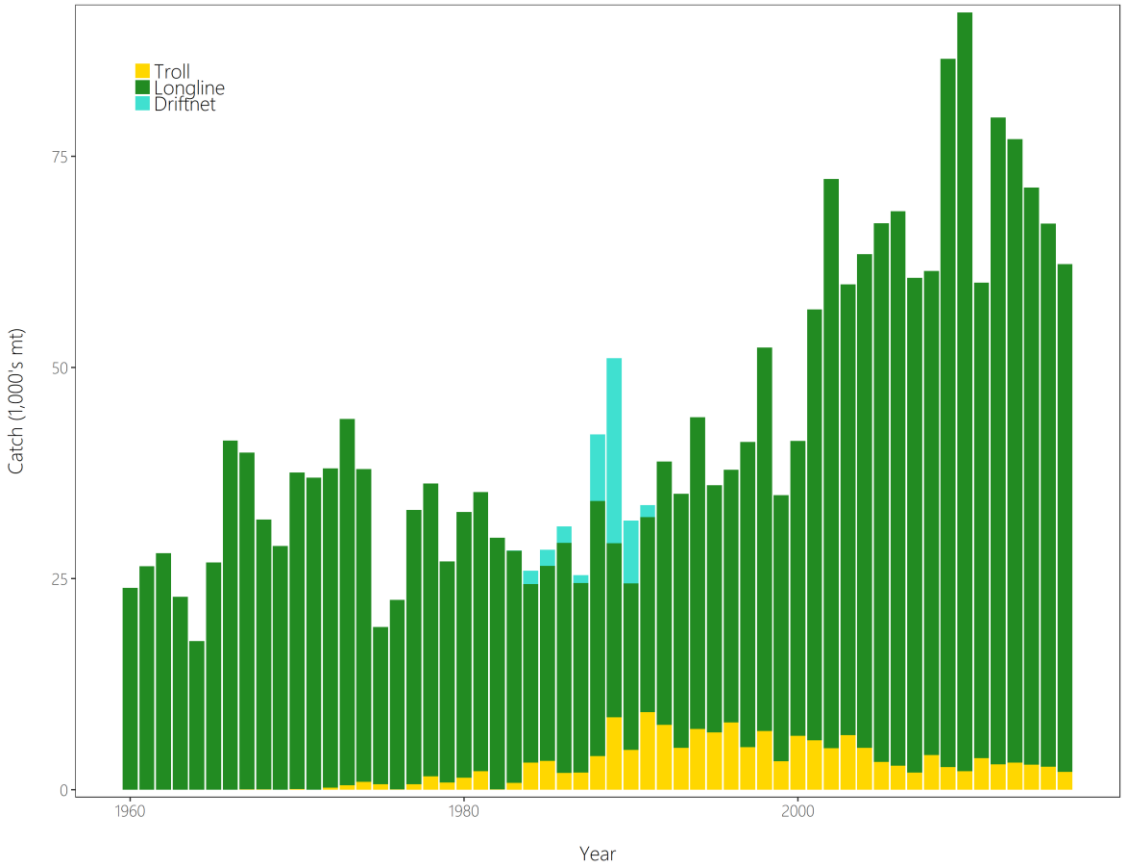

Figure SPA- 2. Time series of total annual catch (1000's mt) by fishing gear for the diagnostic case model over the full assessment period. The different colours refer to longline (green), troll (yellow) and driftnet (turquoise). Note that the catch by longline gear has been converted into catch-in-weight from catch-in-numbers.

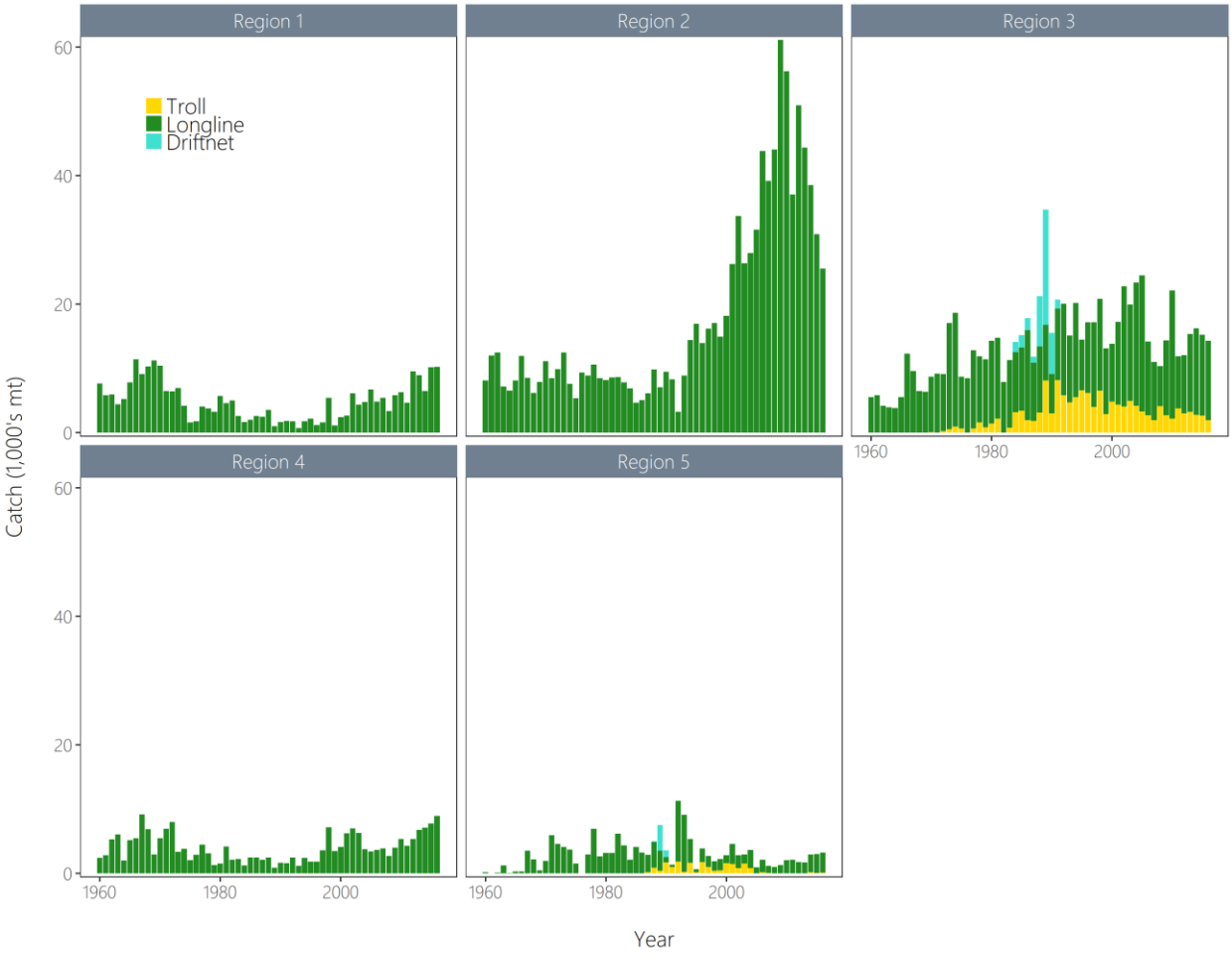

Figure SPA-3. Time series of total annual catch (1000's mt) by fishing gear and assessment region from the diagnostic case model over the full assessment period. The different colours denote longline (green), driftnet (turquoise) and troll (yellow).

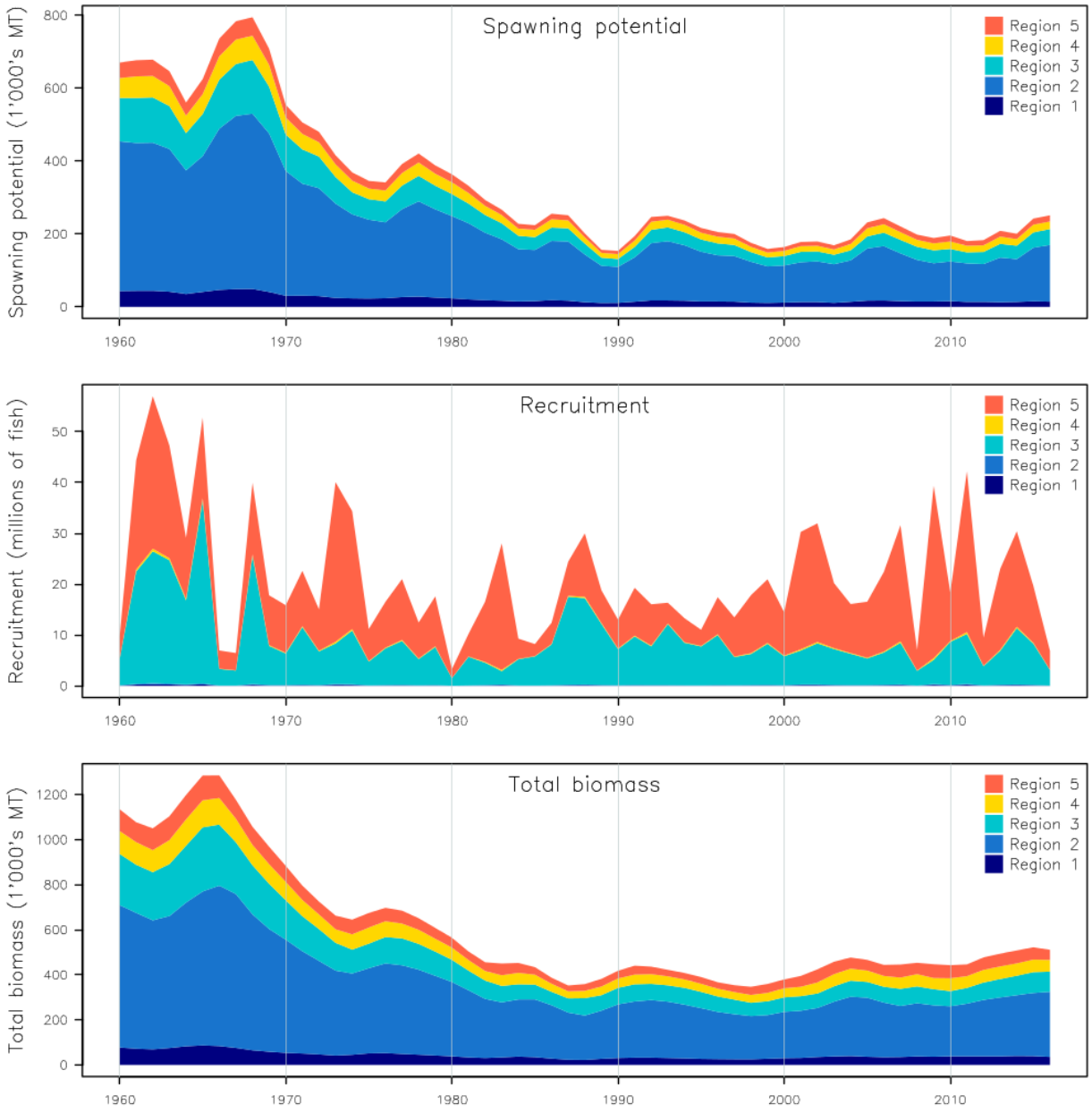

Figure SPA-4. Estimated annual average recruitment, spawning potential and total biomass by model region for the diagnostic case model, showing the relative sizes among regions.

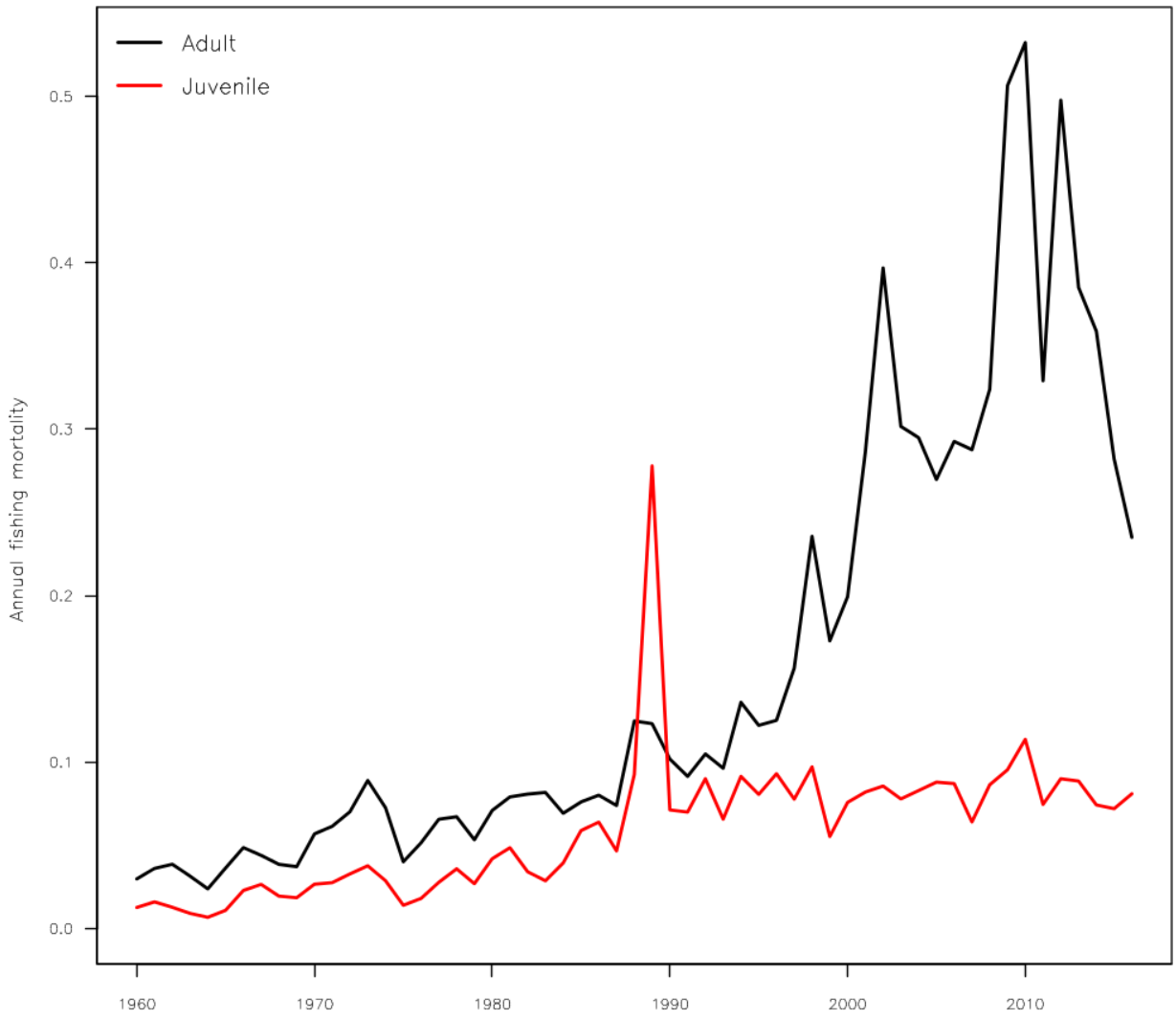

Figure SPA-5. Estimated annual average juvenile and adult fishing mortality for the diagnostic case model.

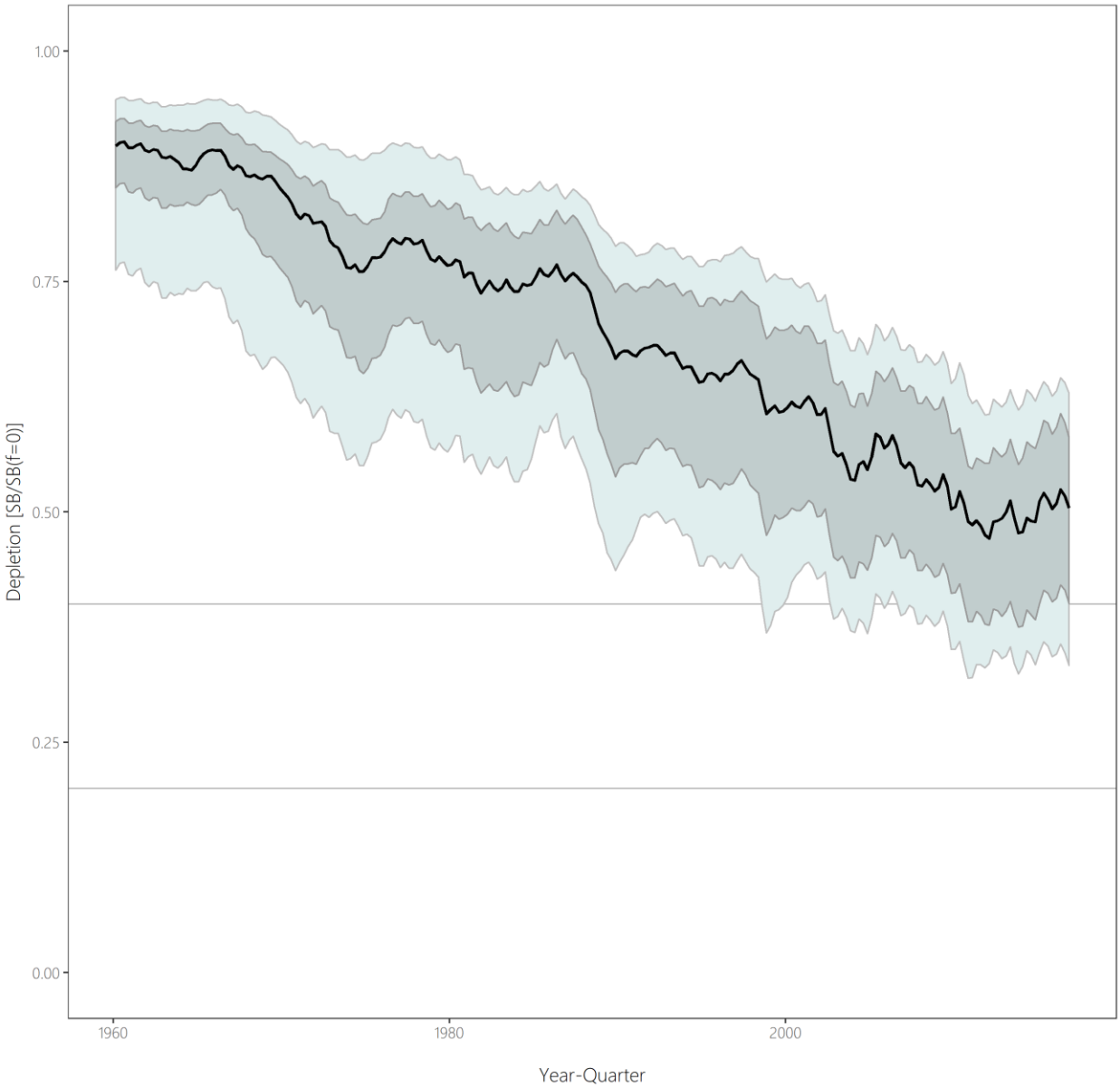

Figure SPA-6. Distribution of time series depletion estimates across the structural uncertainty grid. Black line represents the grid median trajectory, dark grey region represents the 50%ile range, light grey the 90%ile range.

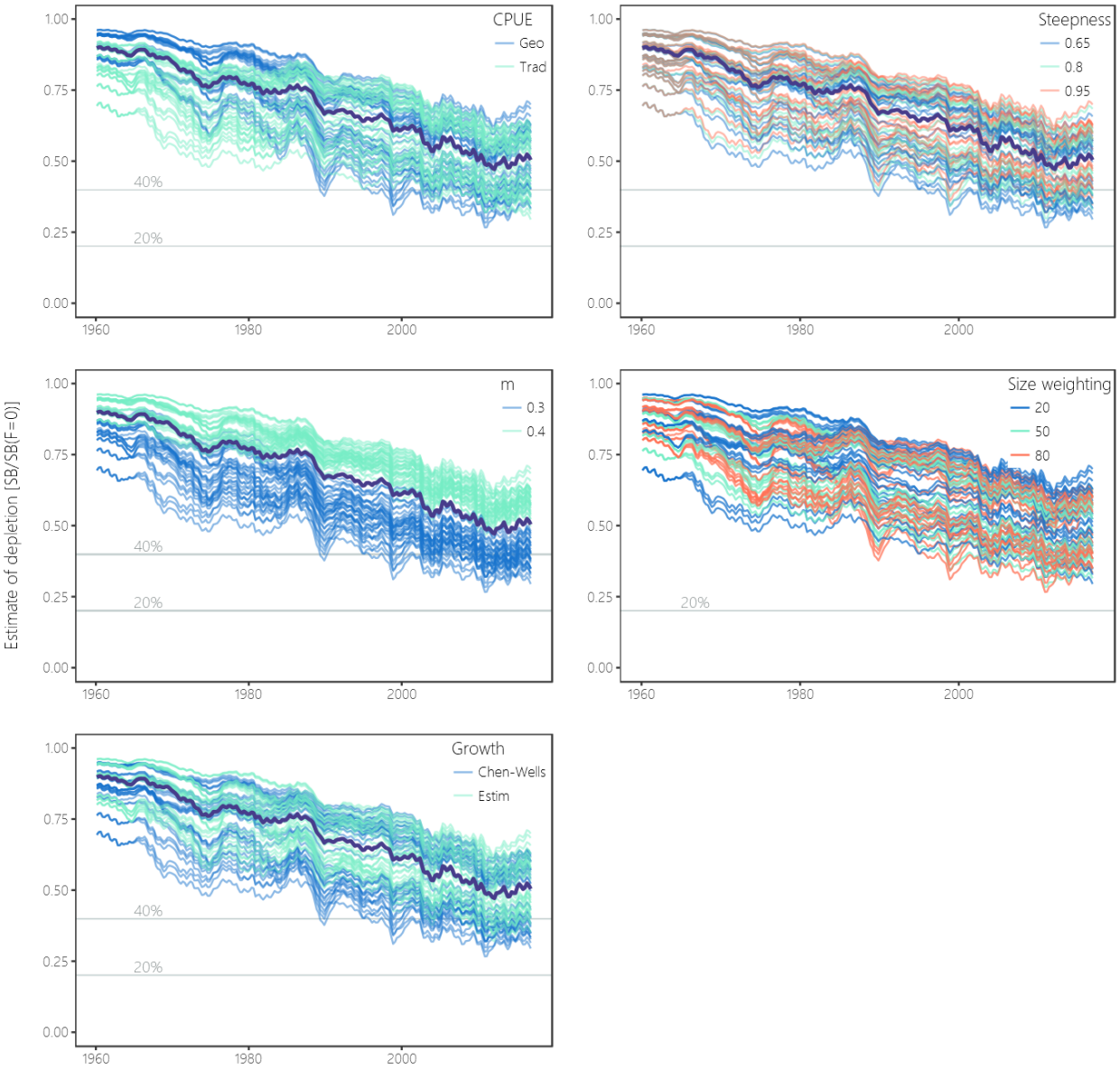

Figure SPA-7. Plots showing the trajectories of fishing depletion (of spawning potential) for the model runs included in the structural uncertainty grid. The five panels show the models separated on the basis of the five axes used in the grid, with the colour denoting the level within the axes for each model.

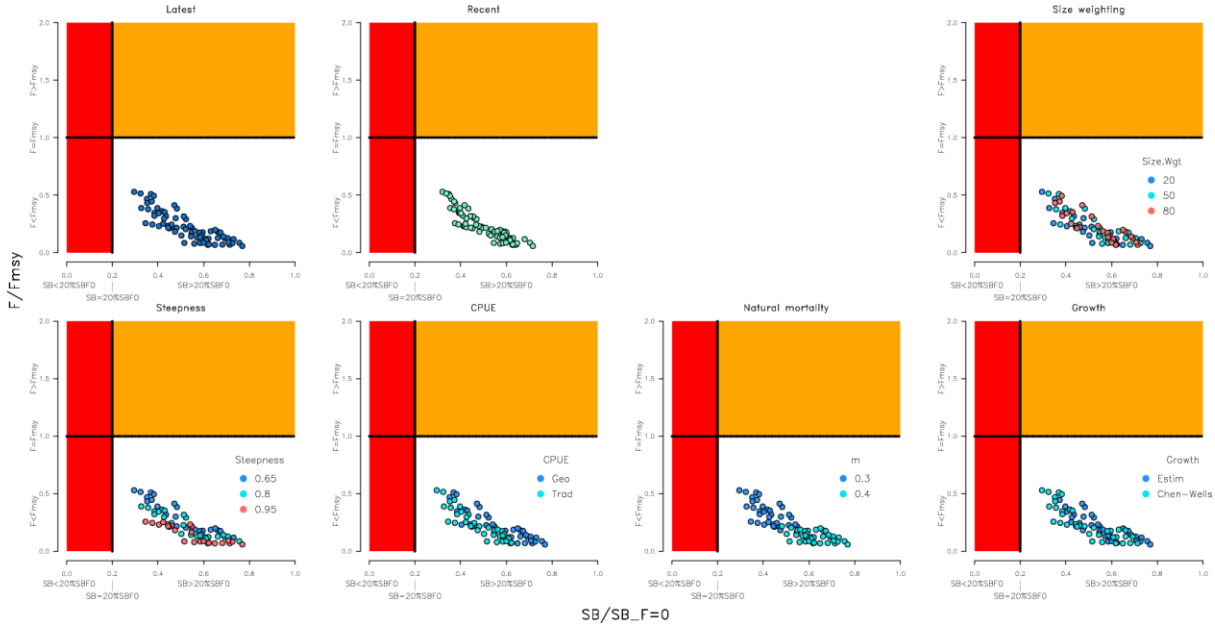

Figure SPA-8. Majuro plots summarising the results for each of the models in the structural uncertainty grid under the $SB_{latest}/SB_{F=0}$ and the $SB_{recent}/SB_{F=0}$ reference points (top left) and each axis of uncertainty.

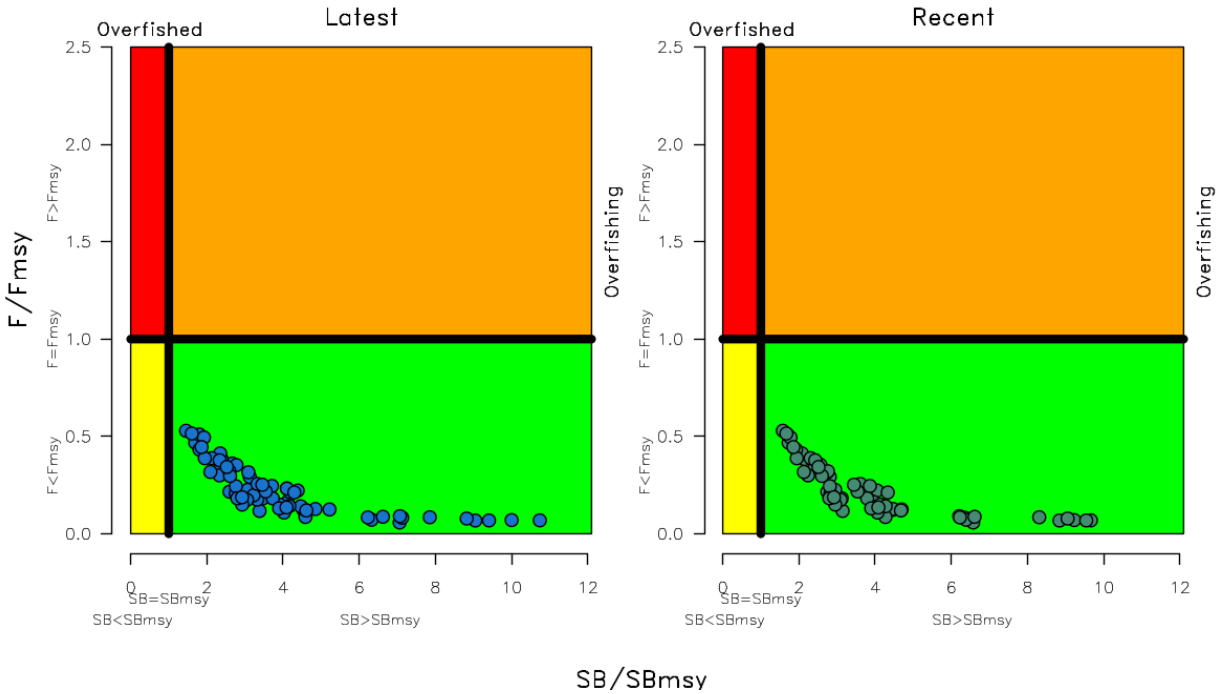

Figure SPA-9. Kobe plots summarising the results for each of the models in the structural uncertainty grid under the $SB_{latest}/SB_{F=0}$ and the $SB_{recent}/SB_{F=0}$ reference points.

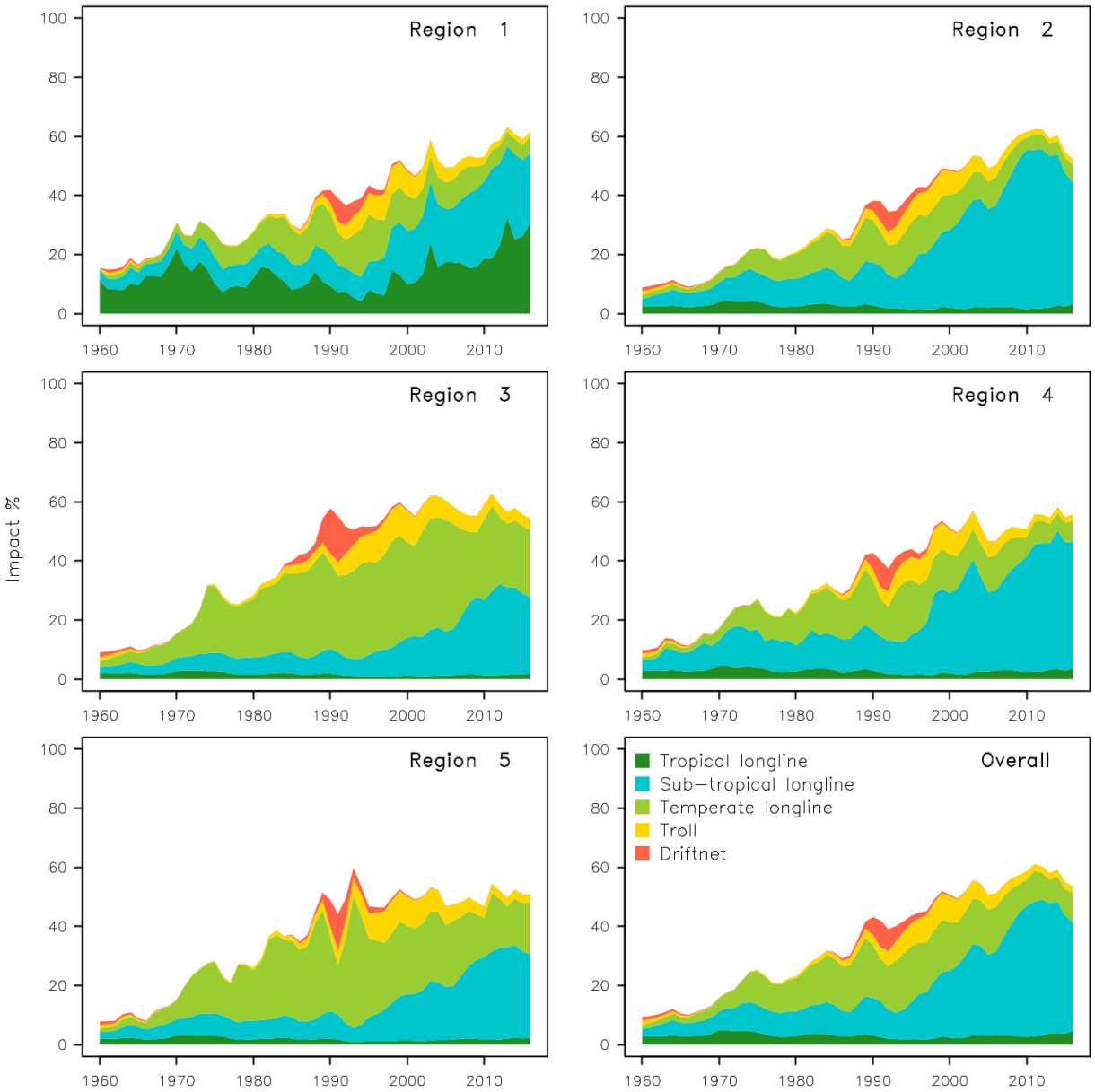

Figure SPA-10. Estimates of reduction in spawning potential due to fishing (fishery impact = 1-SB_{latest}/$SB_{F=0}$) by region, and over all regions (lower right panel), attributed to various fishery groups for the diagnostic case model.

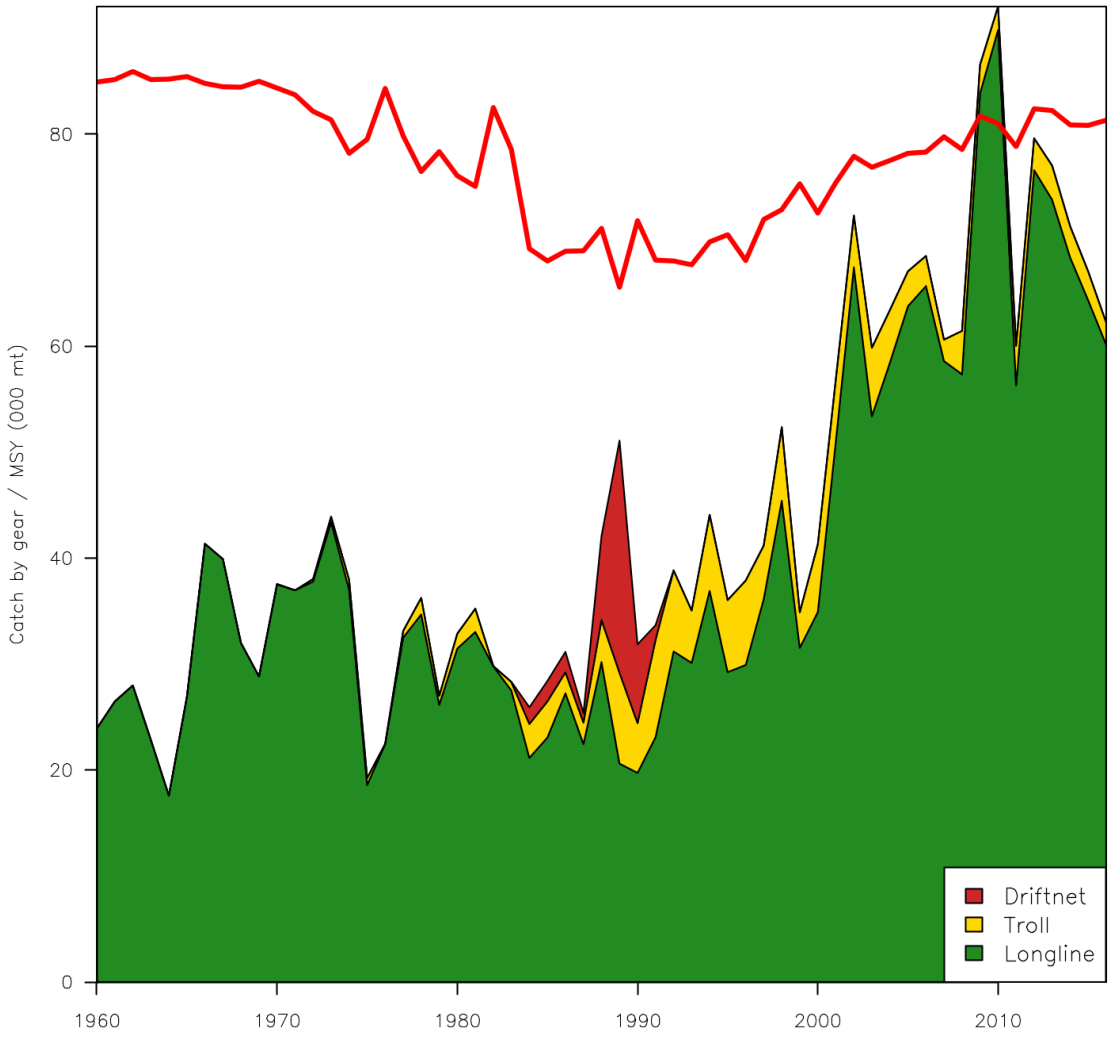

Figure SPA-11. History of the annual estimates of MSY (red line) for the diagnostic case model compared with annual catch by the main gear types.

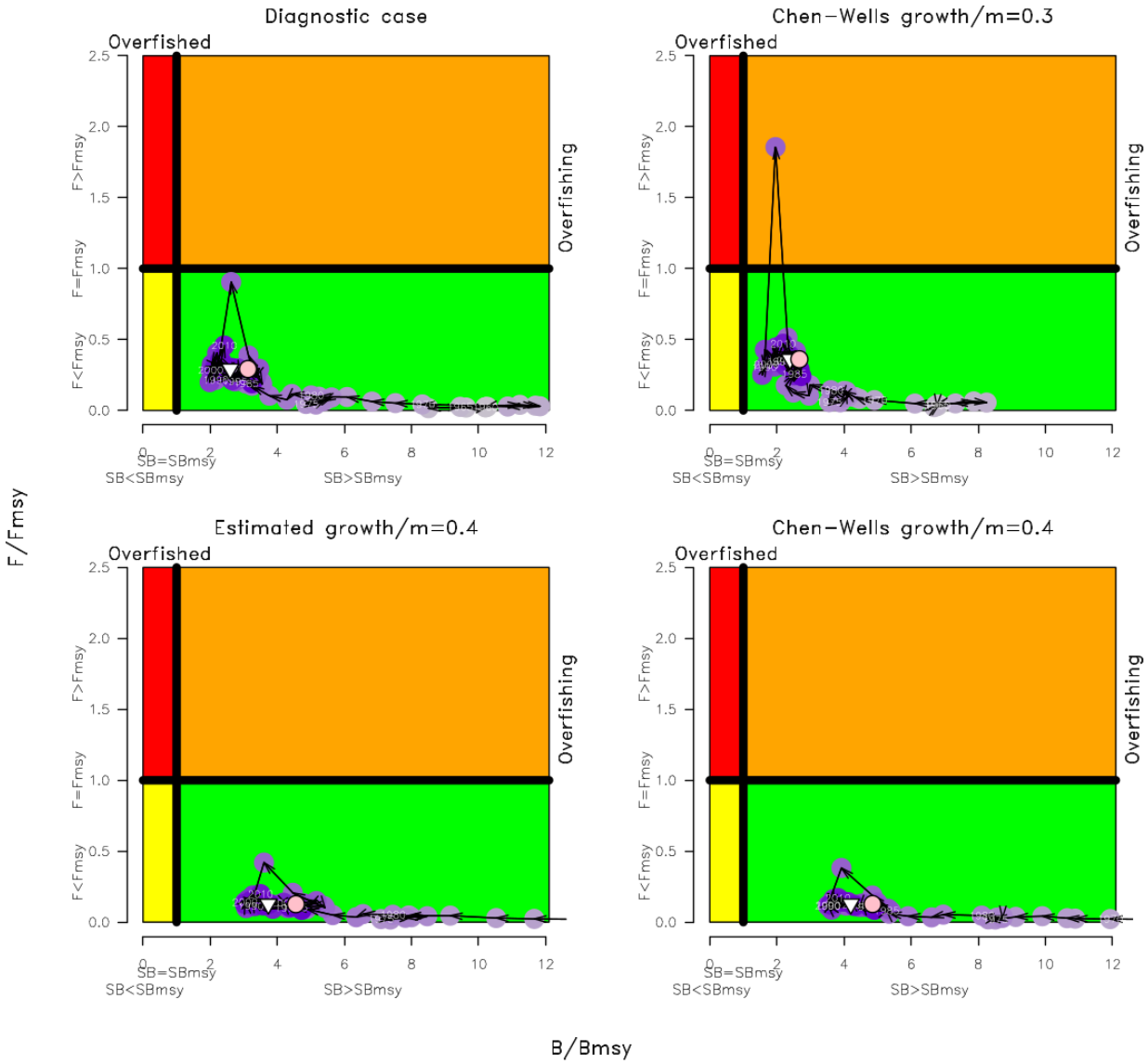

Figure SPA-12. Estimated time-series (or 'dynamic') Kobe plots for four example models from the assessment (one from each of the combinations of growth types, and natural mortality *M* set to 0.3 or 0.4).