Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

Report of the Third Meeting of the Management Procedure Workshop

19-24 April 2004
Busan, Republic of Korea

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Agenda Item 1. Terms of Reference and adoption of agenda

1. The Workshop was opened by Mr Penney, independent Chair of the Scientific Committee and Chair of the Workshop. The Chair noted that this was the first CCSBT meeting to be held in Korea and he thanked Korea for hosting the meeting.
2. The draft agenda circulated prior to the workshop was accepted and is at **Attachment 1**. The Chair outlined the terms of reference for the workshop.
3. Participants introduced themselves and the list of participants is at **Attachment 2**.
4. Meeting documents were classified according to the agenda items for which they were relevant. The list of documents is at **Attachment 3**.

Agenda Item 2. Feedback from CCSBT on management objectives

5. The Chair summarised the feedback provided by the Extended Commission at CCSBT 10 on management objectives and the Extended Commission's requirements for a management procedure.

Agenda Item 3. Performance of candidate management procedures

Presentations of results

6. Documents CCSBT-MP/0404/04, 06, 07, 08, and 09 were considered under this agenda item. The MPs presented in these papers span a range of approaches, including purely CPUE-based rules, model-based rules (e.g. Fox production model and Kalman Filter) and hybrid rules (model and age-based catch or CPUE).
7. Results on the performance of 7 MPs (CON, CPU_05, CPU_10, CPR, FXA, FXR, KAL) were presented in CCSBT-MP/0404/04. Following requests at the last MP workshop for developers to present a reduced set of candidate MPs, a subset of 3 (FXA, FXR, KAL) was proposed for consideration by the workshop. This choice was complex, since performance of the MPs was quite similar in general, and selection was based on the finer and more subtle aspects of performance. The KAL MP was included in this final selection because it showed good robustness to the trials which standardised selectivity over a narrow age range (A12 robustness trials), even though its performance was poor in terms of very high interannual TAC variability.

8. CCSBT-MP/0404/06 provides further results on the Fox model–based MP, presented in the last SAG/SC meeting. A variation which makes use of longline catch-at-age information (4-6 yr olds) in setting the TAC to avoid an inevitable initial TAC reduction if recent recruitment has been good, was also tested (CCSBT-MP/0404/06). Only partial success was achieved, and greater variance in initial TACs was observed. This MP did not perform well with respect to resource recovery for robustness trials which standardized selectivity over a narrow age range.

9. Two CPUE-based MPs were presented in CCSBT-MP/0404/07 (TAI_01, TAI_02). The document notes that the median biomass ratio (B2022/B2002) would reach 0.78, if the current TAC is maintained and makes a recommendation for a moderate target set at 0.88, which is 10% higher than maintaining the current TAC. The TAI_02 rule introduces a negative feedback component in terms of the percentage change in TA C, based on theoretical economic consideration of the inverse relationship between price and demand. This rule leads to some 'flip-flop' behaviour in the TAC trajectories because of the feedback mechanism.

10. Results from testing four CPUE-based MPs (HK5, HST, STL, and KH8) were reported in CCSBT-MP/0404/08. Based on the consistency in TAC and biomass trend, three MPs (HK5, HST, STL) which utilised both CPUE level and slope to specify TAC were selected for further consideration.

11. The effectiveness of adding a mechanism of TAC adjustment by recruitment information to a Fox model-based MP (DMN) was explored in CCSBT-MP/0404/09. CPUE of age 4 fish was used as an indicator of recruitment status. This MP responded accordingly to different recruitment conditions, setting higher TACs when recruitment was good and lower TACs when recruitment was poor. Adding the adjustment mechanism increased variance in TAC but improved the TAC performance compared to the MP without the adjustment.

Process for comparing Candidate Management Procedures (CMP)

12. The workshop prepared plots to compare performance of the range of rules presented to the workshop. These are in **Attachment 4**.

13. With regard to tuning levels differences in performance across tuning levels were greater than differences between the rules tuned to one level. There was general agreement that, the lower and upper bounds were not very realistic with regard to the range of levels the Commission is likely to consider. Irrespective of the MP, the 0.7 tuning had unacceptably high probabilities of stock collapse. The 1.5 tuning requires severe and unrealistic reductions in TAC, to levels close to zero, in order to achieve stock recovery to that level. Alternative levels of tuning were therefore proposed as: 0.9 and 1.3.

14. In some cases (e.g. CCSBT-MP/0404/04) rules 'crossed over' in terms of behaviour at two different tuning levels, for example one rule that performed best under 1.1 tuning, performed worst under 0.7 tuning in terms of TAC and spawning biomass. The workshop considered that comparisons of performance should be made for 1.1 and for 0.9 tuning. Some MPs had already been tuned to 0.9, whereas others had to

be tuned to that level at the meeting. Since rules were seen to be much more similar at the higher tuning levels (such as 1.5), and since results for this tuning level were only made available at the end of the meeting, 1.3 was not used for the purpose of comparing behaviour and making a selection of a subset of CMPs to present to the Commission.

15. The workshop focused primarily on the 3-year TAC change option for the purposes of comparing behaviour, because of the high importance of TAC stability and feedback from the Commission (CCSBT 10) regarding their preferences for frequency of TAC changes.

16. High correlation between some performance measures was again noticed in results, and this enabled the workshop to agree on a reduced set of performance measures to consider for comparison of CMPs.

17. The workshop noted that in addition to the previously identified key trade-off axes, such as TAC and biomass performance, several new differences between the CMPs have emerged from the results presented at this meeting. One of the clearest of these relate to the TAC performance in the initial years versus the last 10 years. In a general sense, some rules reduce TACs immediately and by relatively large amounts, but then increase TACs in the last 10 years. At the other end of the spectrum, rules reduce TACs much more gradually, but that usually implies that TACs continue to decline slowly over the last 10 years. This has implications for the risk of low spawning biomass in the short to medium term, with higher risks for rules which reduce TAC slowly than for those which reduce TAC rapidly.

18. The workshop identified several key 'axes' (see Table 3.1) along which relative performance of each CMP was ranked on the basis of the performance measures:

    - Early TAC reductions
    - Longer term TAC levels
    - Risk of low SSB (10% SSB over time and 10% MinB)
    - Increase in TAC at end of period
    - Range of TAC variation
    - Post 2022 median biomass
    - Probability of low TAC
    - Interannual (AAV) and max TAC change
    - TAC change reversals in early years (A-stat)

Comparison of CMPs at 1.1 Tuning Level

19. Results in Table 3.1, based on 1.1 tuning and a 3-year TAC-change frequency, shows that the CMPs tend to cluster together into three clusters. At the left hand end of the table (rules FXR, FXA, KAL; Cluster A) tend to cut TACs early and therefore have low risk of low SSB in the short term. These rules also have relatively higher interannual TAC variability (AAV). At the end of the period, the range (10-90th percentile) of TACs is larger, but the range of biomass is smaller.

20. At the right hand side of the table, (e.g. TAI and D&M rules; Cluster C) the interannual changes in TACs are deliberately constrained. This leads to high short term TACs and low interannual TAC variability, but implies higher risk of low SSB in the short term. At the end of the period these rules tend to have narrower ranges of TAC but wider ranges of biomass.

21. The TAI_03 rule forms part of Cluster C, but has distinct behaviour in a few regards. (TAI_03 is essentially identical to TAI_02 presented in CCSBT-MP/0404/07, but with a pre-multiplier to allow it to be tuned to the 1.1 level). This tuning was done at the meeting. It shares the characteristic of a narrower range of TAC and a wider range of biomass at the end of the period, but its behaviour differs from the other rules because the negative feedback leads to 'flip-flop' (increases followed by decreases) behaviour in TACs which leads to the 10-90 percentile range on TAC expanding and contracting over time.

22. In the middle of the table (STL, DMN, HK5, HST; Cluster B) the rules show intermediate performance to the other clusters. TAC changes in the short term are not as large as in cluster A, but the rules show more flexible behaviour than those in cluster C. At the end of the period, TAC and biomass ranges are intermediate to the other clusters.

23. Results for most of the robustness trials showed relatively small differences in performance between the robustness trial and the appropriate comparison from the reference set, irrespective of MP. The trials which showed large sensitivity were those which standardised selectivity over a smaller set of ages (low_A12 and med_A12). Here differences between MPs were apparent (see table 3.1), with cluster A showing higher robustness relative to the others. The KAL_01 rule, which had poor performance in some other respects (e.g. high AAV), showed particularly good robustness. The middle cluster of rules all showed intermediate robustness to these trials.

24. With regard to the trials under different recruitment assumptions, all rules responded well in the sense that they tended to increase TACs when recruitment was good and reduced TACs when recruitment was poor, but to a greater or lesser extent depending on the rule (table 3.1). The middle cluster of rules showed medium to high robustness in these trials.

25. The workshop also considered the performance for the high and low steepness scenarios within the reference set (but integrated over the two values of the parameter which defines the relationship between CPUE and biomass) (Table 3.1). In the low steepness scenarios it is the biomass performance that is of more concern, whereas in the high steepness scenarios it is the TAC performance that is of more interest. Results here show that rules designed with less constraints on inter-annual TAC variability can respond faster and therefore increase or reduce TACs faster than those which are more constrained by design.

Comparison of CMPs at 0.9 tuning level

26. Not all rules had been tuned to 0.9 because this was not originally in the required set of tuning levels for this workshop. Some rules had been tuned, but others were tuned at the meeting. Only those for which results could be made available at the meeting are therefore shown in Table 3.2. In the case of cluster A, FXR_01 is given. In the case of the D&M rules, the workshop agreed to replace them with D&M_03. This version of the rule has performance intermediate to D&M_01 and D&M_02 shown in Table 3.1.

27. Results at the 0.9 tuning, showed very little differences in biomass trends after 2022 between different rules. This is in contrast with results for the 1.1 tuning where the different rules showed divergent biomass trends after 2022. Since reversals of trends were noted to occur between the 0.7 and 1.1 tuning levels, it was thought that this similarity could be because "cross-over" occurs close to or at 0.9.

28. It was noted that the distinction in behaviour between clusters identified in Table 3.1 was now much harder to see. At 0.9 tuning, it is therefore much harder to classify rules because their behaviour is much more similar than at 1.1 tuning level. This is partly due to the fact that, at 1.1 tuning, the rules which cut TACs back strongly in the first 10 years need not cut back as strongly to achieve the 0.9 tuning level. The workshop did not note any other features which differed from the trends apparent from table 3.1.

Table 3.1: Comparative performance for tuning level 1.1 and TAC-change frequency of 3 years.

	Ideal	FXR_01	FXA_71	KAL_01	STL_01	DMN_25	HK5_01	HST_01	TAI_03	D&M_01	D&M_02
early TAC reductions	L	**H**	**H**	**H**	**M**	**M**	**M**	**L**	**L/M**	**L**	**L**
longer term TAC levels	H	**H**	**H**	**H**	**M**	**M**	**M**	**L**	**L**	**L**	**L**
risk of low SSB (10% SSB and 10% MinB)	L	**L**	**L**	**L/M**	**L/M**	**L/M**	**L/M**	**H/M**	**H**	**H**	**H**
Increase in TAC at end of period	H	**H**	**H**	**H**	**M**	**M**	**M**	**L**	**L**	**L**	**L**
Range of TAC variation	?	**H**	**H**	**H**	**M/H**	**M**	**M**	**L/M**	**L**	**L**	**L**
Range of biomass variation	?	**L**	**L**	**L**	**M**	**M**	**M/H**	**M/H**	**H**	**H**	**M/H**
post 2022 median biomass	H	**L**	**L**	**M**	**M**	**M**	**M**	**H**	**H**	**H**	**H**
probability of low TAC	L	**L**	**M/ L**	**H**	**M**	**M**	**M**	**M**	**M**	**M**	**M /L**
AAV and max Tac change	L	**H**	**H**	**H**	**M**	**M**	**L**	**L**	**H**	**L**	**L**
TAC change reversals (A-stat)	L	**M**	**M**	**H**	**M**	**M**	**L/M**	**L**	**H**	**L/M**	**L**
Med1_A12/Low1_A12	H	**H**	**H**	**H**	**M**	**M**	**M**	**M**	**L**	**L**	
No_AC	H	**M**	**M**	**M**	**H**	**M/H**	**H**	**M/H**	**L**	**M/L**	**L**
Low_Rec	H	**M**	**H**	**M**	**M**	**M/L**	**H**	**L**	**L**	**L**	**L**
Steepness (high) effect on TAC	H	**H**	**H**	**H**	**M**	**M**	**M**	**M/L**	**L**	**L**	**M/L**
Steepness (low) effect on biomass	H	**M**	**H**	**H**	**H**	**H**	**M**	**M**	**L**	**L**	**L**

Notes: The two rows on steepness effects reflect performance of the MP 1) in high-productivity scenarios as responsiveness in TAC; and 2) in low productivity scenarios in response to biomass risk.

Table 3.2: Comparative performance for tuning level 0.9 and TAC-change frequency of 3 years.

	Ideal	FXR_01	STL_01	DMN_25	HK5_01	HST_01	TAI_03	D&M_03
early TAC reductions	L	**H**	**M/L**	**M**	**M/H**	**L**	**L/M**	**L**
longer term TAC levels	H	**M/L**	**M**	**H**	**M/H**	**M**	**L**	**M**
risk of low SSB (10% SSB and 10% MinB)	L	**L**	**M/L**	**L**	**M/L**	**L**	**H**	**M**
Increase in TAC at end of period	H	**M/H**	**M**	**H**	**M/H**	**M**	**L**	**M**
Range of TAC variation	?	**H**	**M**	**H**	**M**	**H**	**L**	**L**
Range of biomass variation	?	**L**	**M**	**L**	**M/H**	**M**	**H**	**M/H**
post 2022 median biomass	H	**L/M**	**M**	**L/M**	**M**	**M**	**M**	**M**
probability of low TAC	L	**M**	**M**	**M**	**M**	**H**	**L**	**L**
Interannual and max TAC change	L	**M/H**	**M**	**M**	**L**	**L/M**	**H**	**L**
TAC change reversals (A-stat)	L	**M/H**	**M**	**M**	**L**	**L**	**H**	**M/L**

Notes: The two rows on steepness effects reflect performance of the MP 1) in high-productivity scenarios as responsiveness in TAC; and 2) in low productivity scenarios in response to biomass risk.

Agenda Item 4. Selection of candidate management procedures

4.1 Process for selecting a reduced set of MPs

29. Documents CCSBT-MP/0404/04, 10 and 11 were considered under this agenda item.

30. Document CCSBT-MP/0404/04 identifies 6 specific decisions that need to be made by the Commission with regard to the selection of an MP: a decision rule, frequency of TAC change, first year to implement an MP, tuning level, metarules and implementation process. The document considers that these could be addressed in a sequential approach. The paper suggests that it is not just the relative performance of a candidate management procedure (CMP) that is important, but also the absolute performance, in the sense of probability statements about TAC and biomass levels, for any chosen tuning level. Both a high probability of achieving a desirable outcome and a low probability of seeing highly undesirable outcomes should be

considered. Cumulative probability plots, for example, of median B2022/B2002 and/or B2032/B2002 were found to be very useful in this regard.

31. Document CCSBT-MP/0404/10 considers that long term rebuilding, consistency in TAC and biomass changes, and stability in TAC were key considerations for the choice of a candidate management procedure (CMP). It was found that different CMPs could obtain similar goals, but that subtle differences in behaviour among rules were sometimes not reflected in the set of performance measures. Plots of frequency distributions of TAC and biomass in 2022 and in 2032 were found to be useful in this regard. The paper suggests that the inclusion of safeguards in a decision rule should be considered in order to respond in time when events at the lower end of what is expected, e.g. biomass decline, occur, particularly in the case of an 'aggressive' MP. Robustness of CMPs to the different recruitment scenarios is also considered to be desirable. The authors also indicate their preference toward purely CPUE-based decision rules as long as comparable performance can be obtained.

32. Document CCSBT-MP/0404/11 presents feedback from the Korean tuna industry on issues considered to be relevant to the selection of candidate management procedures (CMPs). These views are similar to those reported to CCSBT 10 from the industry consultations. The stability of TAC was identified as one of the most important factors. Conservation and optimum utilisation objectives were also considered to be important.

33. In response to a question regarding the choice of 'target' year for rebuilding, the Chair reminded the workshop that the Commission was willing to reconsider the target year, on the basis of results considered at this meeting and guidance from this workshop.

34. The workshop discussed the issues surrounding the choice of a reduced set of CMPs to present to the Commission. The process developed by the workshop for comparing the performance of all rules, captured some of the key performance measures which were also considered important for selection, and these are given in Section 3 and Tables 3.1 & 3.2.

35. Overall TAC performance, TAC stability, and probability of low TAC were considered to be important. It was, however, noted that average TAC performance of two rules may be similar, but may be achieved in different ways. Some rules may take large early TAC reductions with increases in TAC towards the end of the testing period. Other rules may only take small TAC reductions in the near future, but may then need to continue slowly reducing TACs to achieve the same tuning level. The comment was made that, from an industry point of view, there may be an implicit discount rate, in the sense that large reductions in the near future, say 5 year's time, may be considered less desirable than the same reduction in, say 10 year's time.

36. Risk of low SSB, change in this risk over time, and the length of time spent at low SSB were considered to be important. Although rules tuned to a given level of B2022/B2002 had similar biomass trajectories up to that point, behaviour after 2022 could differ and the behaviour of the median biomass trajectory after 2022 was considered to be important. There was general agreement that appropriate safeguards

should be incorporated to the extent possible. Appropriate safeguards would need to be discussed and incorporated, before MP implementation if possible, but these could also be incorporated after MP implementation.

37. There was also some discussion about the type of rule, for example, model-based, purely CPUE based, or a hybrid between these approaches. On the one hand, simple CPUE rules are easy to understand intuitively and less of a 'black-box'. Some considered that rules which use level and slope of CPUE, possibly also with an age-based index to deal better with recruitment may be preferable to ones which only use one of these components. On the other hand, model based rules use catch and CPUE, and have the capability to learn through estimating parameters which reflect productivity. The model-based rules presented at the workshop used relatively simple models.

38. There were some concerns, based on the 0.7, 1.1 and 1.5 tuning levels, that there may be an interaction between the choice of a rule and the tuning level, particularly for levels between 0.7 and 1.1 (for example, some rules which performed well at 1.1, performed poorly at 0.7). The workshop noted that although there was potential for interaction between the choice of decision rule and tuning level (see above), the reduced range of tuning levels this was not likely to be a major problem. Therefore, the workshop decided to structure its discussion on 1) the selection of CMPs to put forward, 2) the choice of frequency of TAC change, and 3) the choice of start year for implementation of an MP.

4.2 Selection of CMPs

39. During evaluation of results from all decision rules presented to the workshop, a summary table was developed (Table 3.1, section 3 of this report). This summary showed that rules could be grouped together roughly in three clusters which show somewhat different behaviour (see section 3). On the basis of this, the workshop selected one rule from each cluster to put forward to the Commission. A fourth rule, TAI_03, was also included because it had distinct enough behaviour in some regards compared to the other rule in its cluster. The four rules are:

FXR_01, HK5_01, D&M_03 and TAI_03

40. The FXR rule was selected from the first cluster because it showed better performance than the other two (KAL and FXA) over most of the performance measures. KAL had particularly large AAV statistics but had only been retained initially because of good performance in terms of robustness trials (low A12 and med A12). There was more similarity between FXA and FXR, but FXR had higher values for the lower 10th percentile of TAC as well as lower risk.

41. The HK5 rule was chosen mainly because its performance was in the middle of the range of the four in that cluster, and as such provided a good balance between the characteristics of the rules in the other two clusters.

42. The third cluster in Table 3.1 contains rules D&M_01 and D&M_02. A third version, D&M_03 (presented in CCSBT-MP/0404/06) was selected for the third cluster

because it showed behaviour intermediate to D&M_01 and D&M_02. The reason for also including TAI_03 from this cluster is given above.

43. The workshop considered the effects of different choices of frequency of TAC changes on the performance of the four rules. It was noted that the performance D&M_03 with annual TAC changes was quite similar to the performance of FXR_01 under 3-year TAC changes. Both rules are based on the Fox production model, but with differences in the details of the rules themselves. One main difference, which explains some of this similarity is the fact that D&M_03 has a high carryover factor (the proportion of the previous TAC that is included in the calculation of the next TAC) on the TAC, whereas FXR does not use a carryover factor when calculating TAC. In this case, the 3-year blocks of TAC essentially mimic the behaviour of a high carryover.

44. In those rules with no or low carry-over factors the annual TAC cases show high interannual TAC variability as expected. The TAI_03 rule had the highest carryover factor but also showed high interannual TAC variability. This behaviour is due to the negative feedback built-in for economic reasons.

45. The workshop noted that, for some rules, there was interaction between a rule's performance and the frequency in TAC change. For example, D&M_03 shows a continuous decline in median TAC over time for the 3yr TAC frequency case, whereas it shows a slight increase and 'levelling out' in the annual case. It was agreed that, in general terms, there were no clear major advantages in using a 1 year over a 3 year TAC change frequency.

46. With regard to the 5 year block TACs, the workshop noted that although there was not much difference in general performance, this option implies bigger changes when the TAC is set, and under the current set of trials this often means big cuts.

47. It is important to recall that the 1-year case makes the first TAC change in 2006 compared to the 3 and 5 year changes which both make the first TAC change in 2008. The effect of implementing an MP earlier than the years used in the trials was not tested prior to or at the meeting. In a qualitative sense, however, the sooner an MP is implemented, the more likely the risk of low SSB will be reduced.

48. One issue related to multi-annual TACs that was not tested is one where the change in TAC is phased in over several years. However this would not be expected to alter the performance of MPs.

49. As noted in Section 3, all rules were sensitive to the robustness trial which standardises selectivity over a narrow age range.

Overall performance of the reference case model

50. The reference case developed for the purpose of testing candidate MPs represents a wide range of scenarios, each weighted based on historical data up to 2000 together with expert judgment.

51. Stock projections done with the reference set provide estimates of probabilities that the stock reaches different levels of rebuilding. Although in previous workshops

some problems related to the model structure were recognized, the probabilities provided based on the reference case represented our best estimates of the risks involved in following different management options.

52. New information made available during this meeting indicates that:

    - The reference case model predicts with near certainty that SSB and CPUE will decline under current catches, a prediction that is inconsistent with the advice on stock status provided in 2001 through 2003.
    - It appears that the operating model may be too certain in its predictions: recruitments estimated for 1998-1999 show unrealistically narrow confidence bounds in MCMC trials.
    - Predictions of CPUE declines are inconsistent with new **nonstandardized** CPUE data for 2001 and 2002, which fall above the 95% confidence bounds estimated from the reference set. This however may change once the medians of the four standardised CPUE series for 2001 onward become available. Analyses show that there are some differences in direction between three year trends in nominal and median CPUE series in the past.
    - It was pointed out that the lack of small fish in the Japanese LL fishery in 2003 and recent drops in the Indonesian catch are likely to be inconsistent with model predictions.

53. All new information needs to be considered before drawing conclusions about performance of the operating model.

54. In spite of these discrepancies and problems in model structure, the reference case model proved to be valuable as a tool for evaluating performance of different MPs. In particular, the results provide an adequate representation of trade-offs between different performance statistics associated with the different candidates.

55. Given the problems discussed above, however, the estimates of probabilities of meeting different stock rebuilding targets are considered to be reliable only in relative terms.

56. Estimates of absolute probabilities are likely to change in future updates of the model.

57. The reference case model will be updated and used to assess stock status together with other assessment models during the next SAG. Advice to the Commission on probabilities of rebuilding and TAC performance is critical to understand the implications of different tuning levels. Noting that management advice should be provided based on the most current information, the workshop concluded that the probabilities of reaching rebuilding targets and of future TACs under different candidate MPs should be updated and the MPs should be retuned.

58. The recommended terms of reference for the SAG in this context are:

    - To update the operating (reference case) model, simply by adding data for 2001 and onwards and leaving all aspects of the estimation procedure unchanged. It was recommended that Vivian Haist conduct the OM update for presentation to the Scientific Committee. It was further recommended that she would clean the

OM code and distribute the cleaned version to members. This should be available two weeks after the new data are made available.

- To conduct an in-depth evaluation of the consistency of the operating model predictions with the assessment results.
- To advise on whether the current operating model structure (updated with the new data) is an adequate model to use for computing probabilities of meeting rebuilding targets under different candidate MPs and,
- If not, initiate a process to update the model structure.

Agenda Item 5. Metarules, assessments and special circumstances

59. A discussion paper on the scientific issues related to metarules and implementation issues associated with the MP (CCSBT-MP/0404/05) was presented. In the context of the management procedure, metarules can be thought of as "rules" which prespecify what should happen in unexpected, exceptional circumstances. Metarules also have a role to play in cases where circumstances have changed substantially. Examples of this might be where the range of uncertainty used in simulation testing of the decision rule no longer overlaps with the situation implied by the new circumstances, or where the decision rule appears not to be performing as expected on the basis of the simulation evaluations.

60. The workshop considered the role and nature of metarules as a component of the management procedure process and agreed that:

    - The establishment, review and implementation of metarules and/or safe guards should be seen as an element of the SAG/SC/Commission review process supporting the Management Procedure (MP) rather than a parallel or competing process,
    - The implementation of a metarule would occur only in exceptional circumstances.
    - Wherever possible safeguards should be embedded within the MP.

61. In this context the definition of what constitutes an exceptional circumstance is important. Although there is insufficient information to provide firm definitions of exceptional circumstances, examples of what might constitute an exceptional circumstance include:

    - Recruitment "Failure" – ie. below the changes predicted by operating model (OM)
    - CPUE changes are notably outside the bounds of OM
    - Substantial changes in biological parameters
    - Non-party catch increases are greater than steps covered by OM.

62. The workshop agreed on recommending a hierarchy of reviews to support the Management Procedure and set this within a decision tree framework (**Attachment 5**). This figure outlines three levels of reviews:

    - Annual reviews of stock indicators

- In depth stock assessments – held every 3 years
- Management procedure reviews – held every 9 years (ie every 3rd stock assessment cycle).

63. The workshop recommended that the Scientific Committee maintain the current set of stock indicators as a minimum for annual review. It was noted that as the risk to stock increased, more reliable and precise monitoring would be needed. It was noted that there was also a lack of appropriate monitoring procedures, especially for recruitment. It was recommended that the Scientific Committee should seek to improve the current set of indicators, particularly those related to recruitment and CPUE.

64. The workshop discussed the merit of including routine calculation of stock status with pre-agreed models as part of the annual review of stock indicators and agreed to further discuss this at the next SAG/SC.

65. As part of the recommended process at the end of each review the SAG/SC would provide advice to the CCSBT on the condition of the stock relative to the expectations of the OM, and whether exceptional circumstances existed that required immediate action by the CCSBT to revise the MP and associated TAC. Where immediate action is not required, the existing MP could continue to be used while the SAG/SC developed options for improvements.

Agenda Item 6. Implementation issues and other considerations

66. Document CCSBT-MP/0404/05 on MP implementation requirements and metarules was presented under agenda item 5. The evaluation of a DR's performance is based on assumptions about the reliability and consistency of the data provided to it. As a result, a critical issue with respect to the implementation of an MP is the integrity and consistency of the data inputs. Mechanisms and types of verification are largely a management issue, but the scientific advice about a DR's performance is under the assumption that this issue is appropriately handled.

67. The SAG/SC will have to develop a specific data implementation plan for the Commissions' consideration. This plan should present information covering:

- Specification of input data requirements for the MP;
- Review of indicators and metarules;
- Data quality assumptions and verification requirements;
- Process for providing the data;
- Administrative framework for implementing the MP;
- Process for dealing with incomplete or inaccurate data. This may include coding processes into the DR;
- Implications of a large mismatch between the TAC recommended by the MP and actual catches; and
- Timeframe issues.

68. The Commission has already adopted administrative procedures for general data exchange and indicator analysis that provide a basis for the development of a specific MP data implementation plan. Members were encouraged to present examples of implementation guidelines to the SAG5/SC9.

69. Once a MP is chosen, there will be a substantial amount of work required before it can be administratively implemented. Data verification requirements will have to be resolved by the Commission before the MP is implemented. The workshop agreed that these tasks could be resolved efficiently by meeting together, and indicated the potential need for additional meetings after CCSBT 11 and before implementation of MP.

Agenda Item 7. Workplan and timetable

70. The meeting did not see any need to revise the work plan prepared by the 8th Meeting of the Extended Scientific Committee (paragraph 118 of the Report of the Eighth Meeting of the Extended Scientific Committee).

71. Additional work associated with MP implementation will become necessary once the Commission selects a management procedure and gives guidance on future activity. It was noted that the work associated with implementing the MP needs to be expanded to include preparation of a definition document that describes the MP and its specific implementation requirements. There may also be a need to hold a workshop to address MP implementation issues.

Agenda Item 8. Presentation of results and documentation

72. The meeting developed a presentation to be given by the Independent Panel to the Special Meeting of the Commission. A copy of the agreed presentation is at **Attachment 6**.

Agenda Item 9. Other business

73. A working group met to discuss issues associated with the use and exchange of historic data for the 2004 stock assessment. The report of the working group is at **Attachment 7**.

Agenda Item 10. Finalisation of report

74. The report was adopted.

Agenda Item 11. Close of meeting

75. In closing the meeting the Chair thanked all participants for their constructive input to the workshop. In particular, he thanked the Korean hosts for their arrangements and hospitality during the meeting.

76. The meeting closed at 18:45pm, 24 April 2004.

List of Attachments

Attachment

Attachment 1

Agenda
Third Meeting of the Management Procedure Workshop
19-24 April 2004
Busan, Republic of Korea

1. **Terms of Reference and Adoption of Agenda**

2. **Feedback from CCSBT on Management Objectives**

3. **Performance of Candidate Management Procedures**
   3.1 Review results of MP trials conducted after September 2003.

4. **Selection of Candidate Management Procedures**
   4.1 Process for selecting a reduced set of MPs
   4.2 Selection of MPs.

5. **Metarules, Assessments and special circumstances**
   5.1 Use of future assessment results in connection to MP.
   5.2 Changes in the development of the fisheries that may alter MP performance (e.g. changes in unregulated fisheries).
   5.3 Metarules.

6. **Implementation issues and other considerations**
   6.1 Specification of input data needed to implement candidate MPs and process for providing the data.
   6.2 Specification of input data needed to implement metarules.

7. **Workplan and Timetable**

8 **Presentation of Results and Documentation**
   8.1 Prepare presentation for Special meeting.
   8.2 Strategy for presenting results to CCSBT
   8.3 Documentation of process for testing and selecting a set of MPs.

9. **Other Business**

10. **Finalisation of Report**

11. **Close of Meeting**

Attachment 2

List of Participants
Third Meeting of the Management Procedure Workshop
19-24 April 2004
Busan, Republic of Korea

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Attachment 3

List of Documents
Third Meeting of the Management Procedure Workshop

(CCSBT-MP/0404/)

01. Draft Agenda of 3rd MPWS
02. List of Participants of 3rd MPWS
03. Draft List of Documents of 3rd MPWS
04. (Australia) Comparison of the performance of tuned candidate management procedures for southern bluefin tuna based on the final trial specifications and testing procedures.: T. Polacheck, P. Eveson, J. Hartog, M. Basson, and D. Kolody
05. (Australia) Discussion of scientific issues related to metarules and the implementations of a management procedure for southern bluefin tuna.: M. Basson, T. Polacheck and D. Kolody
06. (Japan) Application of variants of a fox-model based MP to the "Christchurch" SBT trials.: D.S. Butterworth & M. Mori
07. (Taiwan) Selection of the decision rules of management procedures for southern bluefin tuna.: Chin-Hwa Sun
08. (Japan) Behaviors of CPUE-based management procedures examined through the CCSBT final trial specifications.: K. Hiramatsu, H. Kurota, H. Shono and N. Takahashi
09. (Japan) Trials of Fox-model based management procedures with TAC adjustment by recruitment information.: N. Takahashi, M. Mori, S. Tsuji and D. Butterworth
10. (Japan) Considerations toward choosing appropriate management procedures.: S. Tsuji, K. Hiramatsu, H. Kurota, N. Takahashi and H. Shono
11. (Korea) Consideration of decision rules based on the feedback from Korean tuna industry.: Dae-Yeon Moon, Jeong-Rack Koh, and Soon-Song Kim

(CCSBT-MP/0404/Rep)

01. Report of the Tenth Annual Meeting of the Commission (October 2003)
02. Report of the Eighth Meeting of the Scientific Committee (September 2003)
03. Report of the Fourth Meeting of the Stock Assessment Group (August 2003)
04. Report of the Second Meeting of Management Procedure Workshop (April 2003)
05. Report of the Indonesian Catch Monitoring Review Workshop (April 2003)
06. Report of the Third Meeting of the Stock Assessment Group (September 2002)
07. Report of the First Meeting of Management Procedure Workshop (March 2002)
08. Report of the CPUE Modelling Workshop (March 2002)
09. Report of the Management Strategy Workshop (May 2000)

Attachment 4

Figures in support of MPWS3

Table of contents

Figures

Naming conventions

We are tuning each decision rule (DR) to 5 levels of the biomass statistic B2022:B2002:

Level	"Tuning" value
1	0.7
2	1.1
3	1.5
4	0.9
5	1.3

Furthermore, for each MP, we are considering 3 options for how frequently the TAC is set (a = annually, b = 3-year intervals, and c = 5-year intervals). For tuning levels 1, 3, 4, and 5, only TAC-interval option b is presented. For tuning level 2, we are considering all 3 TAC-interval options (a,b,c).

Note that a Decision Rule (DR) represents a specification of behavior relative to some data indication (typically) while a Management Procedure (MP) is a DR that has a specific median rebuilding level (i.e., that it represents a priority of the median spawning biomass in 2022 relative to the 2002 value).

After presentations of a large number of DRs, the workshop focused effort on the following sets (as noted from their source documents). The initial 10 DRs were evaluated and then subsets that were representative were examined in more detail and finally a set of 4 were selected for candidacy. These are listed in the following table:

Top ten DRs	Source	Subset of seven DRs	Final four DRs
FXR_01	CCSBT-MP/0404/04	FXR_01	FXR_01
FXA_71	CCSBT-MP/0404/04	STL_01	HK5_01
KAL_01	CCSBT-MP/0404/04	DMN_25	TAI_03
STL_01	CCSBT-MP/0404/08	HK5_01	D&M_03
DMN_25	CCSBT-MP/0404/09	HST_01	
HK5_01	CCSBT-MP/0404/08	TAI_03	
HST_01	CCSBT-MP/0404/08	D&M_03	
TAI_03	CCSBT-MP/0404/07		
D&M_01	CCSBT-MP/0404/06		
D&M_02	CCSBT-MP/0404/06		

Other non-decision rule output (for referral purposes)

CON_01	Constant catch run (tuned to whatever standard (e.g., 0.9, 1.1, 1.3, etc)
CON_99	Constant **current** catch (untuned)
No_Catch	No catch starting in 2008 (except for the "a" cases where annual TAC changes are specified, for these the zero-catch begins in 2006.

Table of figures

The standard set agreed by the meeting is included in this printed document. An electronic appendix is available (which includes this document in addition to additional figures) is given as E-ppendix to Attachment 4.doc.

The list of output is summarized in the following table:

Tuning level/TAC change	Model	Figure	Decision rules	Destination
1.1 tuning level, triennial TAC changes (2b)	Reference	Standard set	Top 10	Attachment
		Example projections for all DRs	Top 10	Attachment
		Cumulative and freq	Top 10	Electronic
0.9 and 1.3 tuning levels, triennial TAC changes (4b and 5b)	Reference	Standard set	Subset of 7	Attachment
		Example projections	Subset of 7	Electronic
		Cumulative and freq	Subset of 7	Electronic
1.1 tuning level, triennial TAC changes (2b)	Robustness set: Med1_A12	Standard set	Top 10	Attachment
		Cumulative and freq	Top 10	Electronic
	Low1_A12		Top 10	Electronic
	No_AC			
1.1 tuning level, annual, 3, and 5-year TAC changes (2a, 2b, and 2c)	Reference	Standard set	Final 4	Attachment
		Example projections	Final 4	Electronic
		Cumulative and freq	Final 4	Electronic
1.1 tuning level, triennial TAC changes (2b)	Reference	Extended indicators set (including 1980 reference point)	Final 4	Electronic

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Data file structure

The final set of data structure (Final four decision rules) have been stored in a zip file: ccsbtMPWS30404.zip (note that selecting this link may open the zip application on your computer). This consists of the raw “tree” structure that was used to construct the figures in this document.

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Priority set to 1.1 rebuilding

Reference case

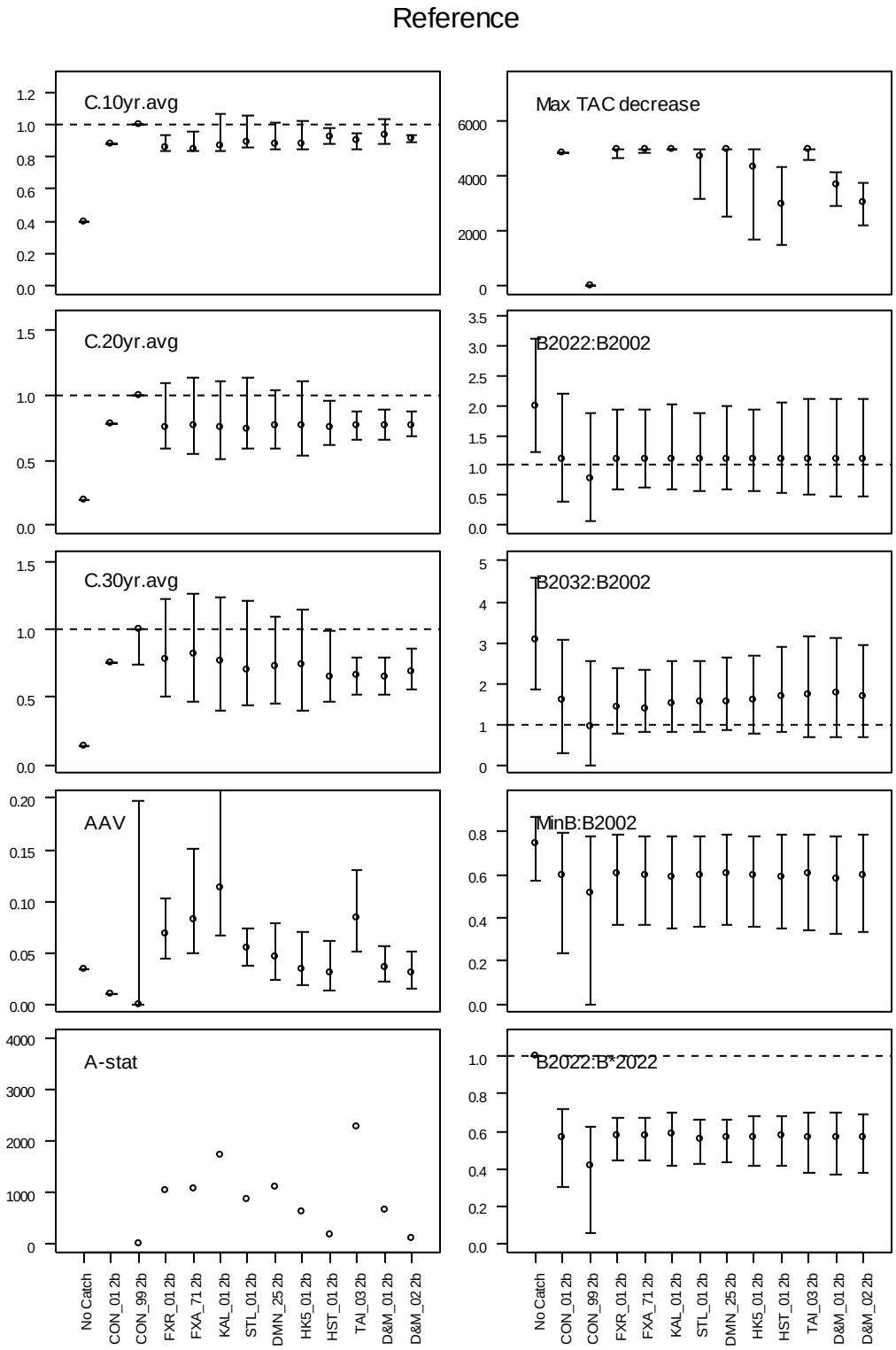

Figure 1. Performance statistics for 1.1 tuning level with 3-year TAC changes using the reference model for the initial 10 DR.

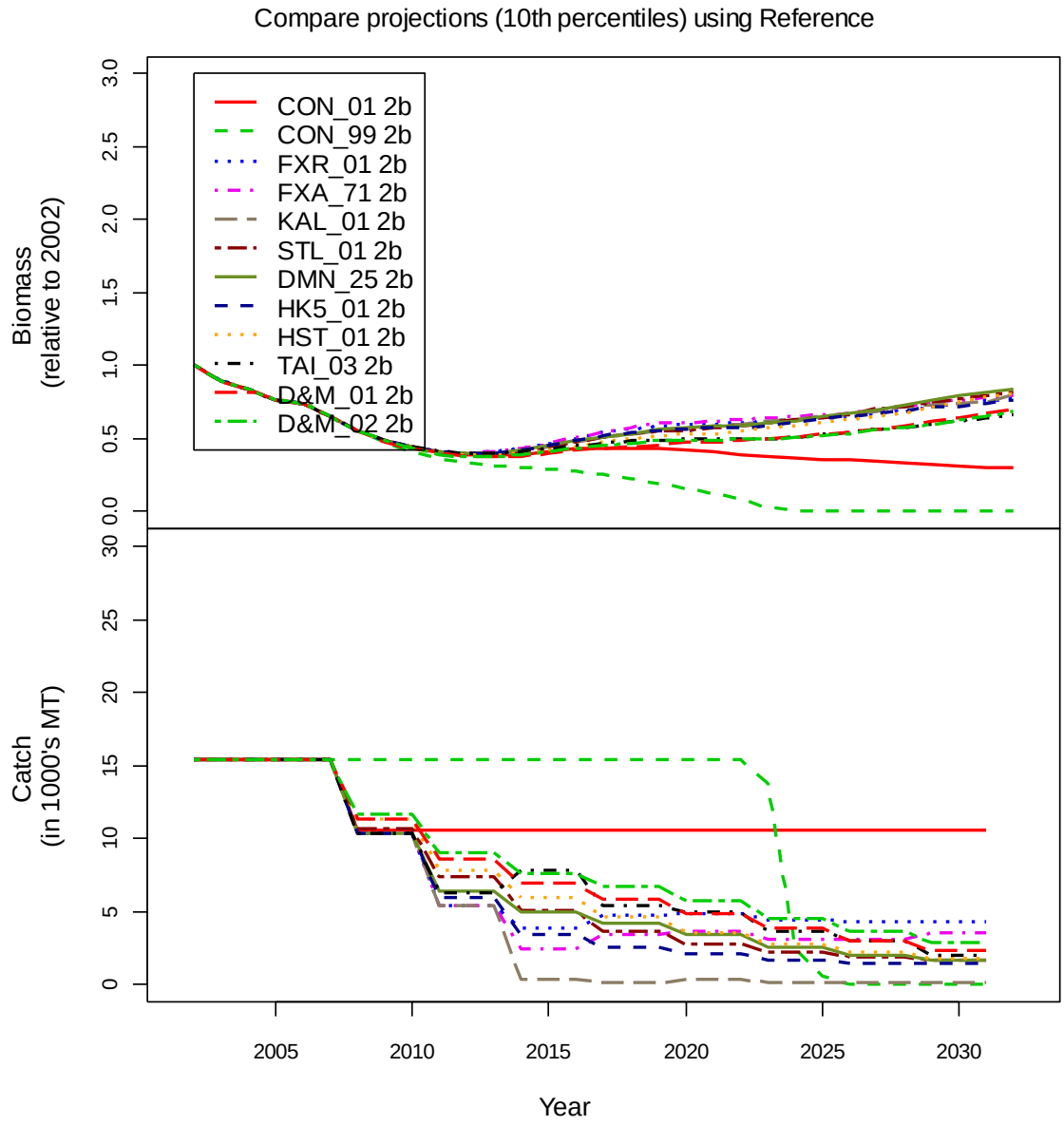

Figure 2. 10^{th} percentile values based on 1.1 tuning level with 3-year TAC changes using the reference model for the initial 10 DR.

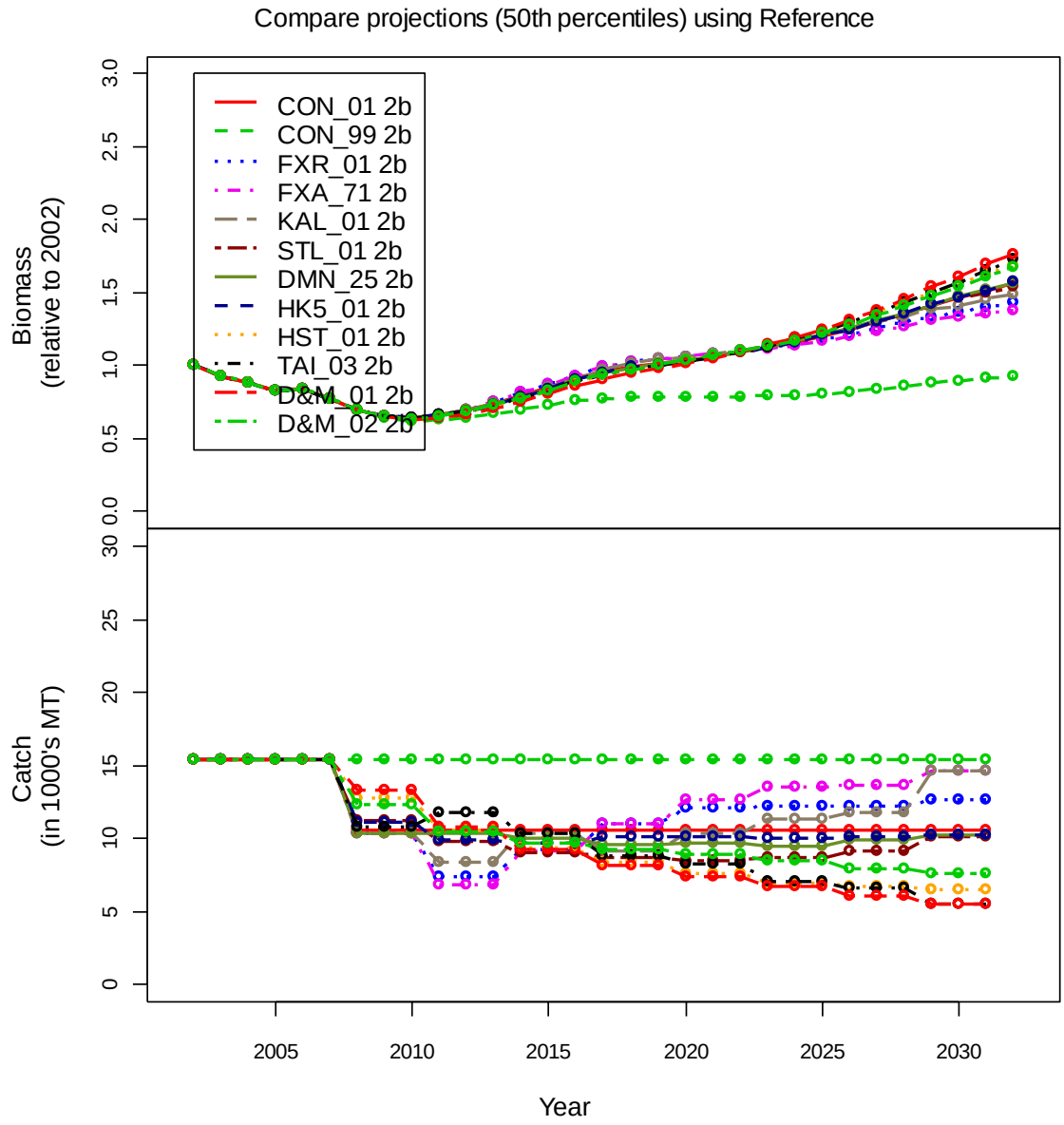

Figure 3. 50th percentile (median) values based on 1.1 tuning level with 3-year TAC changes using the reference model for the initial 10 DR.

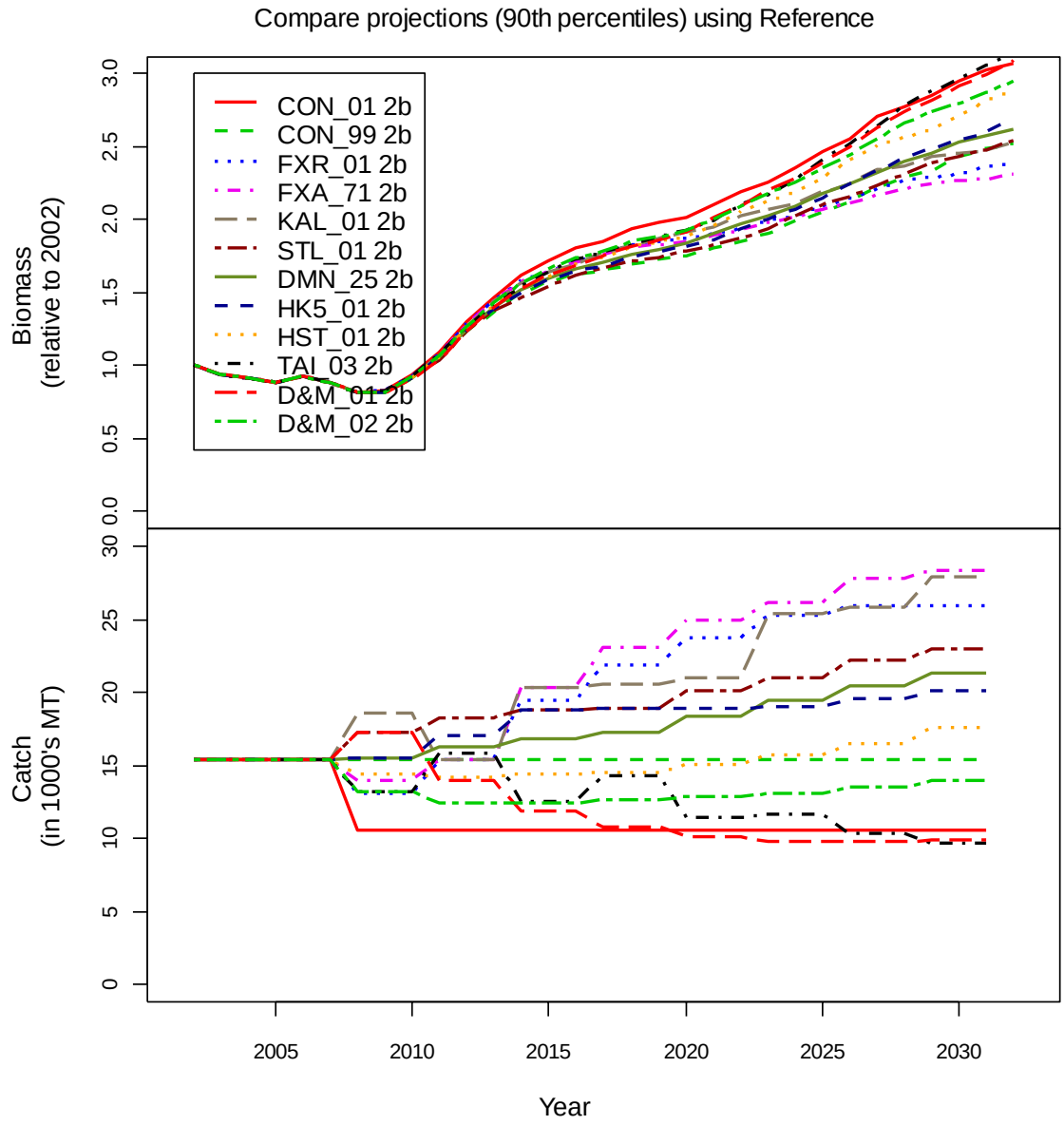

Figure 4. Percentile values based on 1.1 tuning level with 3-year TAC changes using the reference model for the initial 10 DR.

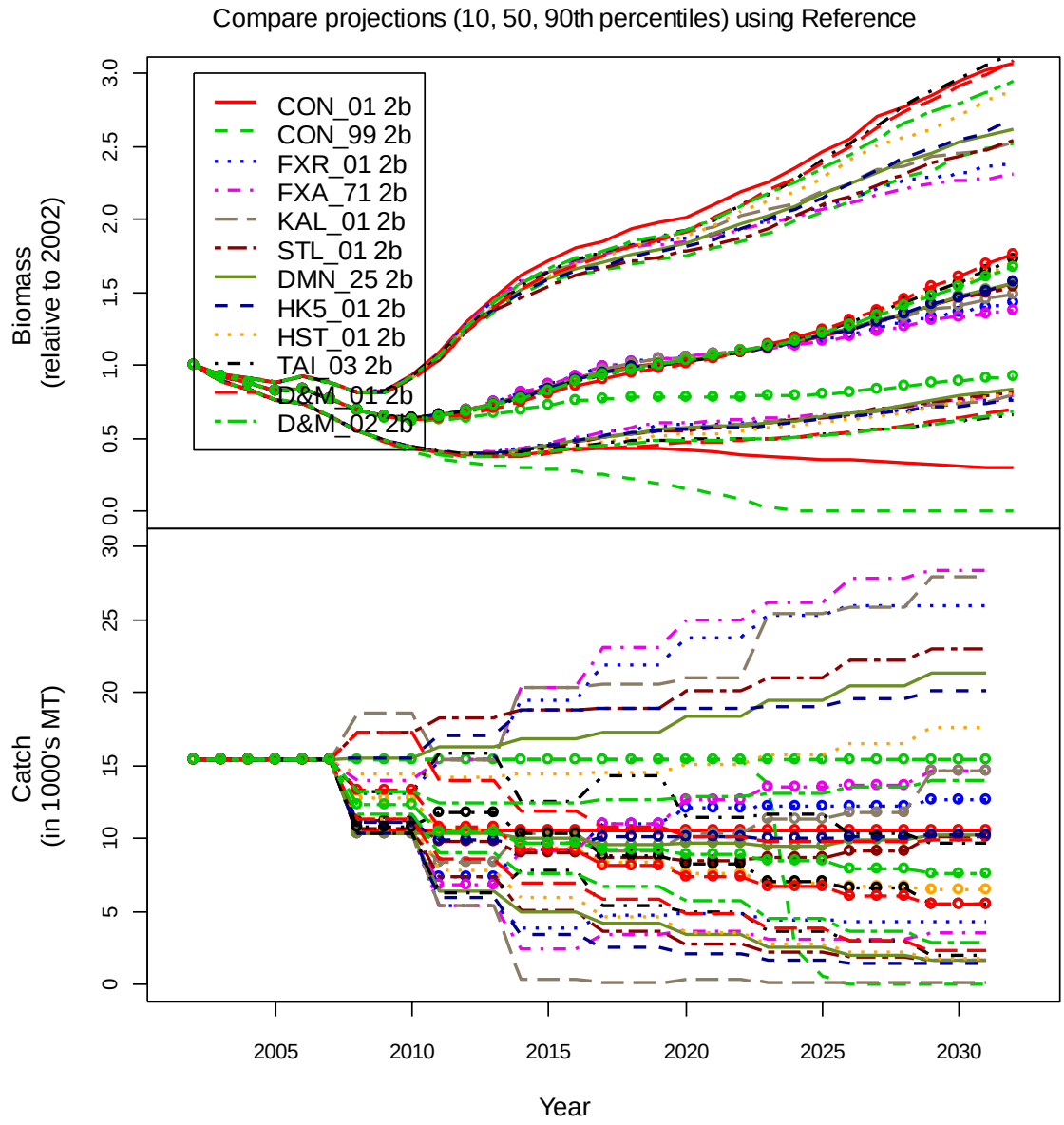

Figure 5. All percentile values based on 1.1 tuning level with 3-year TAC changes using the reference model for the initial 10 DR.

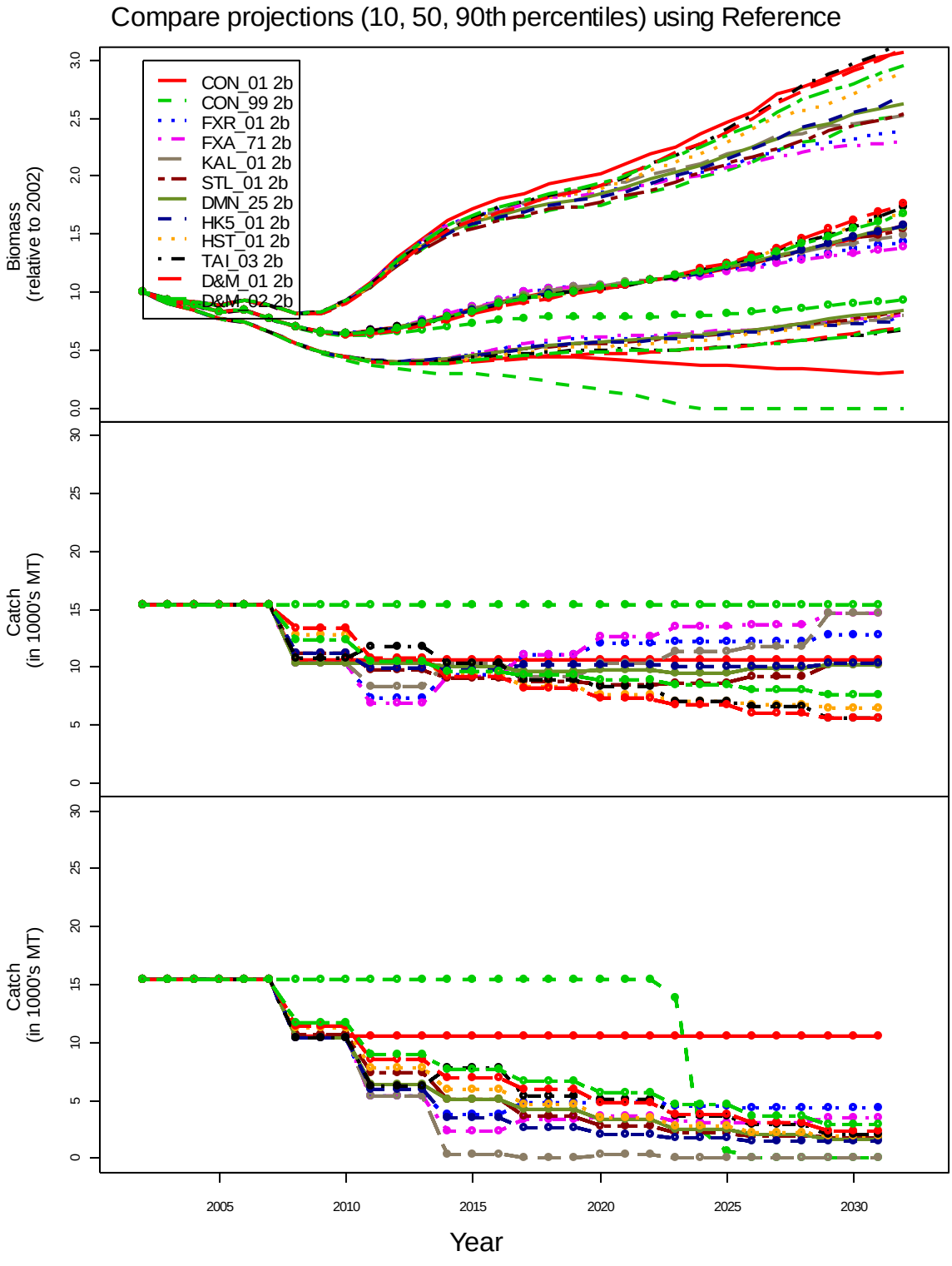

Figure 6. All percentile values for biomass (top panel) and median and lower 10th percentile for catch (middle and lower pane) based on 1.1 tuning level with 3-year TAC changes using the reference model for the initial 10 DR.

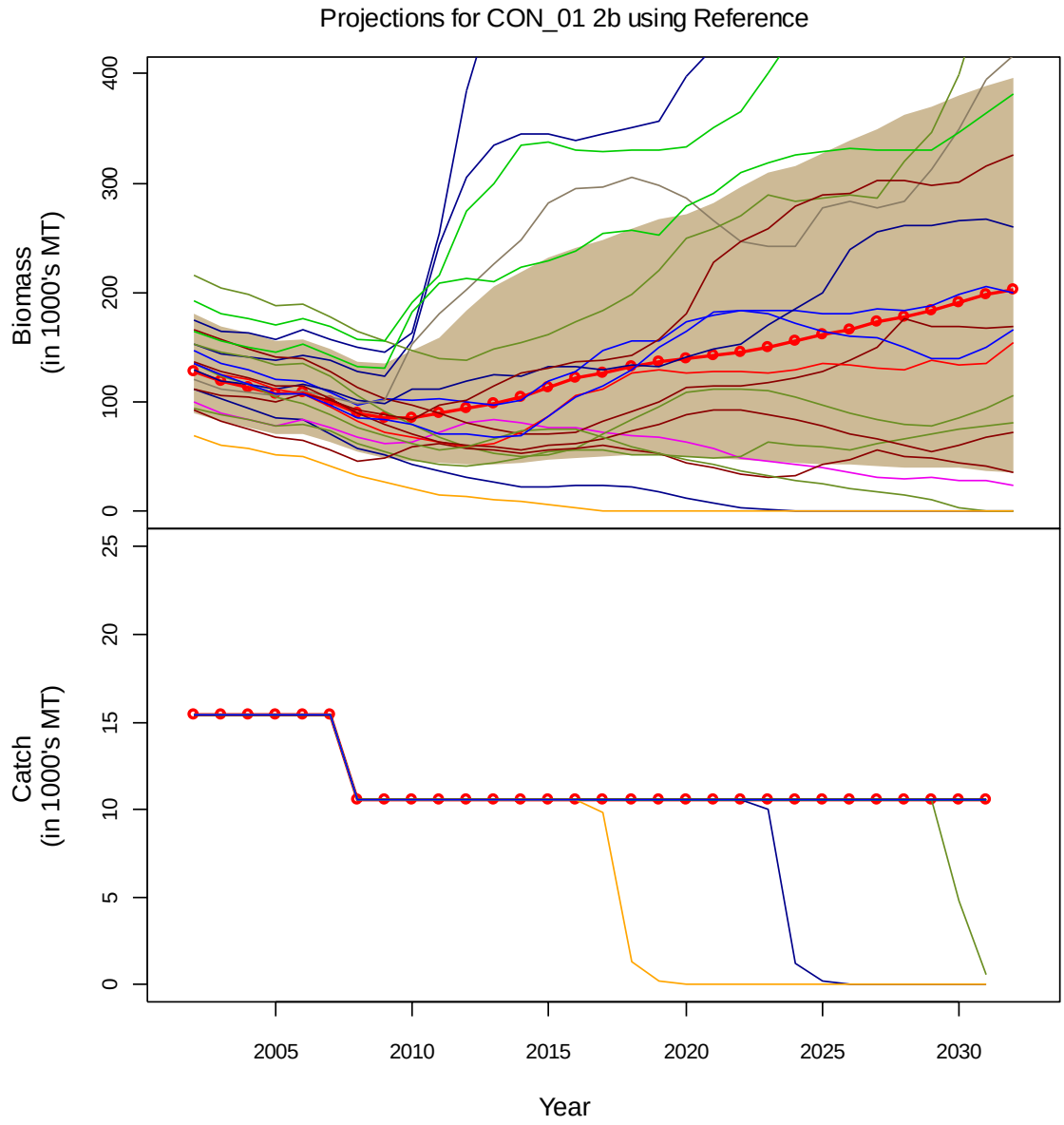

Figure 7. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for constant (tuned) catch option.

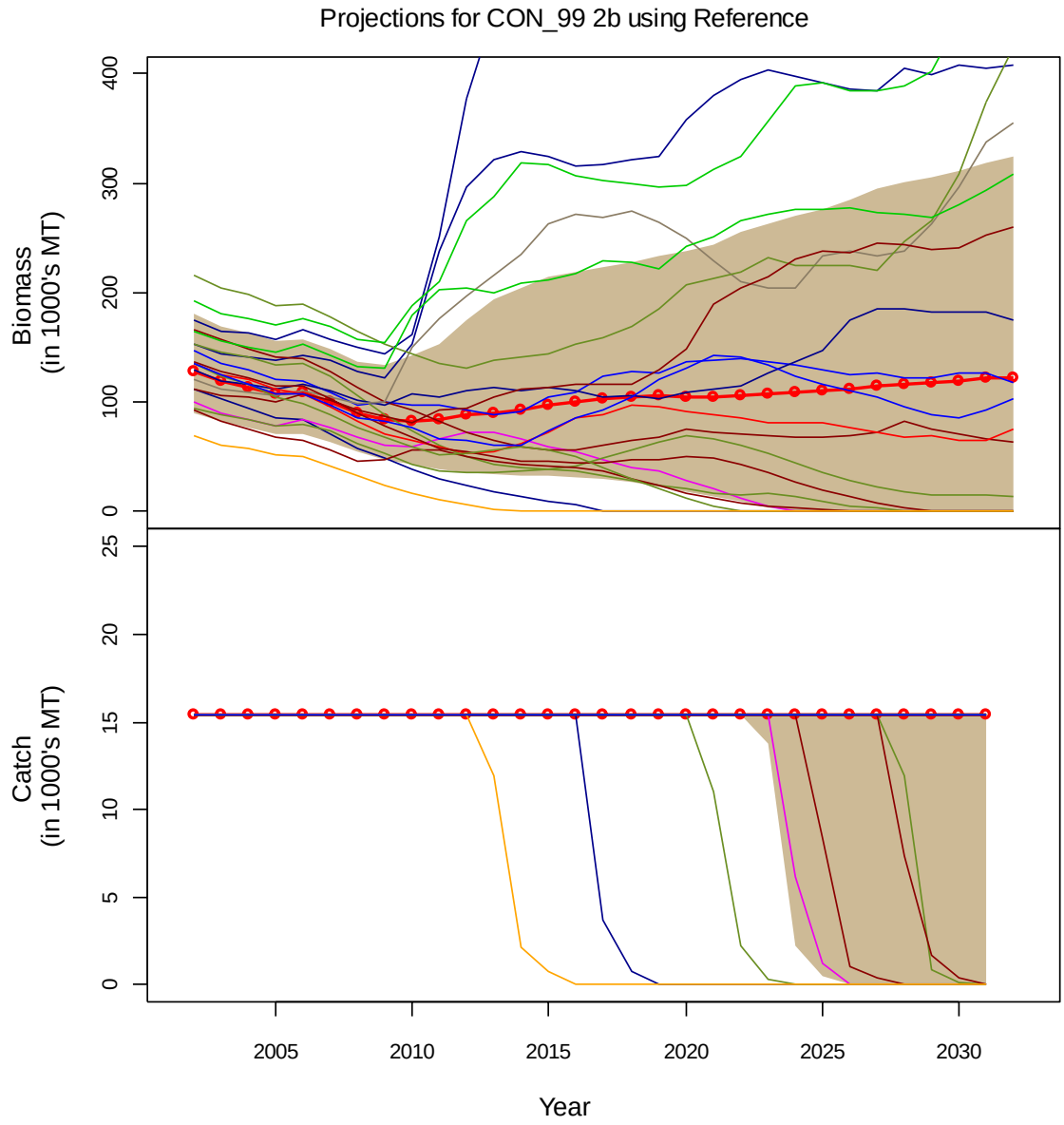

Figure 8. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for current catch levels

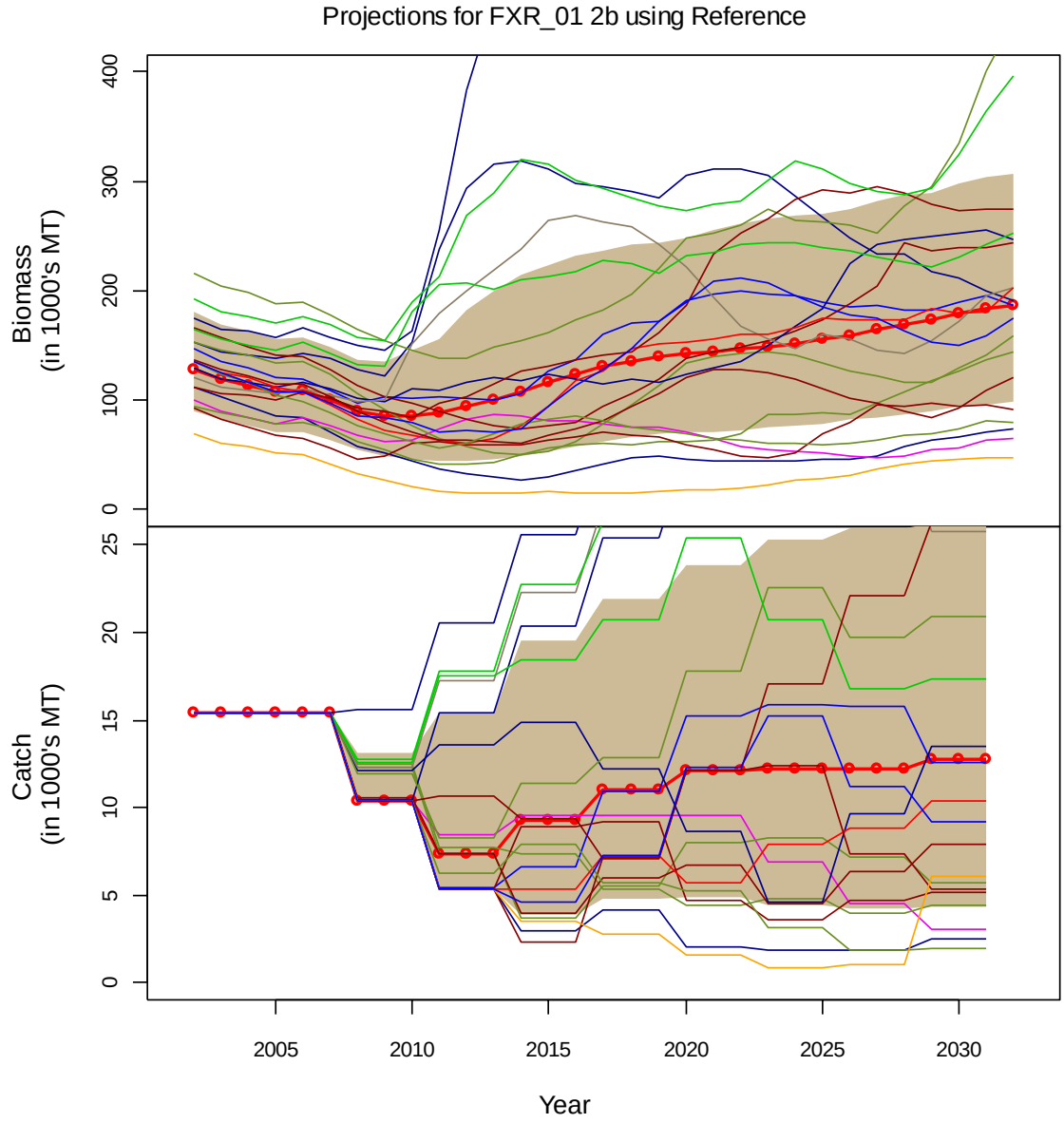

Figure 9. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for FXR_01.

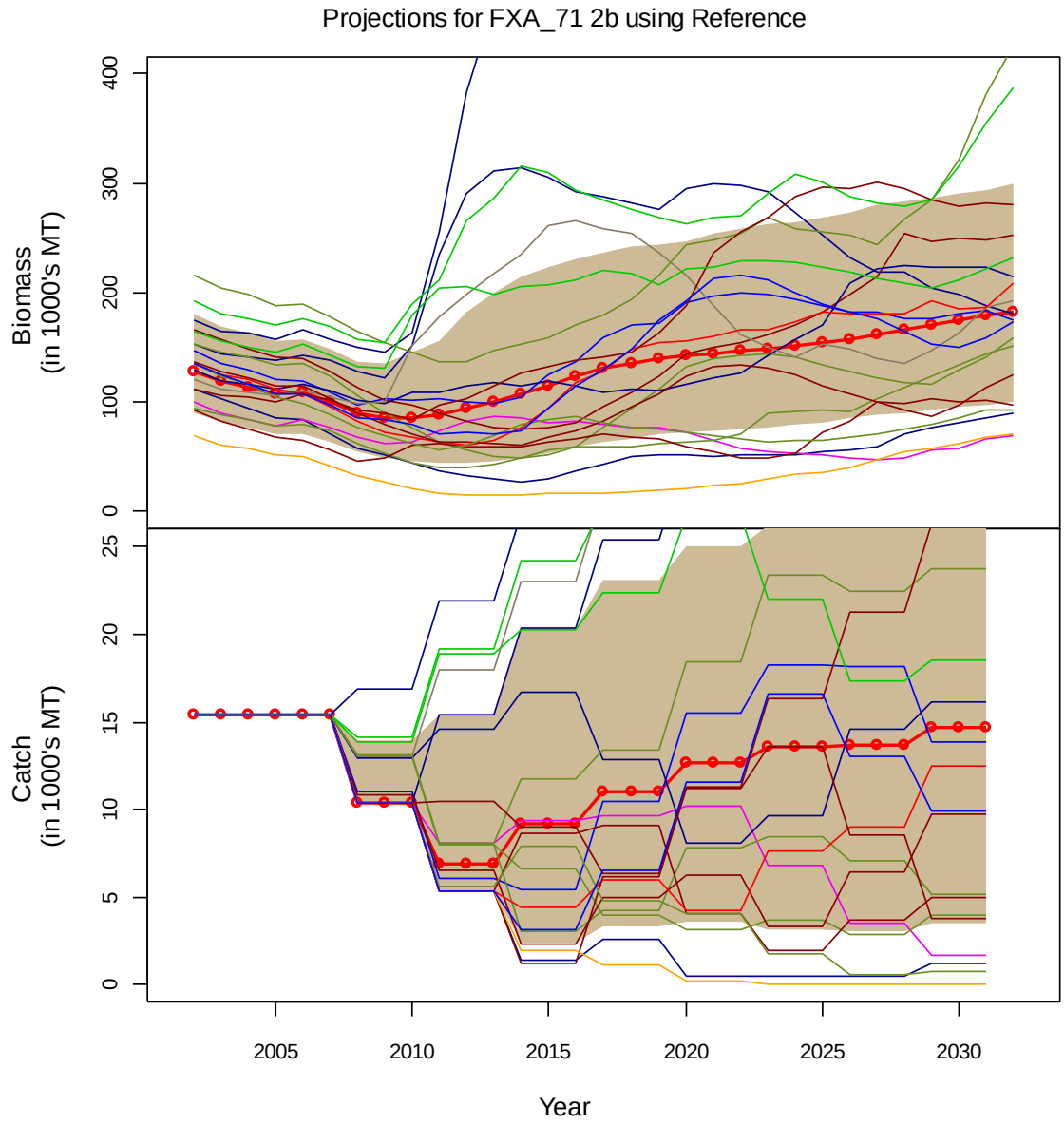

Figure 10. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for FXa_71.

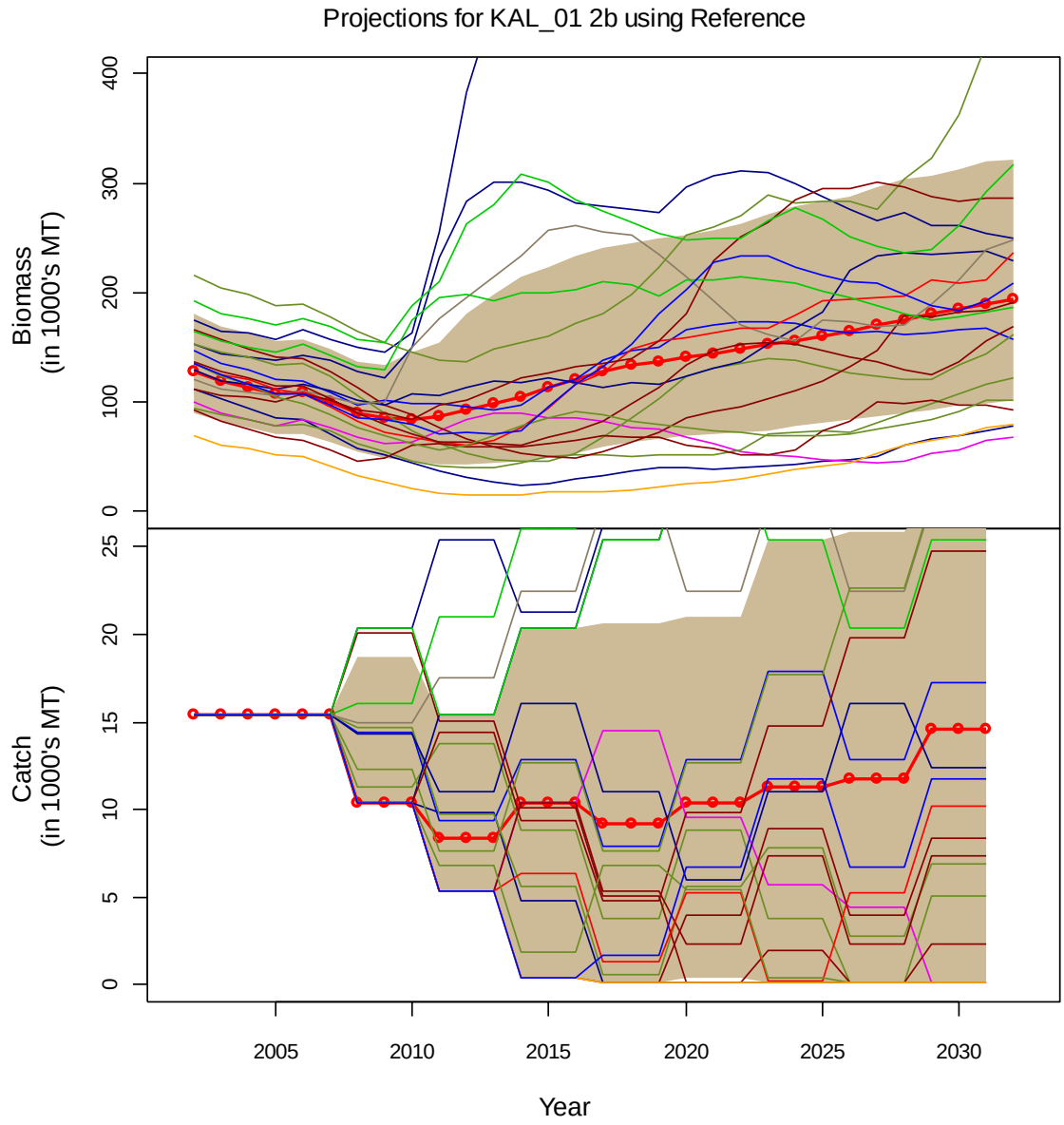

Figure 11. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for KAL_01.

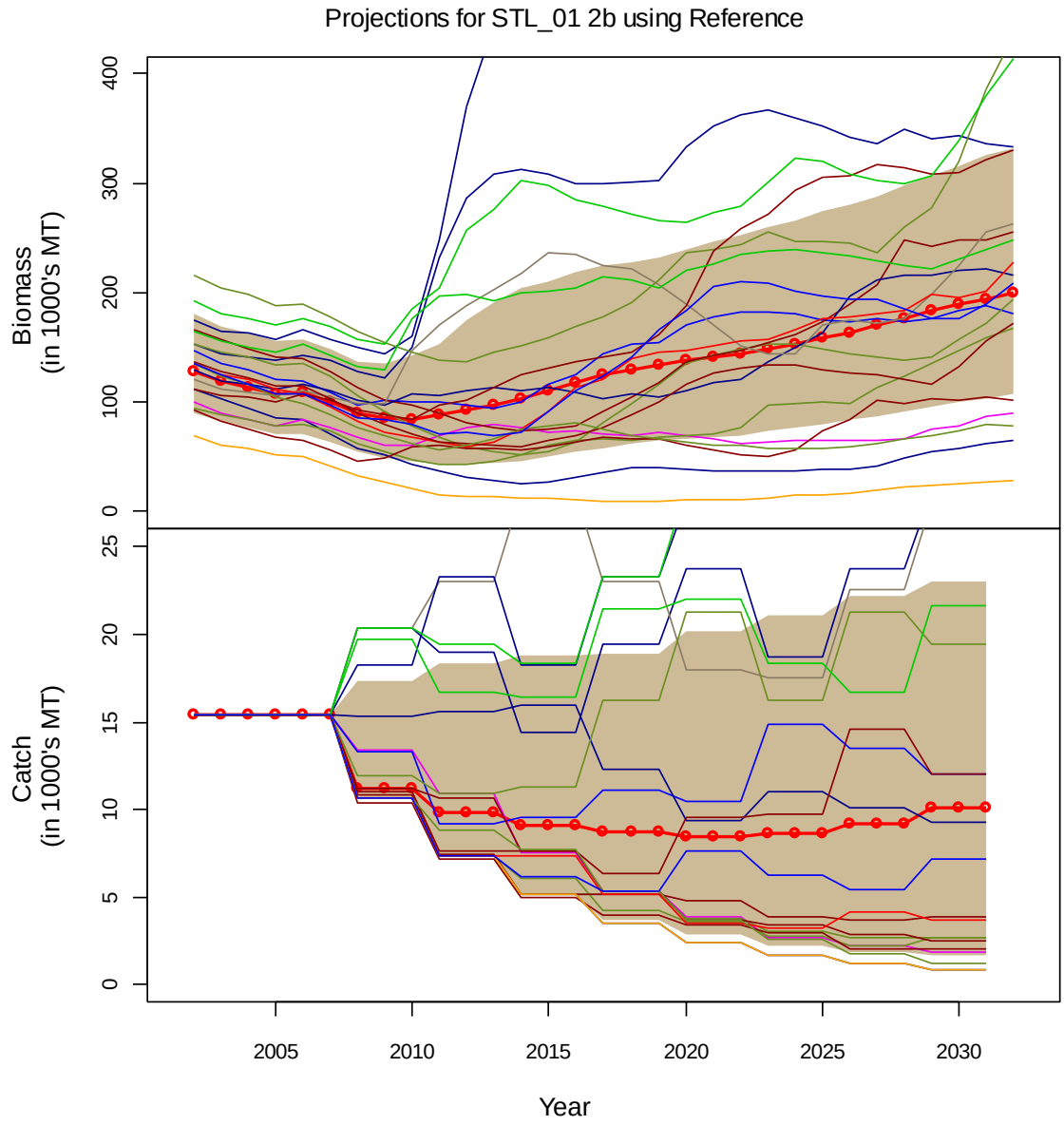

Figure 12. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for STL_01.

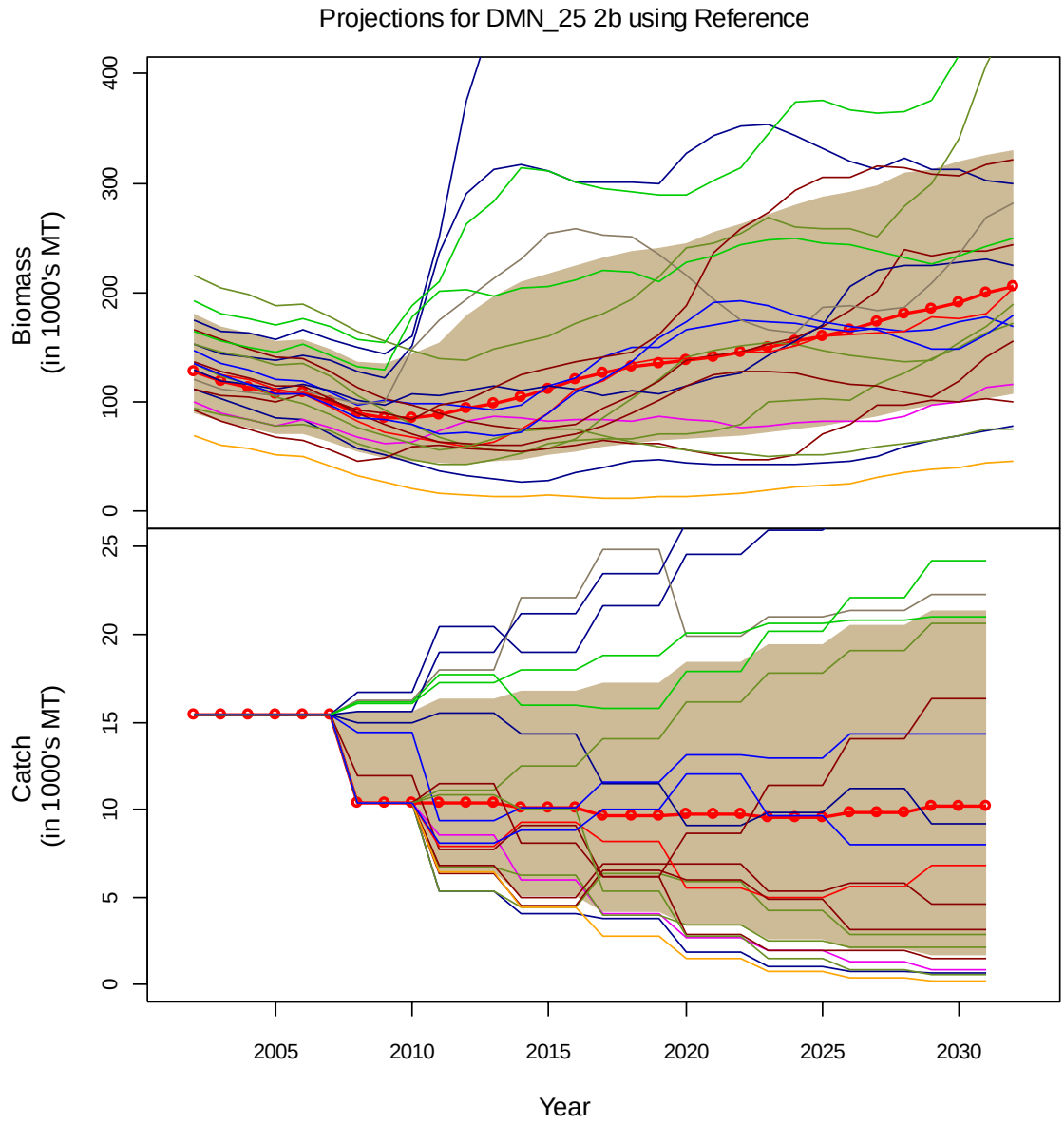

Figure 13. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for DMN_25.

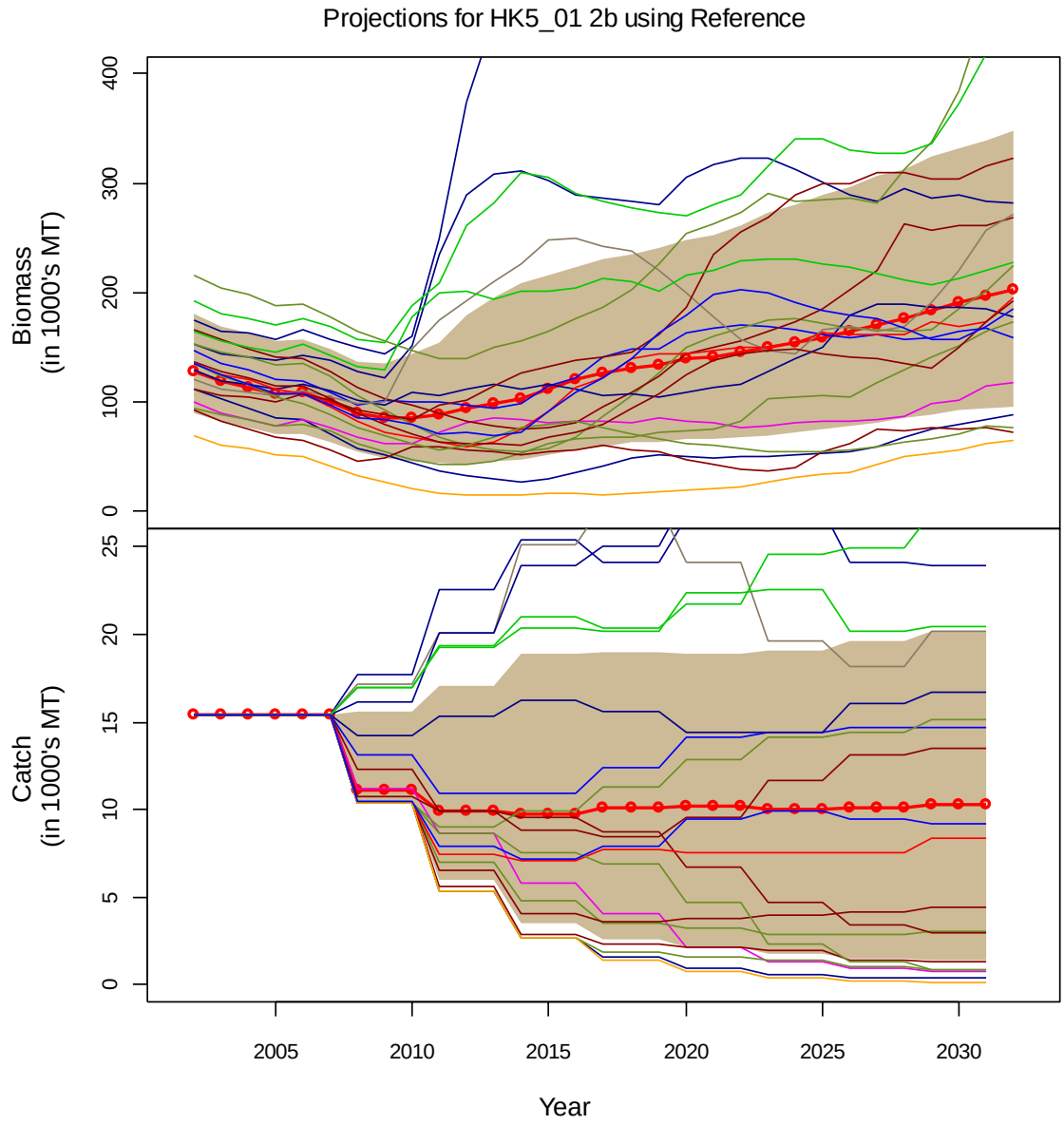

Figure 14. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for HK5_01.

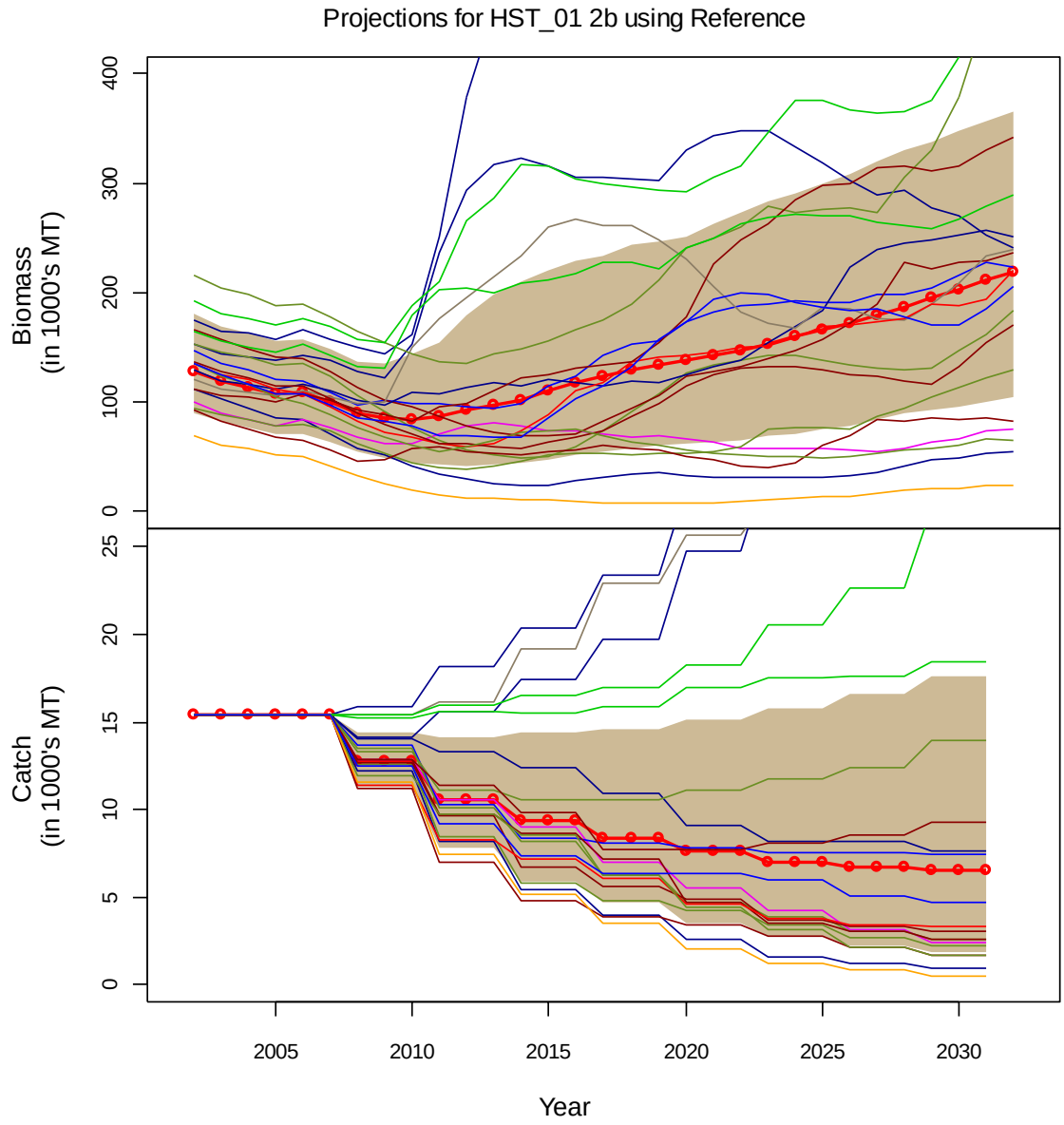

Figure 15. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for HST_01.

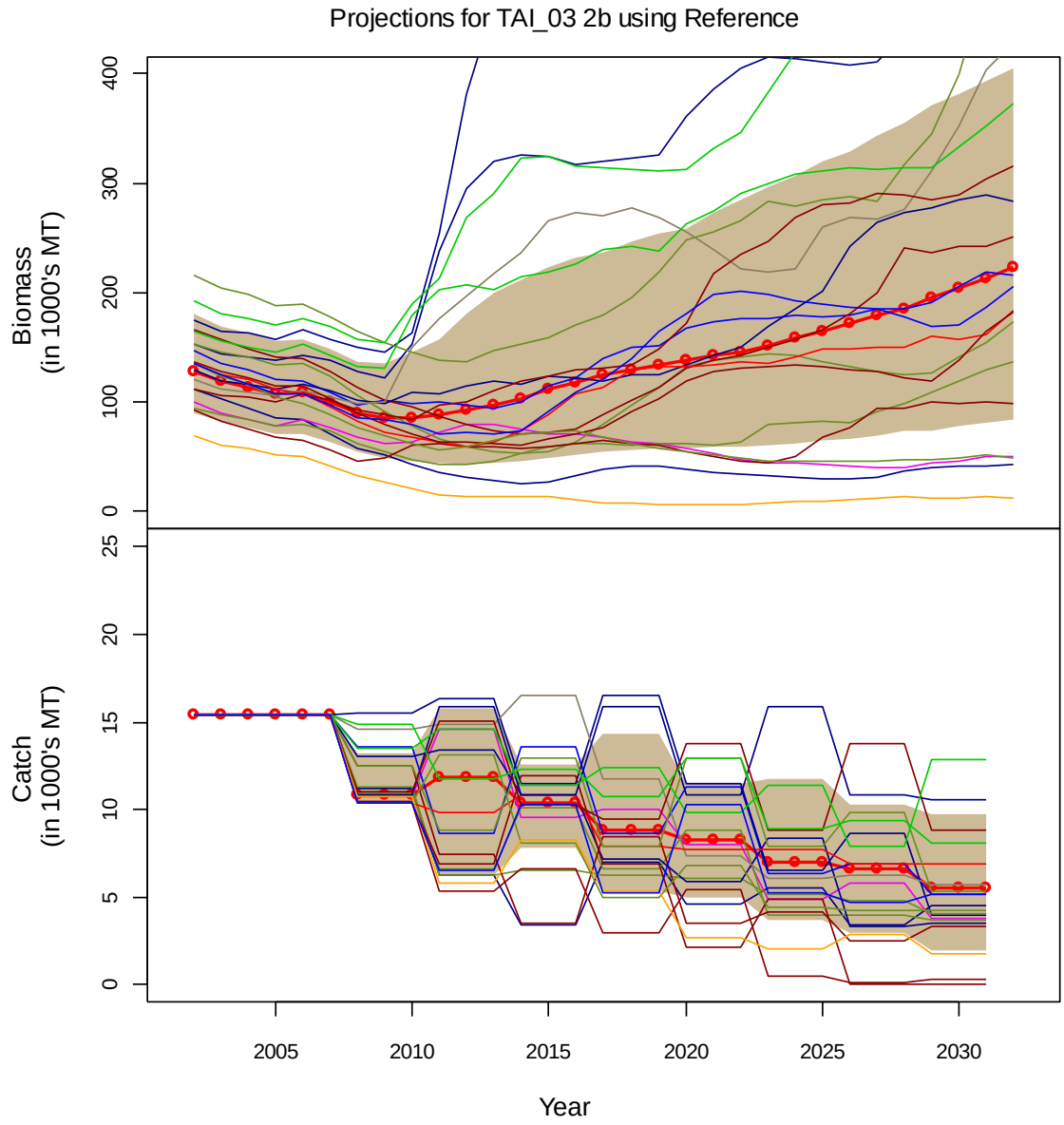

Figure 16. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for TAI_03.

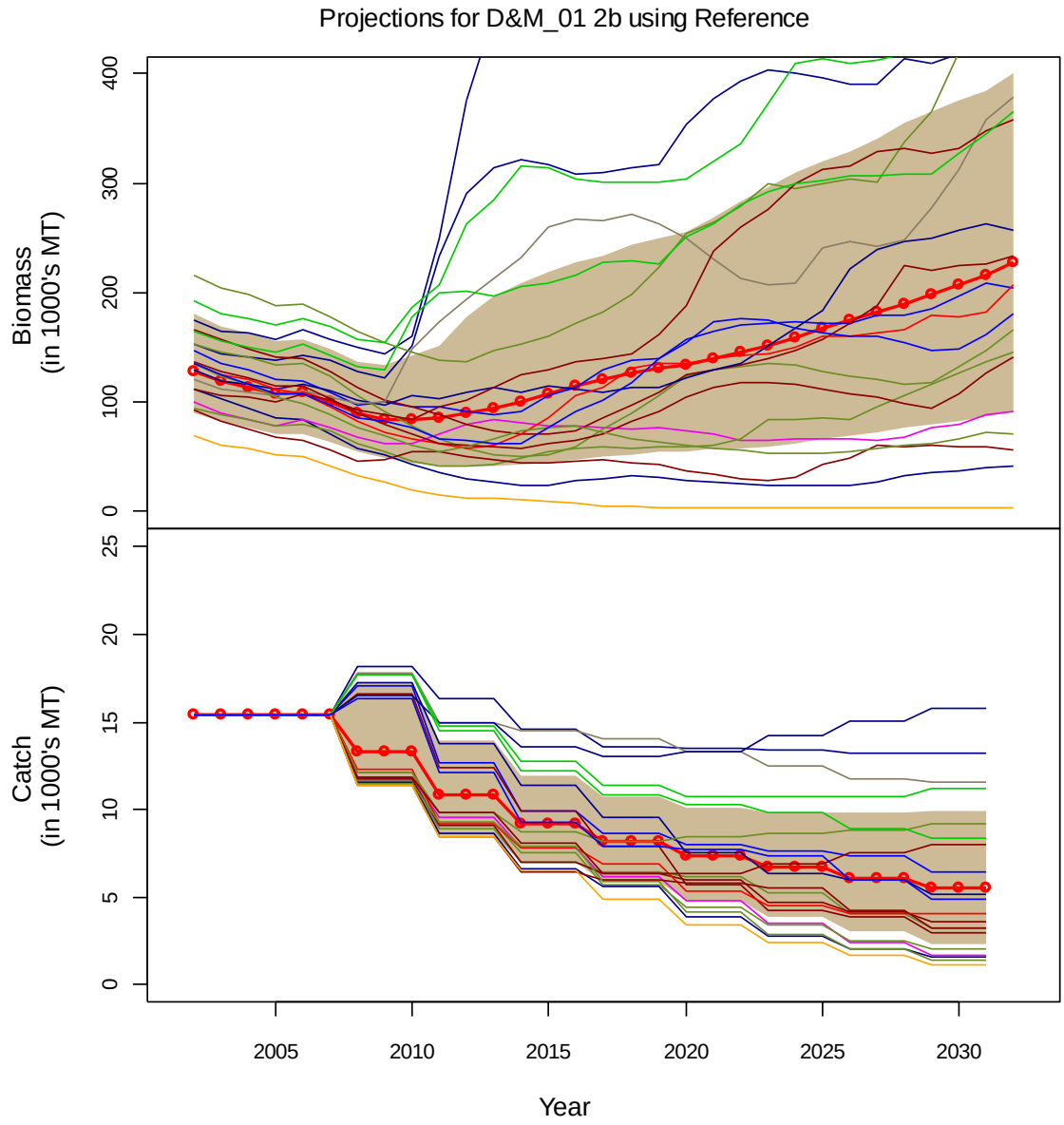

Figure 17. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for D&M_01.

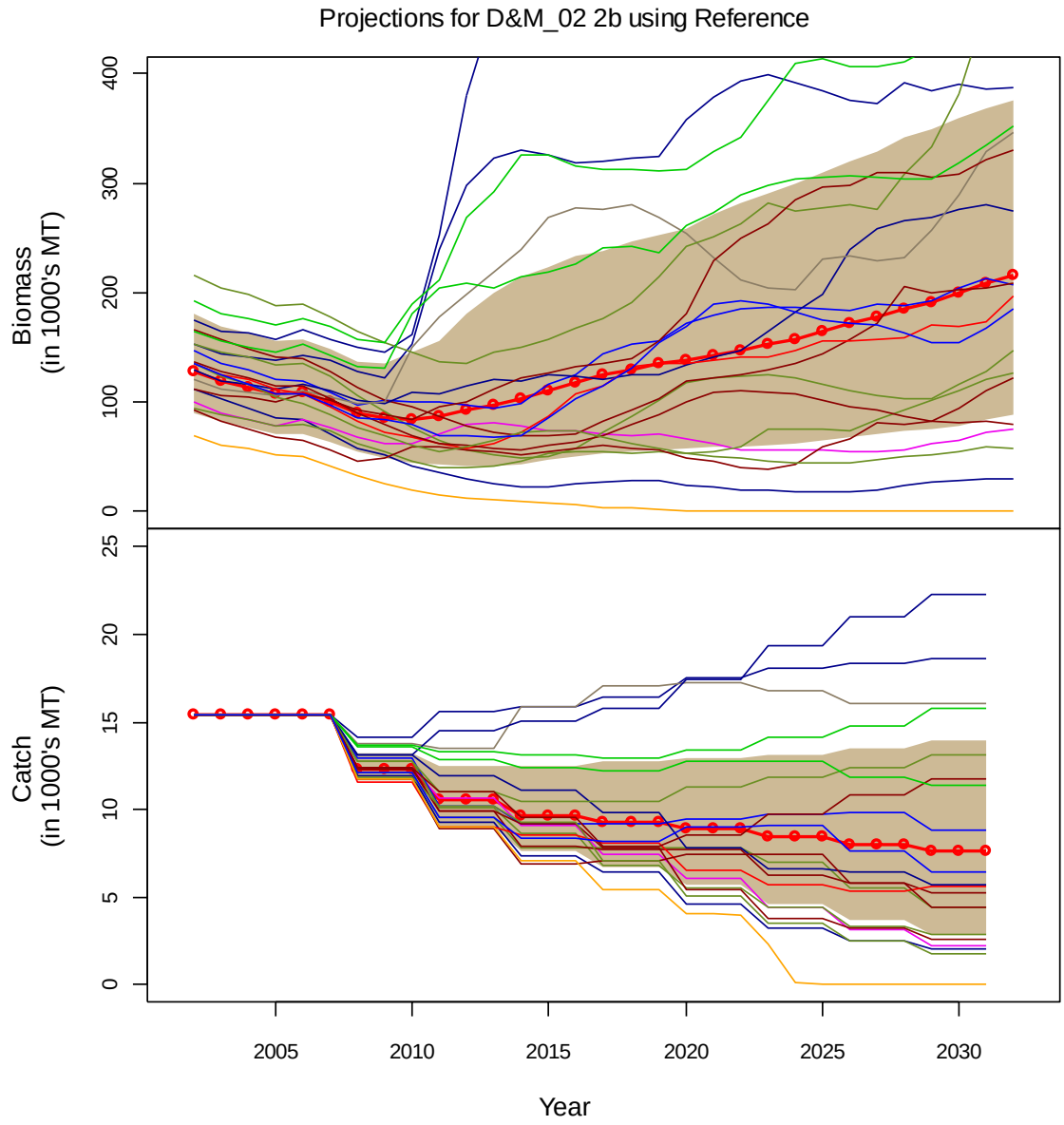

Figure 18. Biomass and catch trajectories for 20 representative samples based on 1.1 tuning level with 3-year TAC changes using the reference model for D&M_02.

Reference case tuned to 0.9 and 1.3 levels

Tuned to 0.9

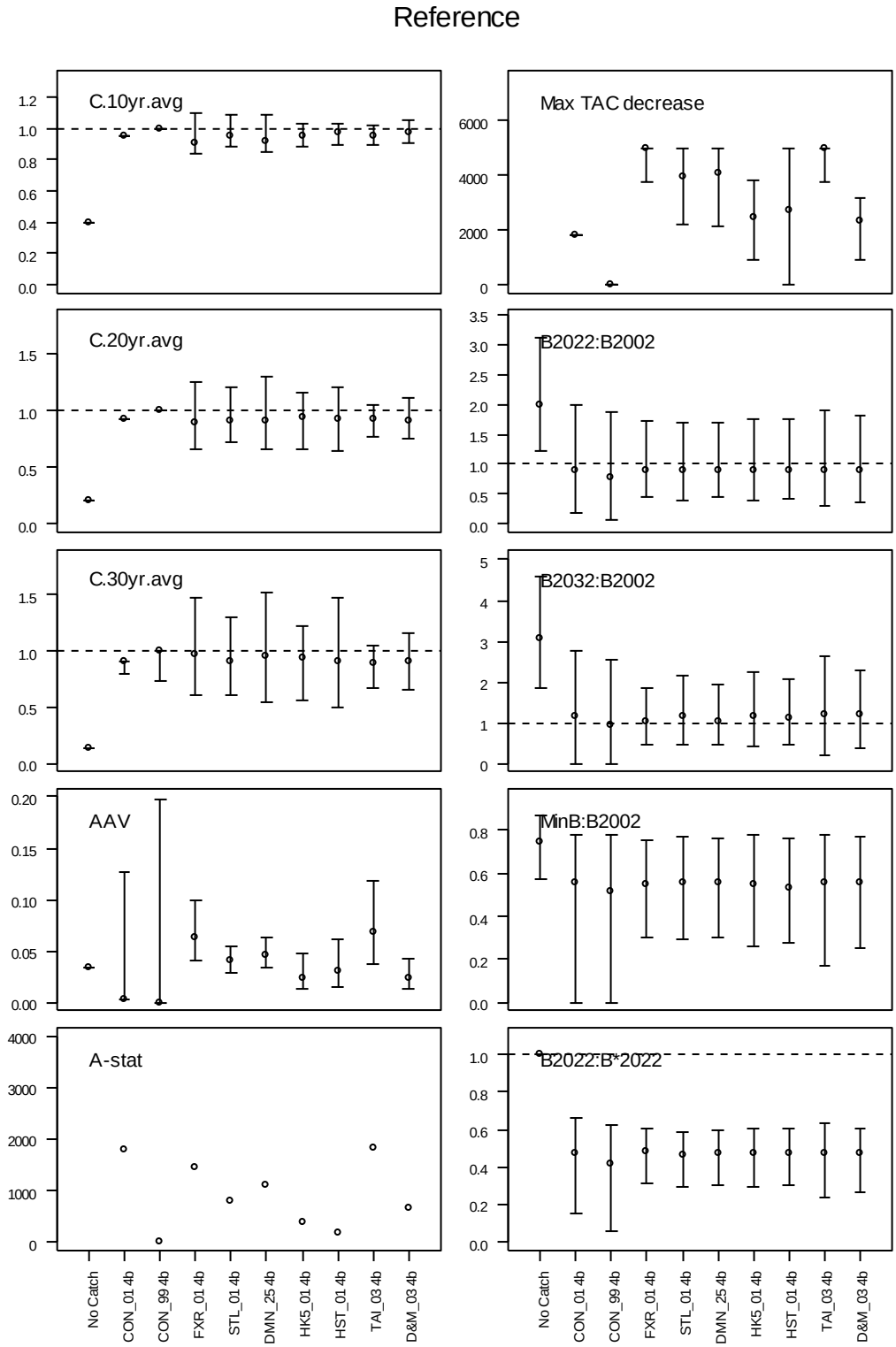

Figure 19. Performance statistics for 0.9 tuning level with 3-year TAC changes using the reference model for the subset of seven DRs.

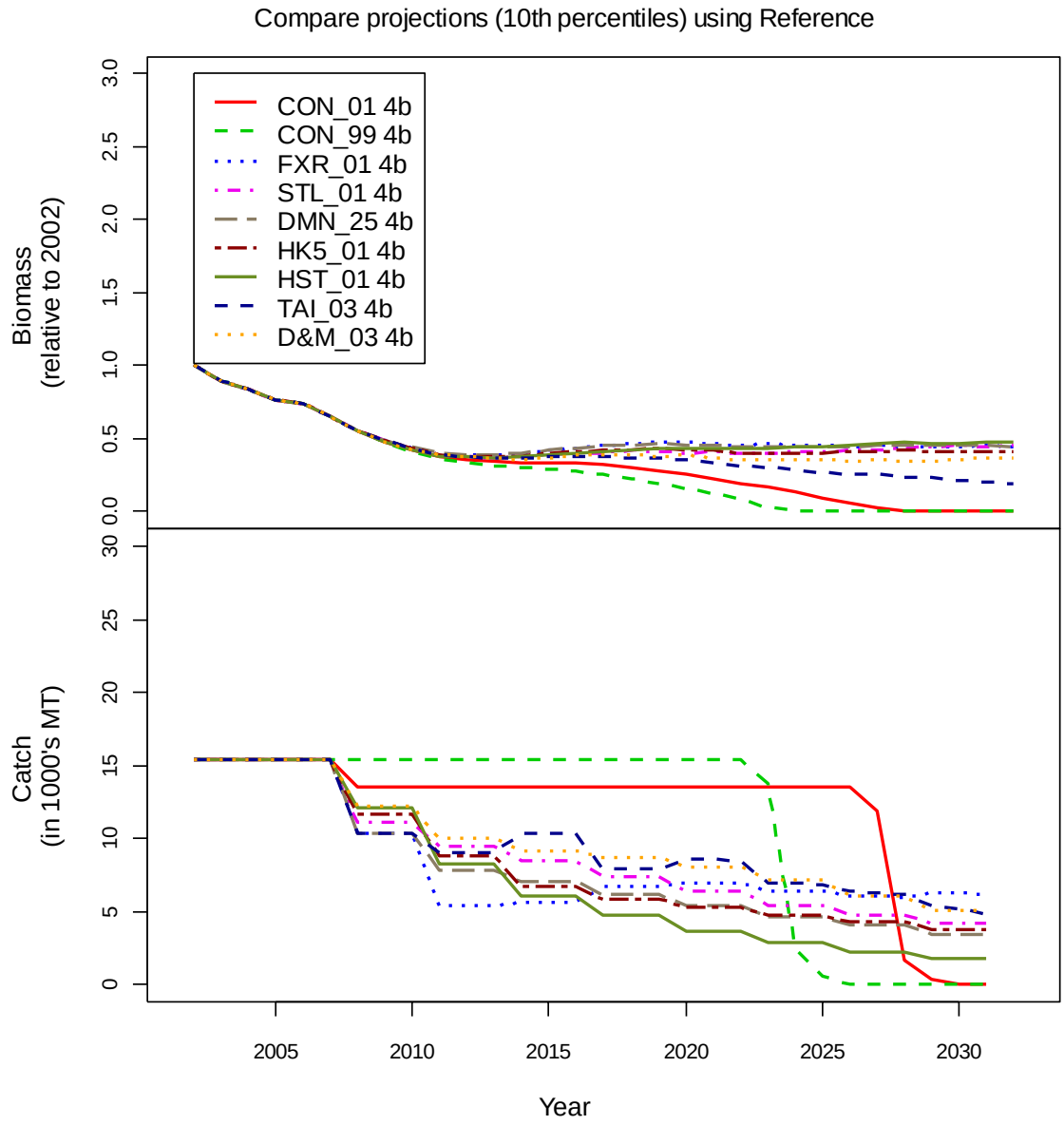

Figure 20. 10^{th} percentile values based on 0.9 tuning level with 3-year TAC changes using the reference model for the subset of seven DRs.

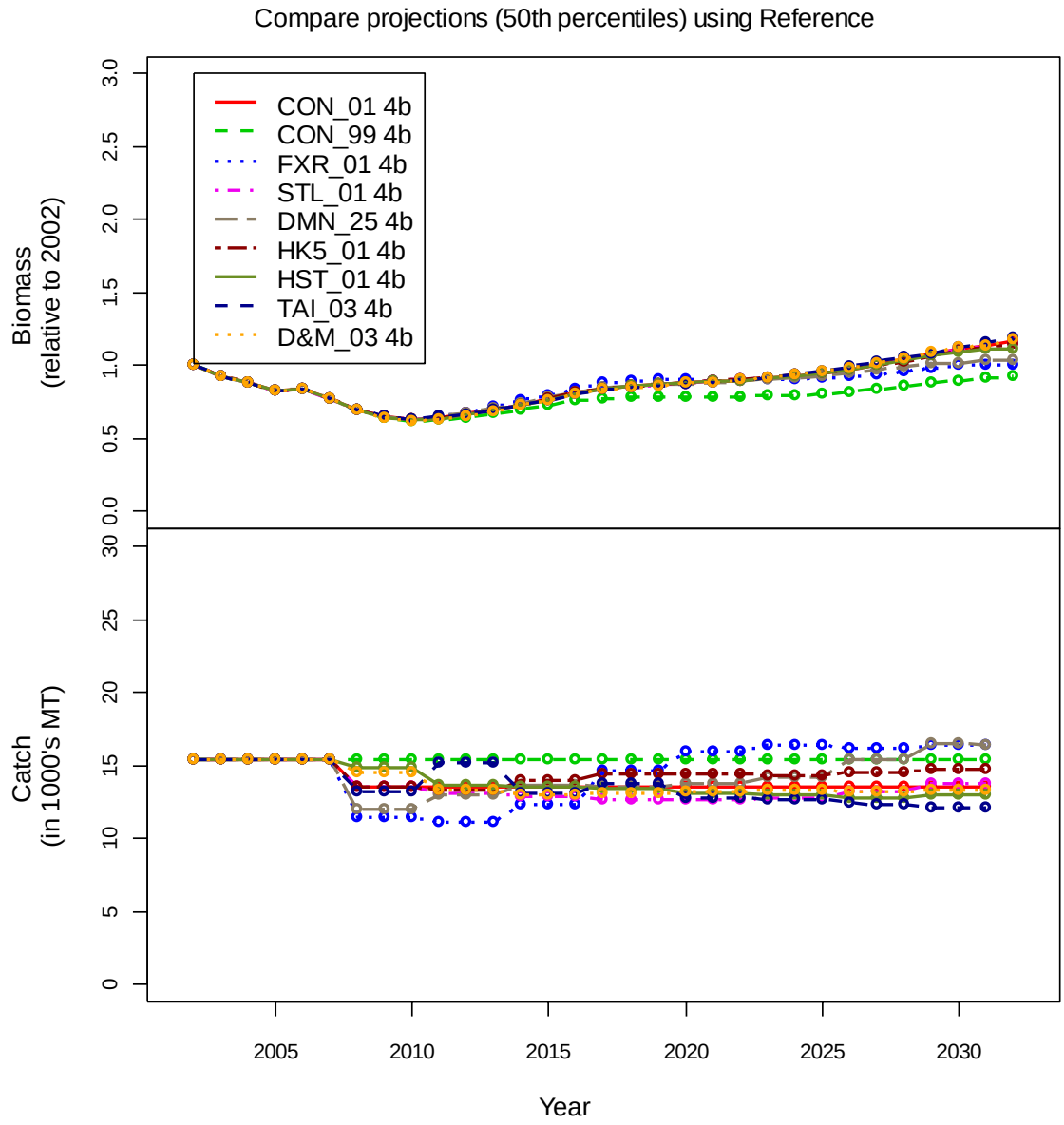

Figure 21. 50th percentile (median) values based on 0.9 tuning level with 3-year TAC changes using the reference model for the subset of seven DRs.

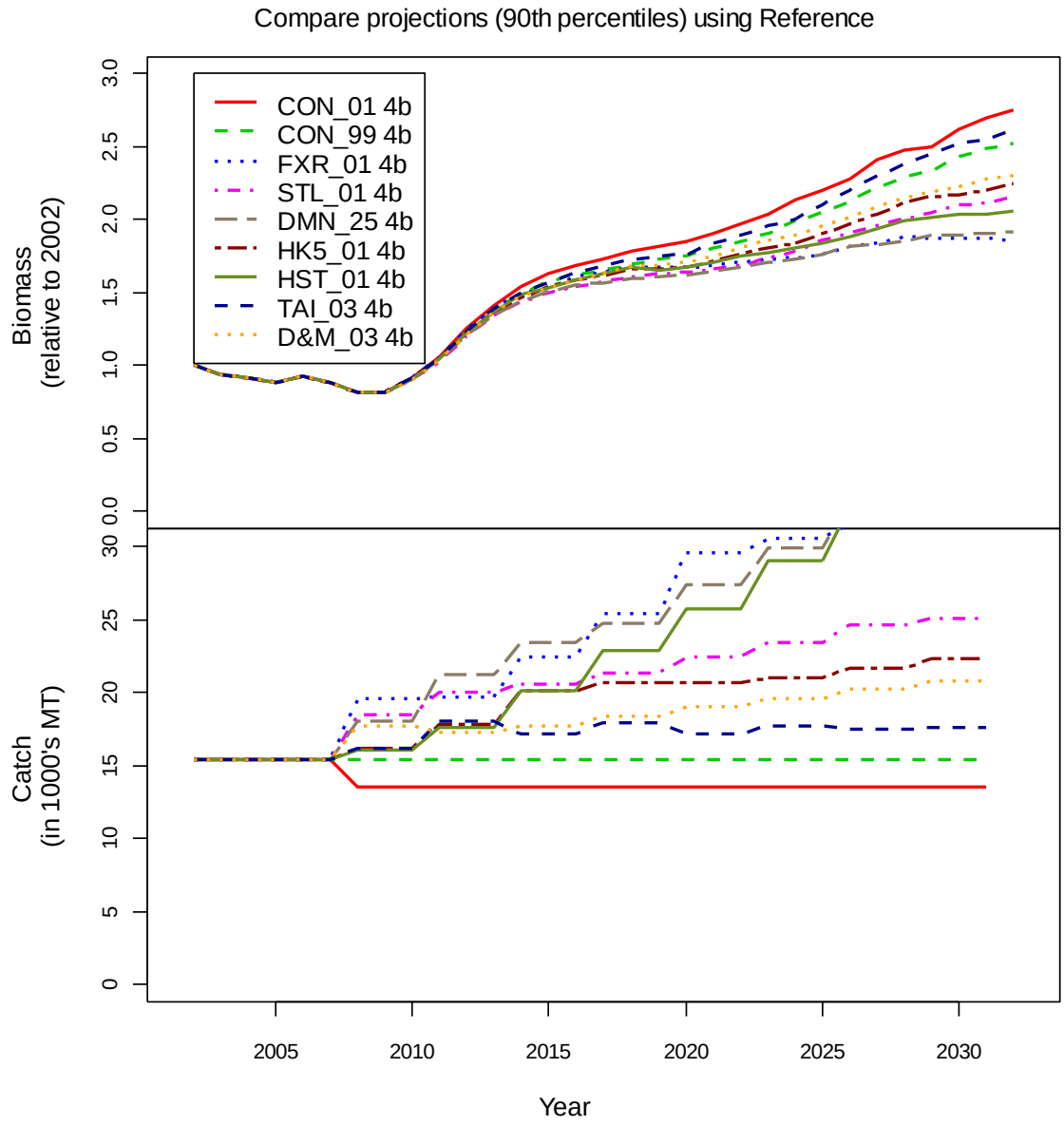

Figure 22. 90th percentile values based on 0.9 tuning level with 3-year TAC changes using the reference model for the subset of seven DRs.

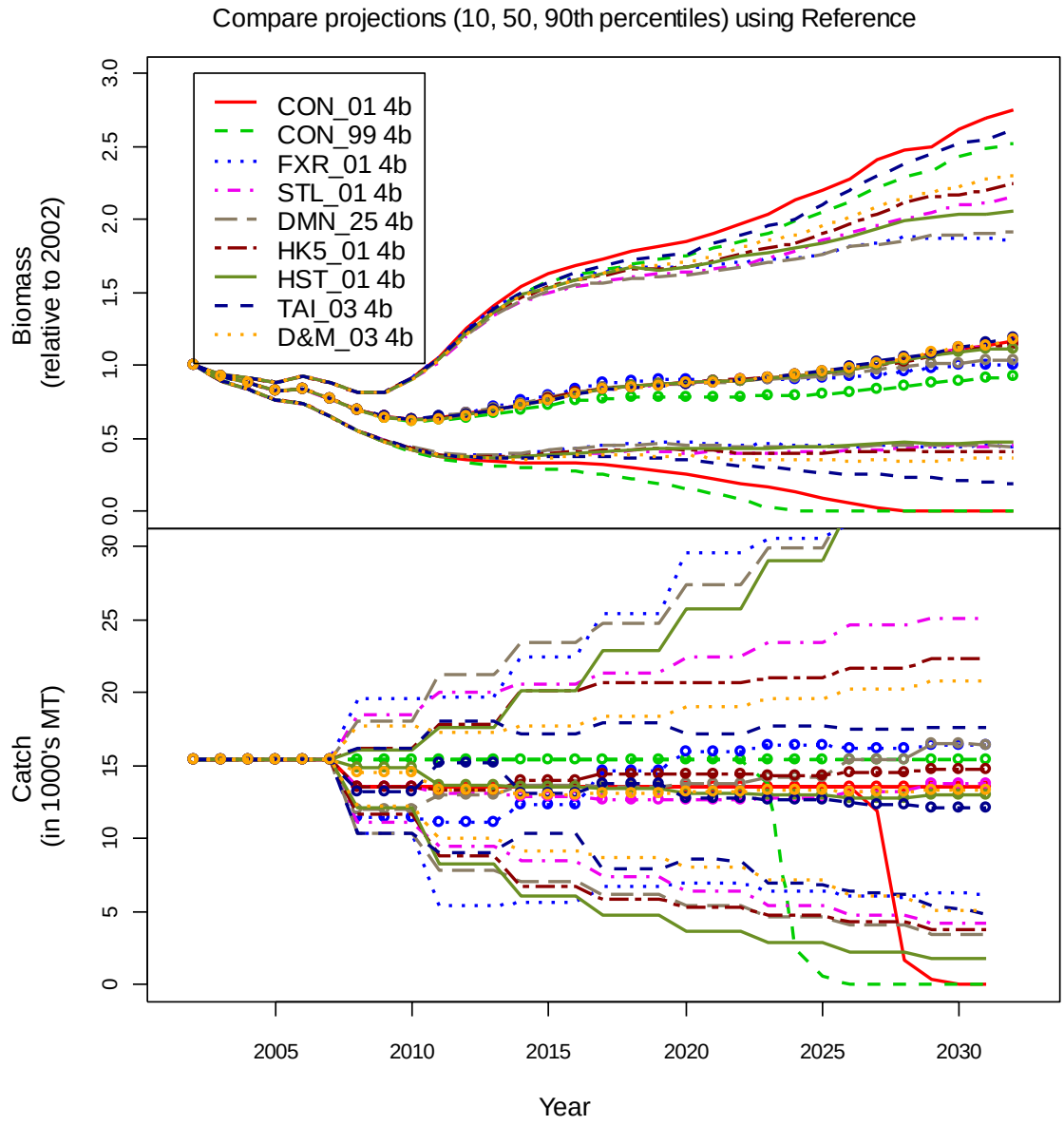

Figure 23. All percentile values based on 0.9 tuning level with 3-year TAC changes using the reference model for the subset of seven DRs.

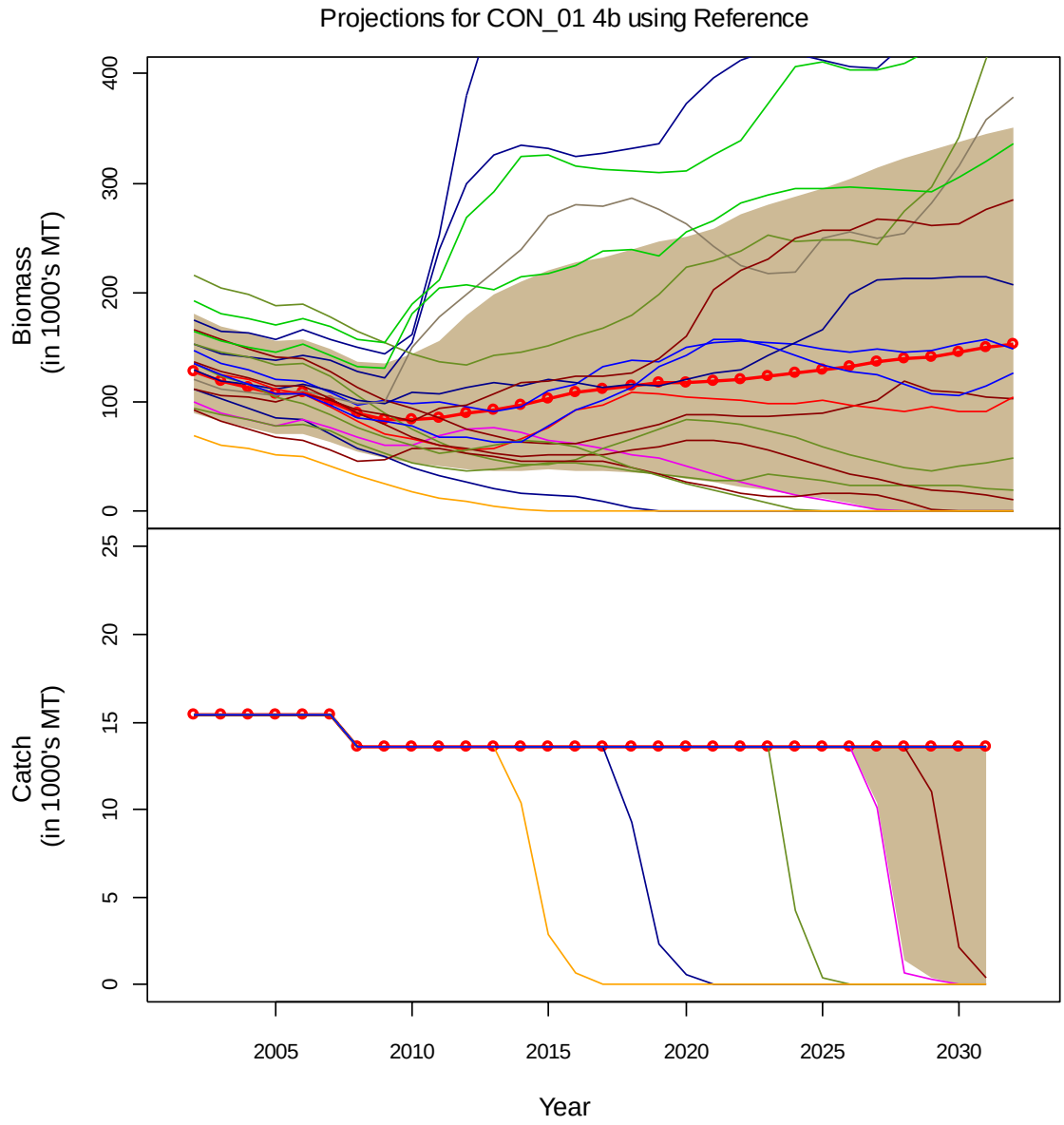

Figure 24. Biomass and catch trajectories for 20 representative samples based on 0.9 tuning level with 3-year TAC changes using the reference model for constant (tuned) catch option.

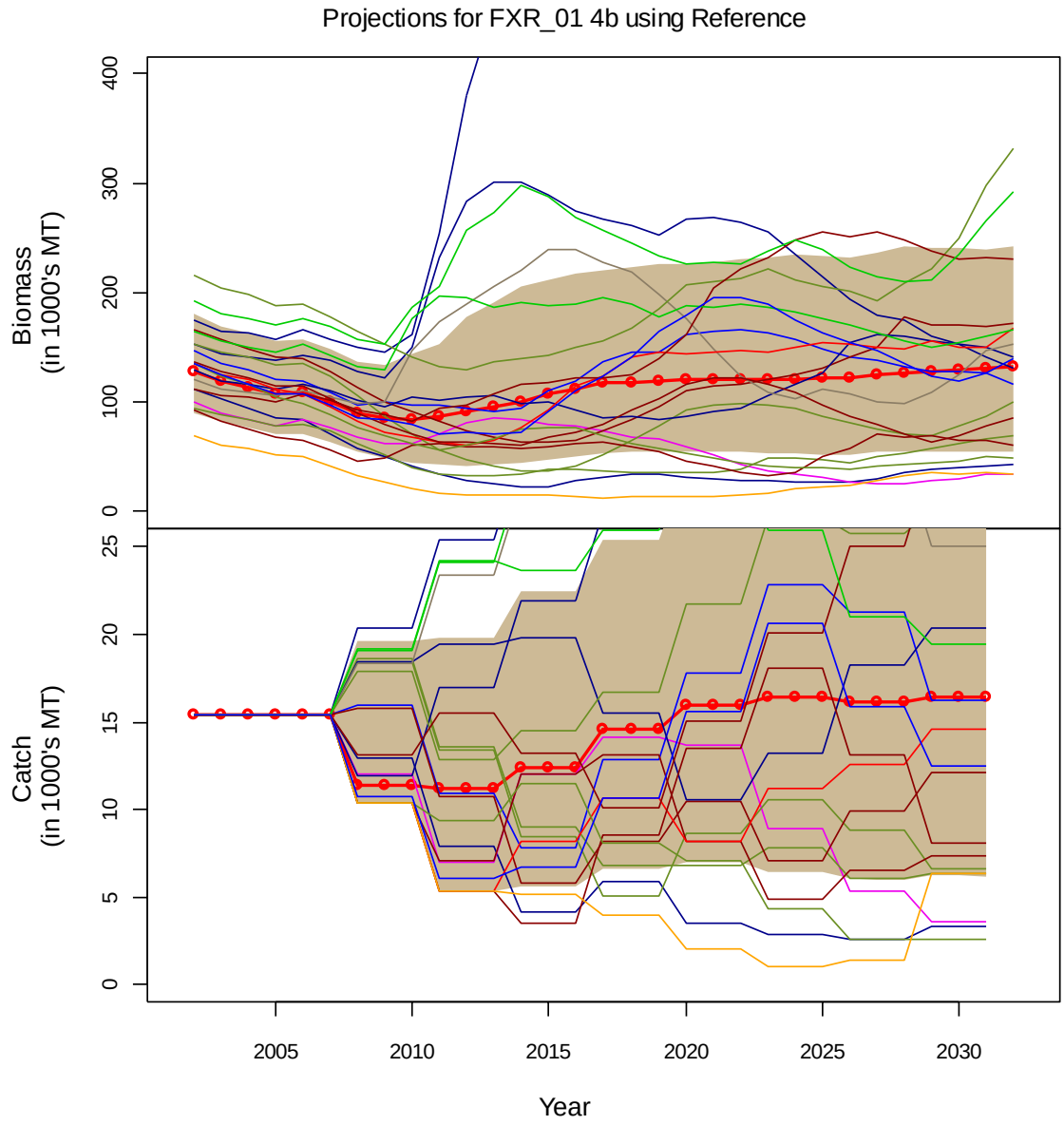

Figure 25. Biomass and catch trajectories for 20 representative samples based on 0.9 tuning level with 3-year TAC changes using the reference model for FXR_01.

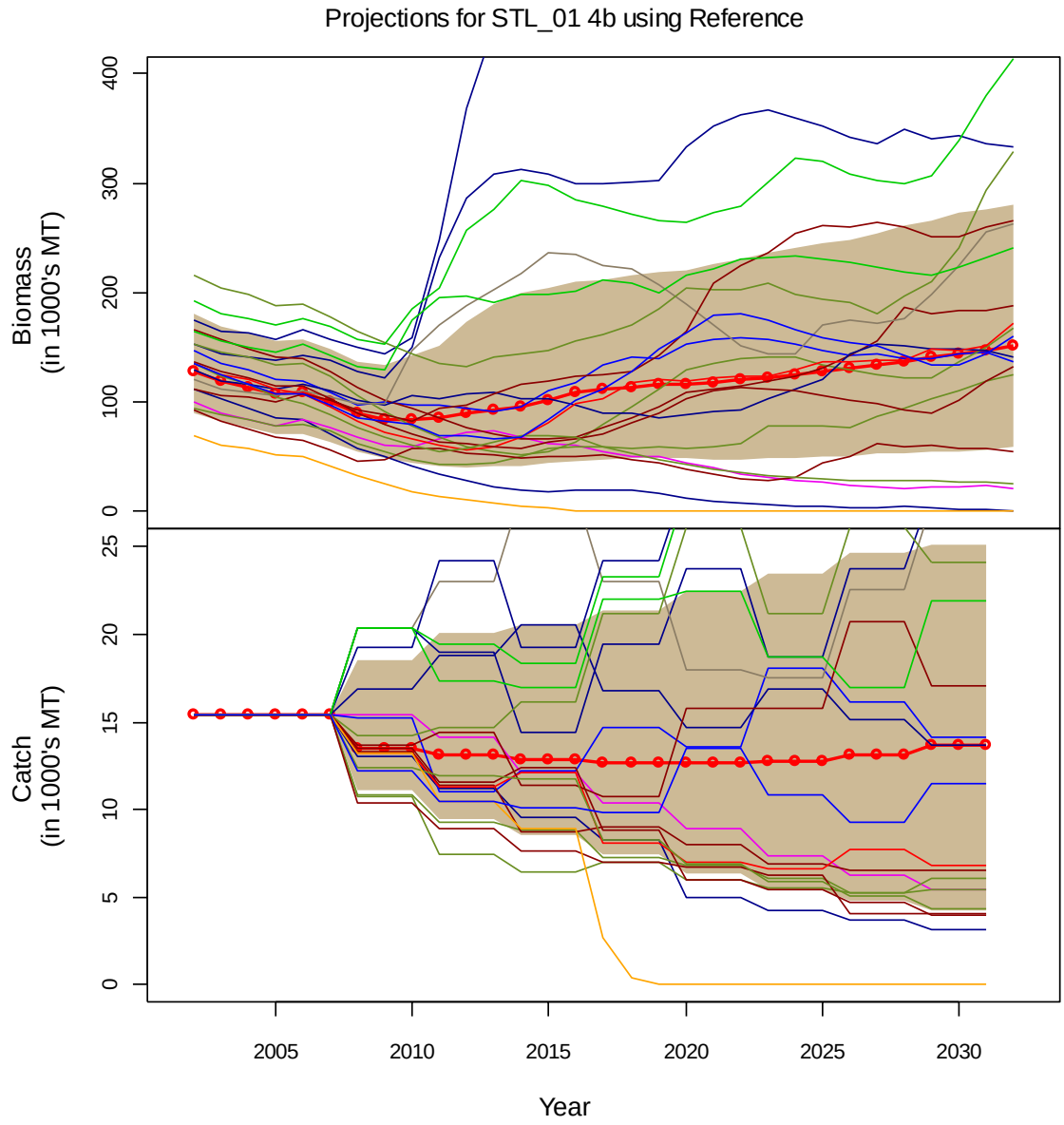

Figure 26. Biomass and catch trajectories for 20 representative samples based on 0.9 tuning level with 3-year TAC changes using the reference model for STL_01.

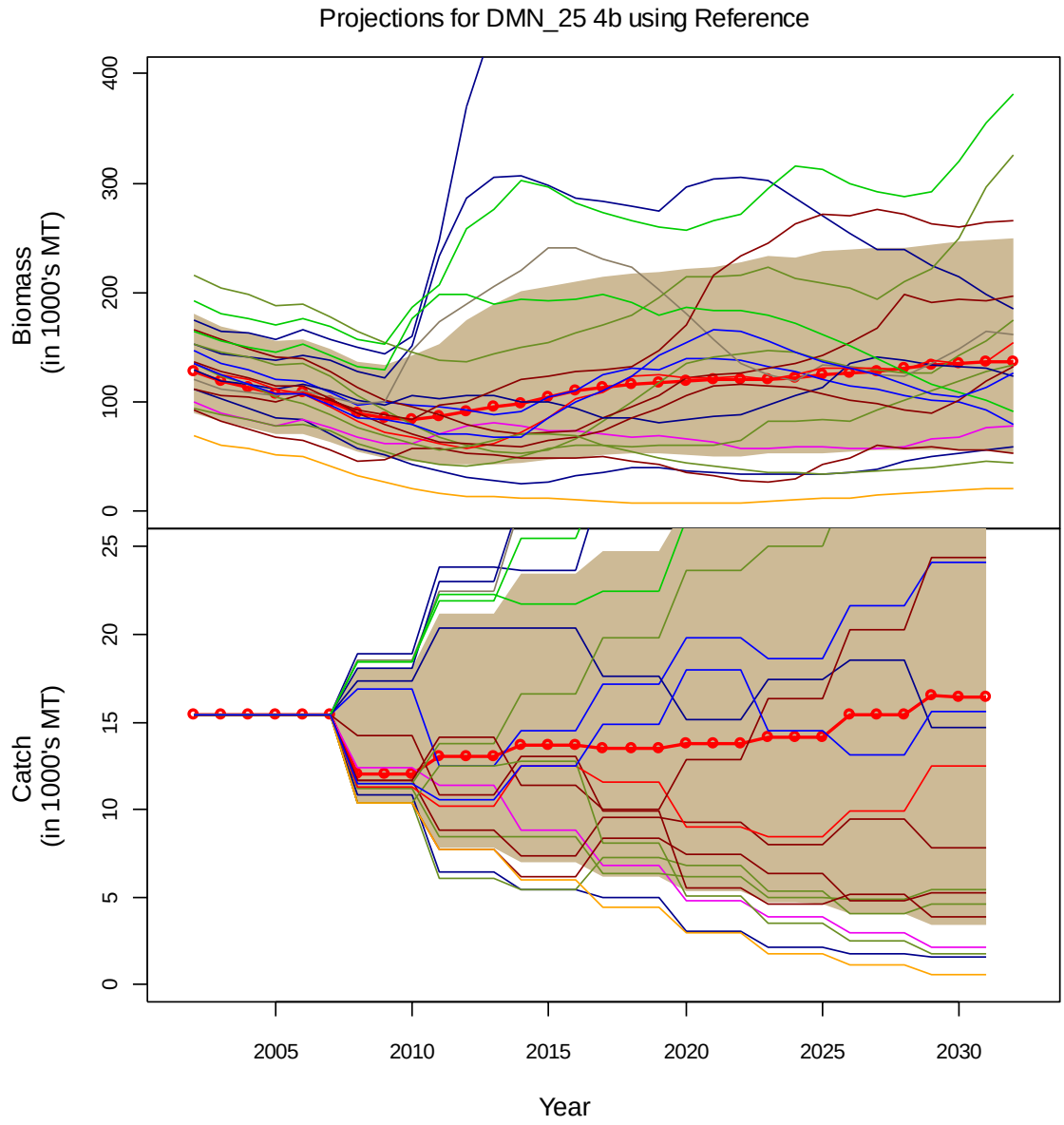

Figure 27. Biomass and catch trajectories for 20 representative samples based on 0.9 tuning level with 3-year TAC changes using the reference model for DMN_25.

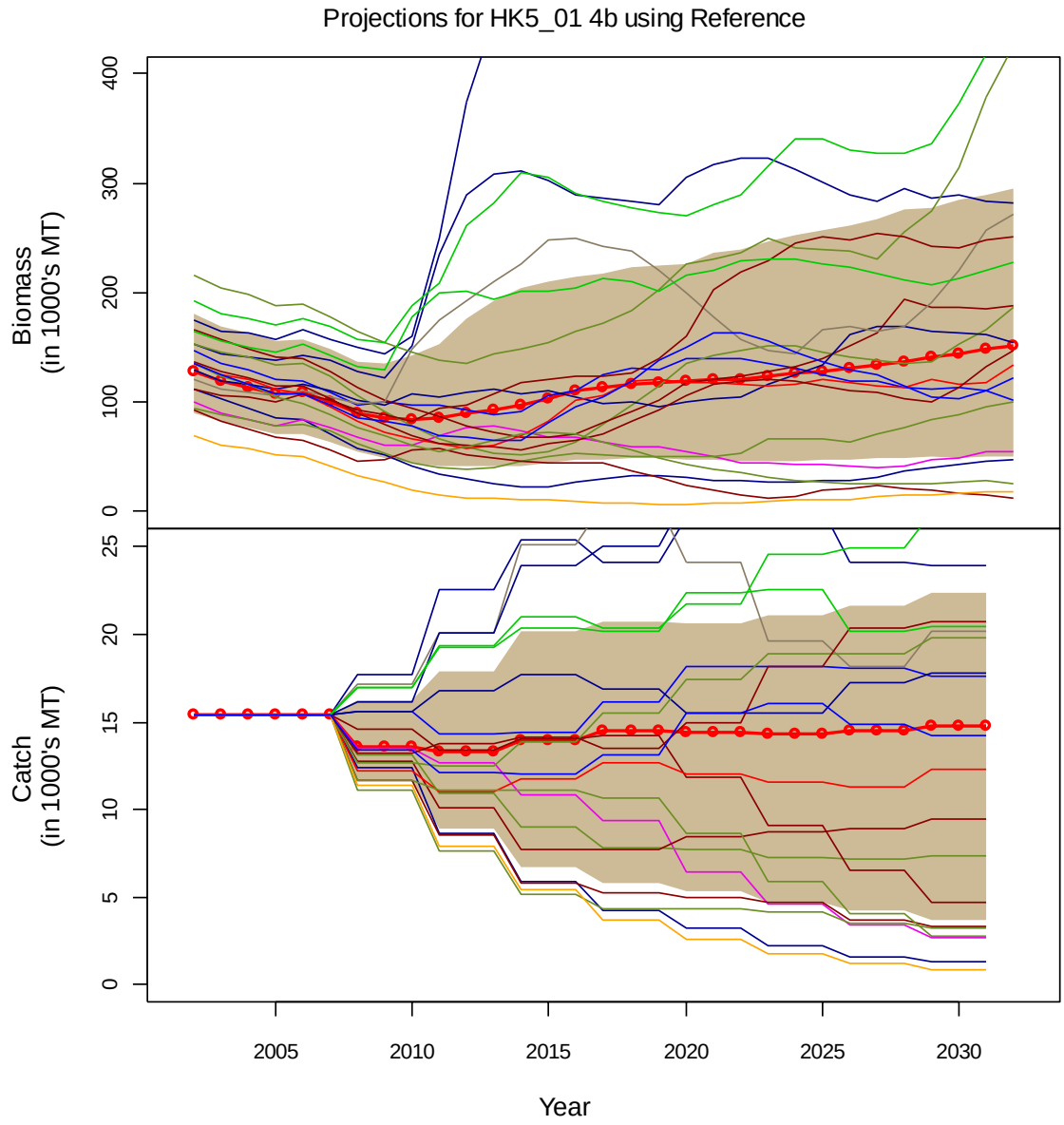

Figure 28. Biomass and catch trajectories for 20 representative samples based on 0.9 tuning level with 3-year TAC changes using the reference model for HK5_01.

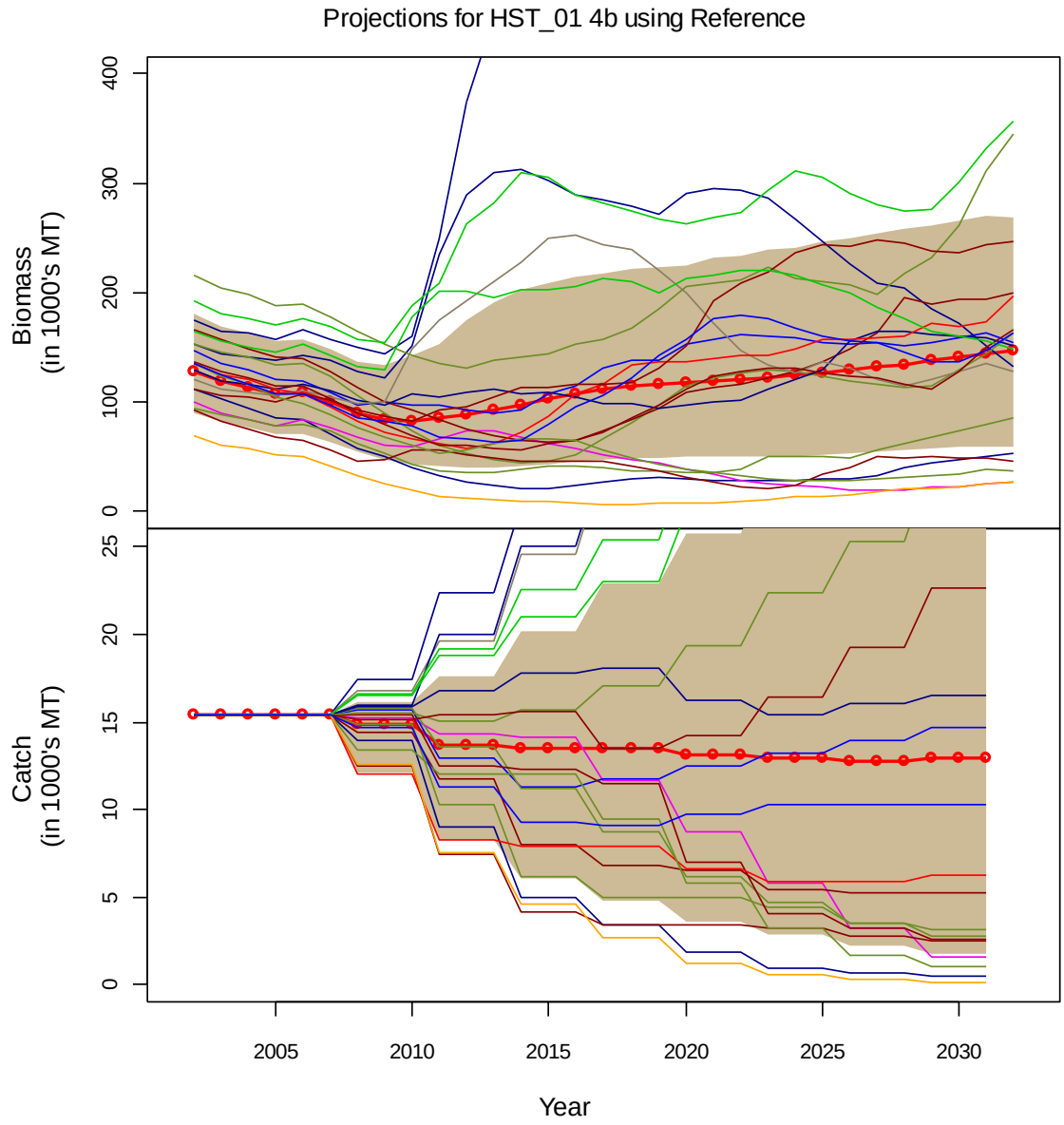

Figure 29. Biomass and catch trajectories for 20 representative samples based on 0.9 tuning level with 3-year TAC changes using the reference model for HST_01.

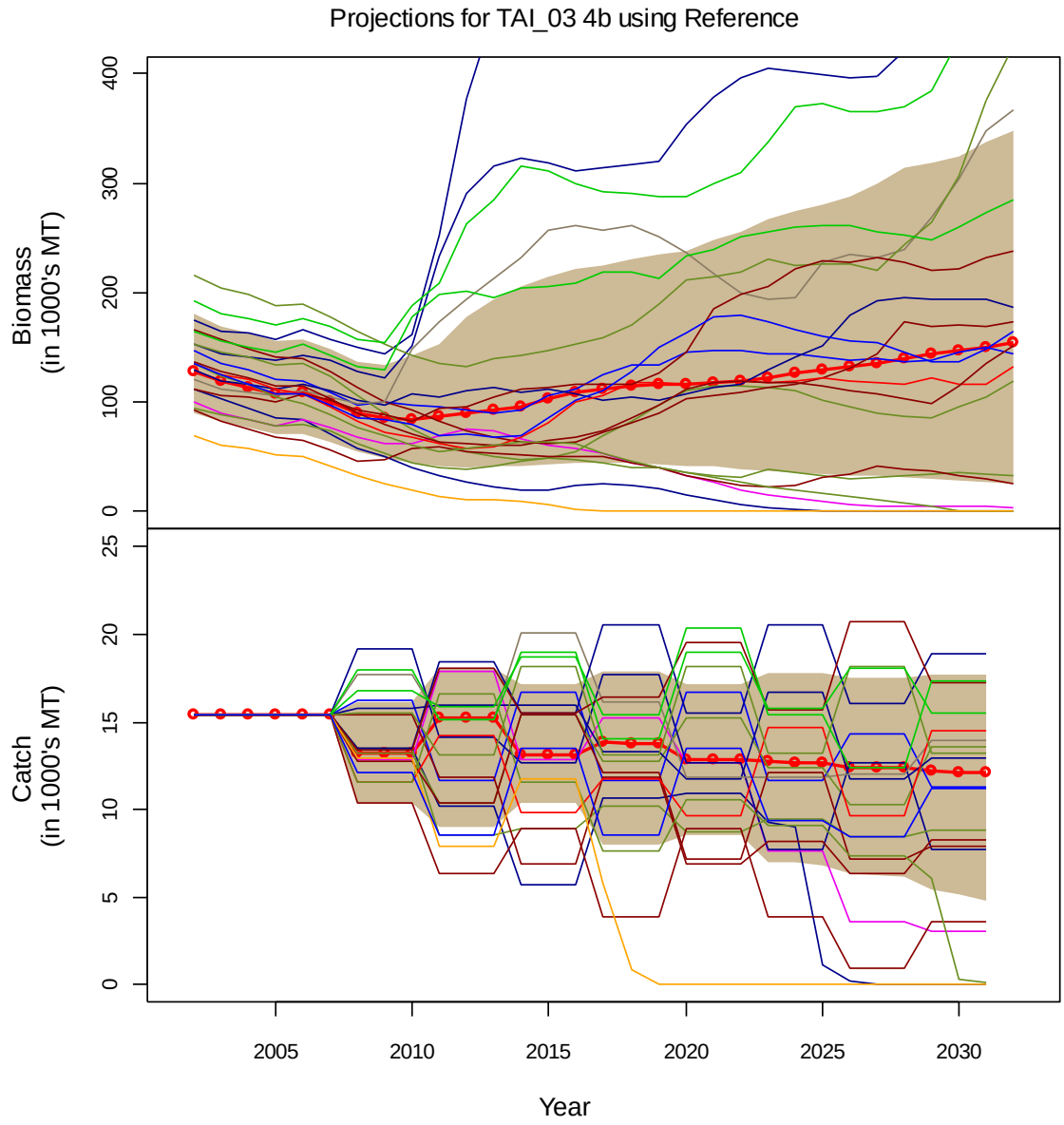

Figure 30. Biomass and catch trajectories for 20 representative samples based on 0.9 tuning level with 3-year TAC changes using the reference model for TAI_03.

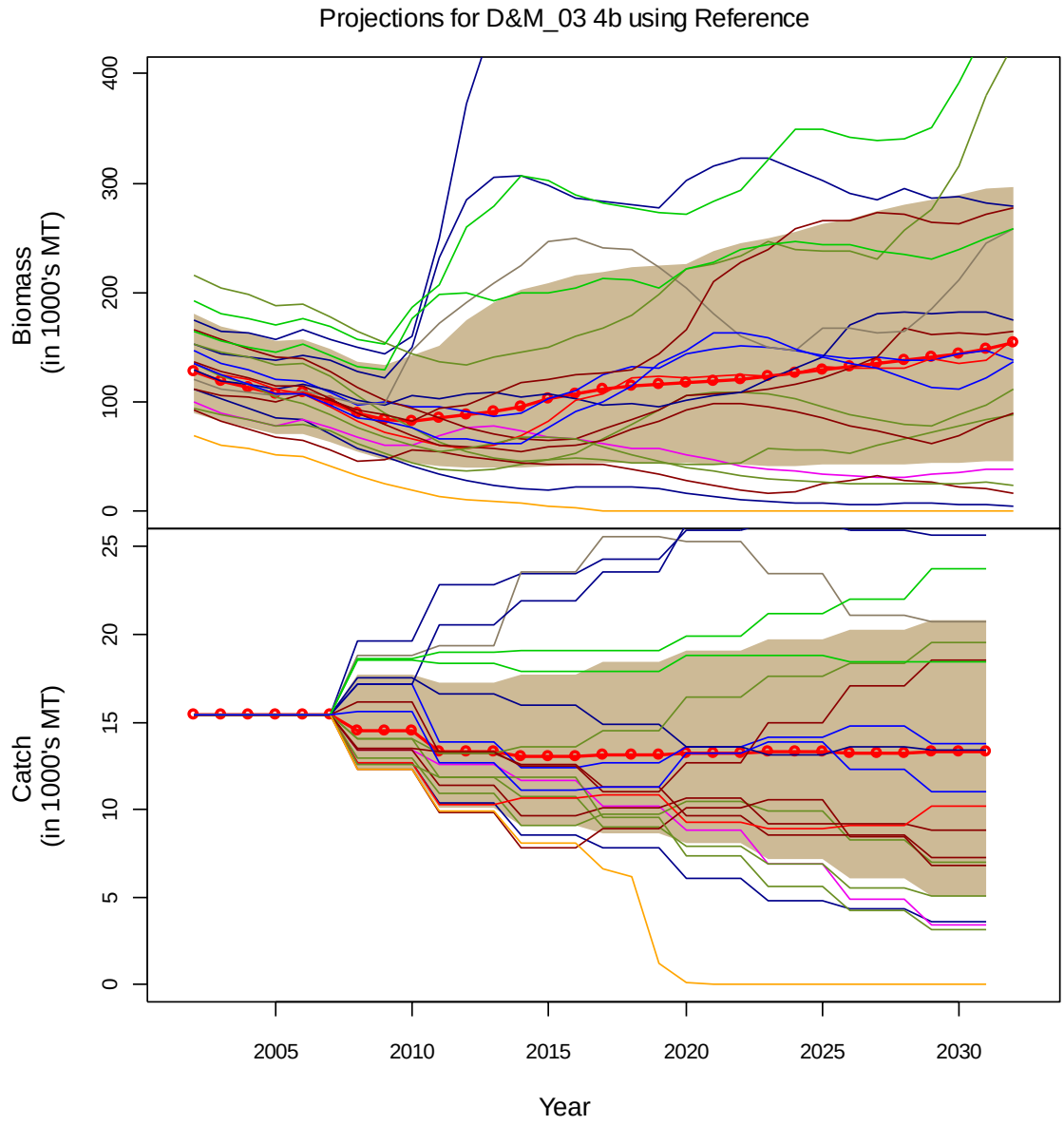

Figure 31. Biomass and catch trajectories for 20 representative samples based on 0.9 tuning level with 3-year TAC changes using the reference model for D&M_03.

Tuned to 1.3

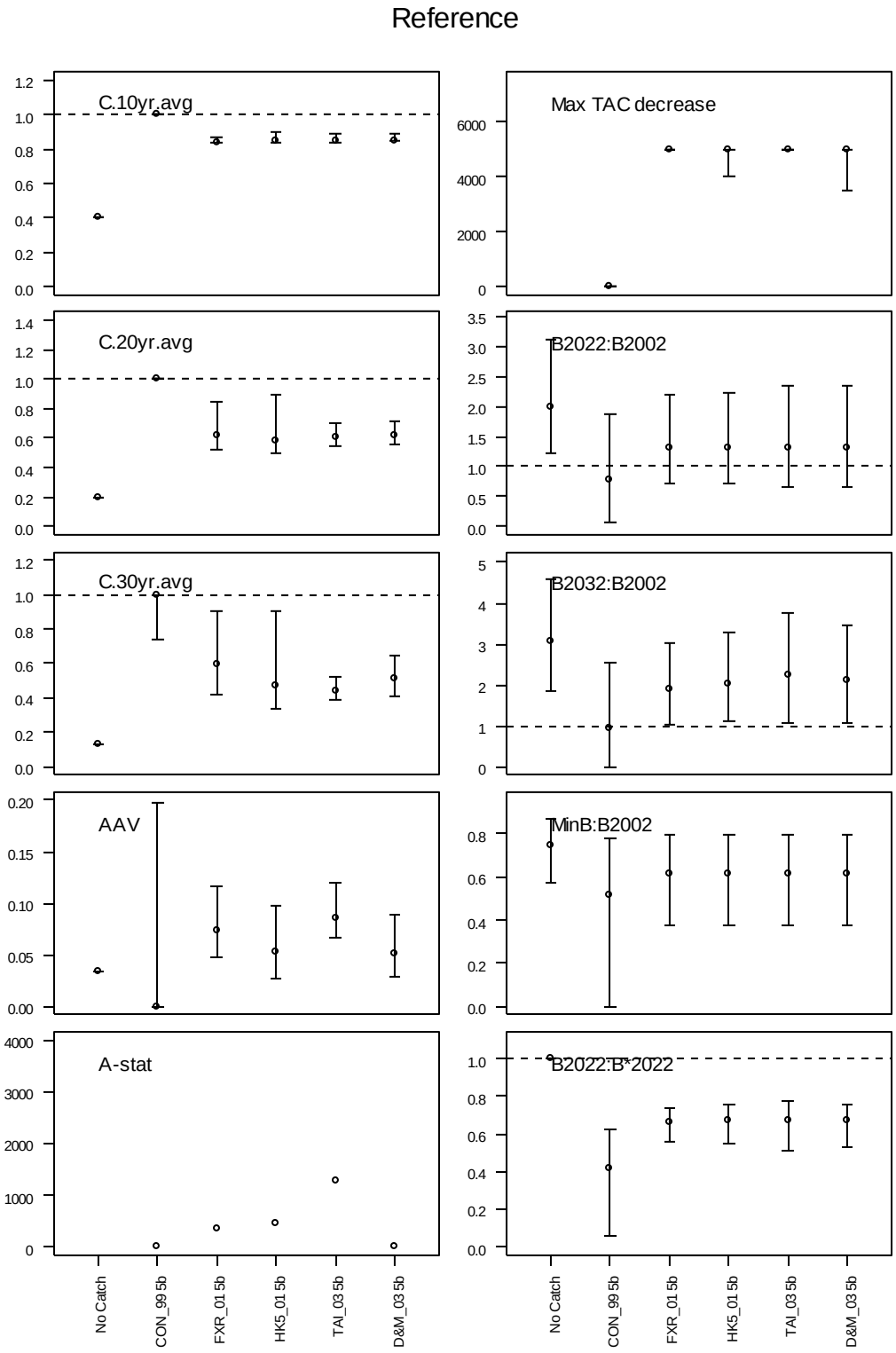

Figure 32. Performance statistics for 1.3 tuning level with 3-year TAC changes using the reference model for the subset of seven DRs.

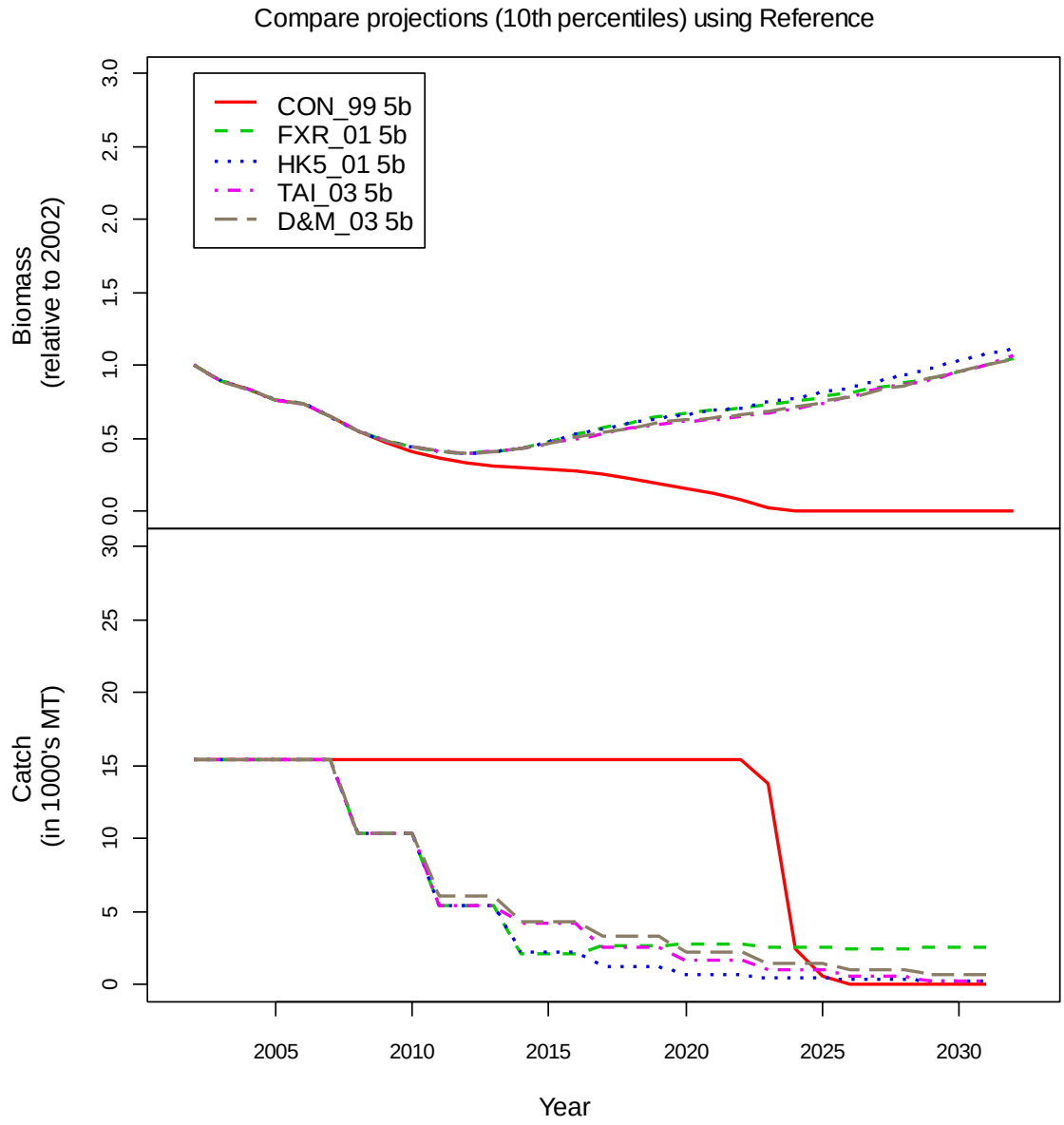

Figure 33. 10^{th} percentile values based on 1.3 tuning level with 3-year TAC changes using the reference model for the subset of seven DRs.

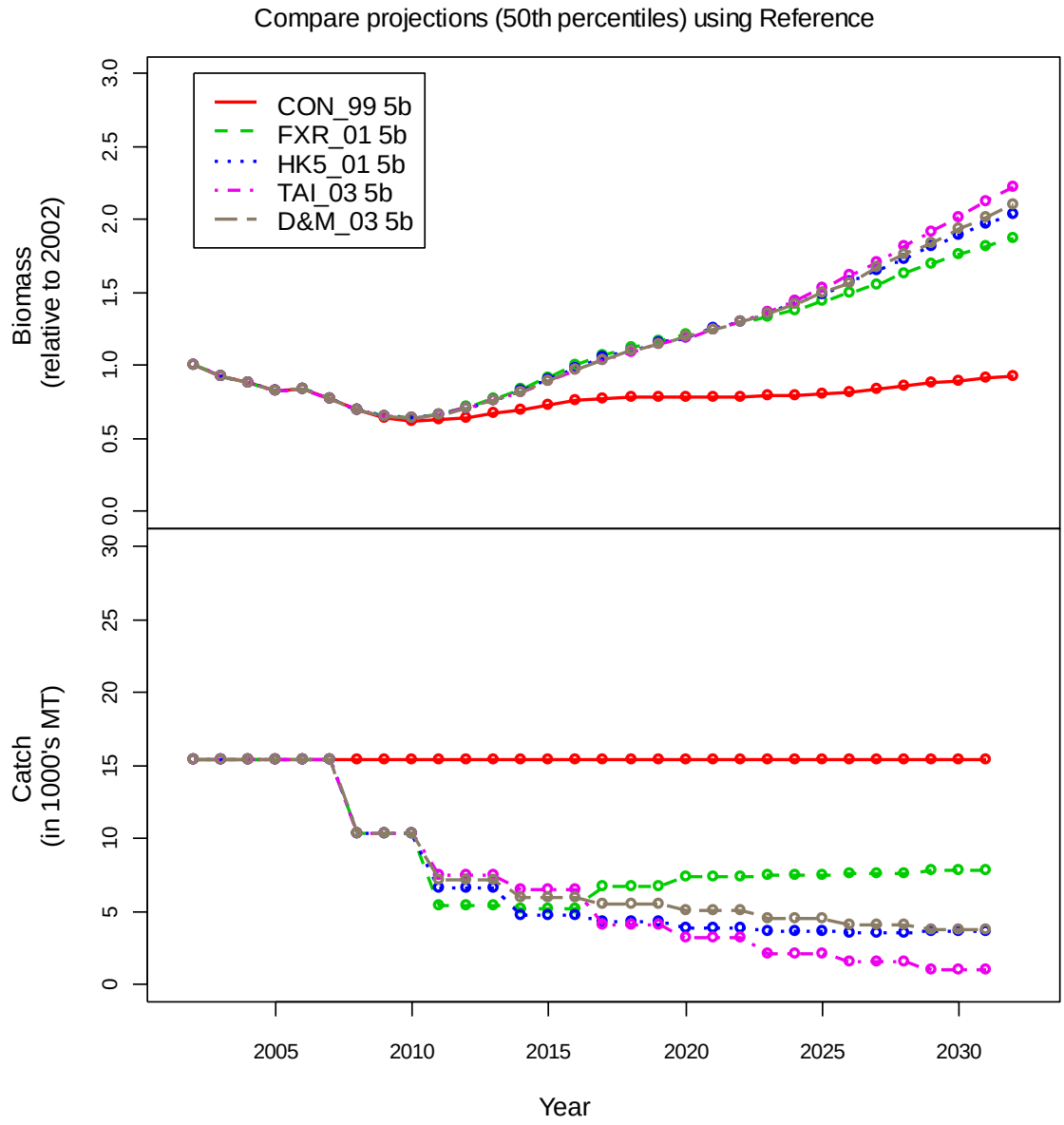

Figure 34. 50th percentile (median) values based on 1.3 tuning level with 3-year TAC changes using the reference model for the subset of seven DRs.

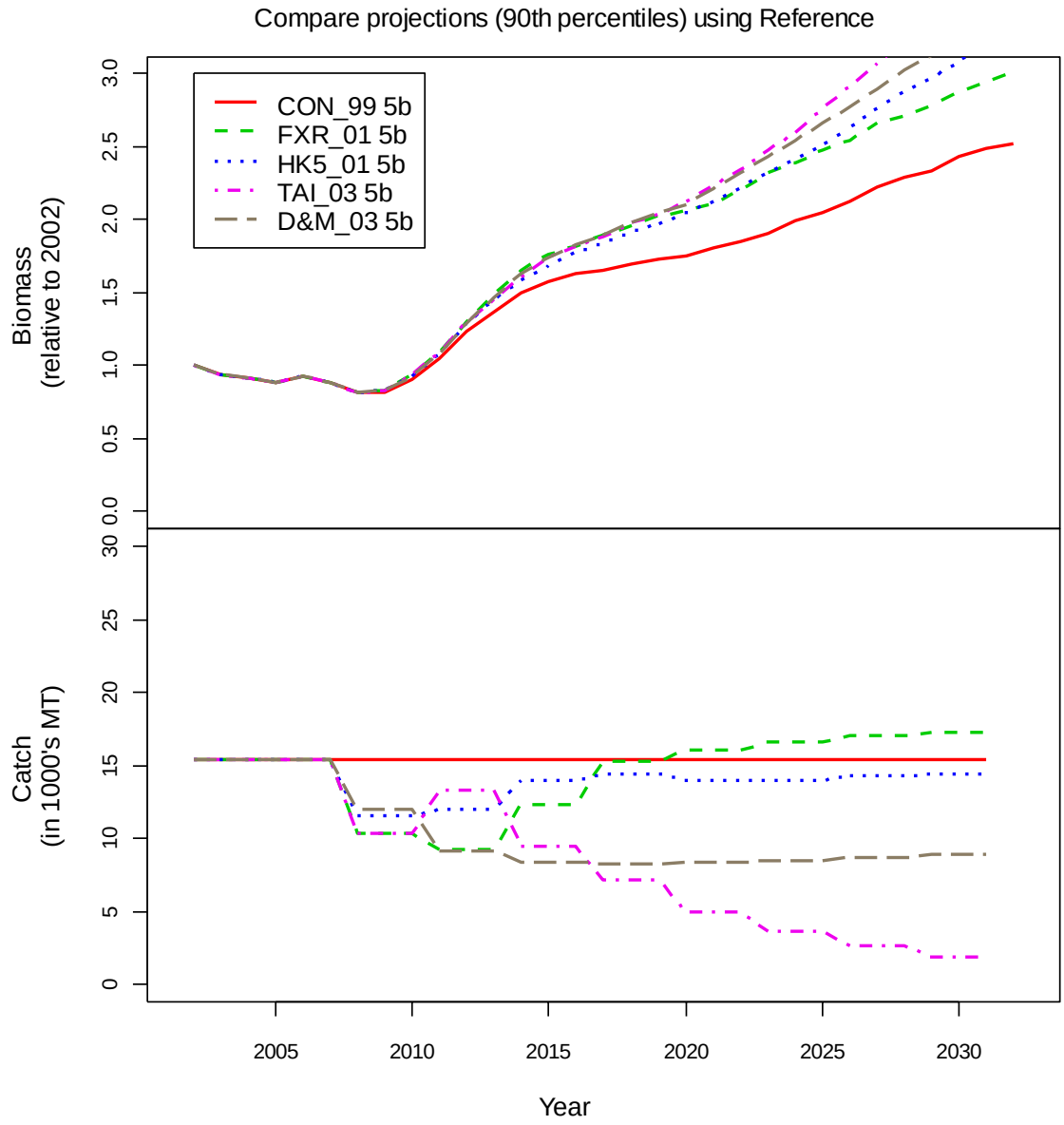

Figure 35. 90th percentile values based on 1.3 tuning level with 3-year TAC changes using the reference model for the subset of seven DRs.

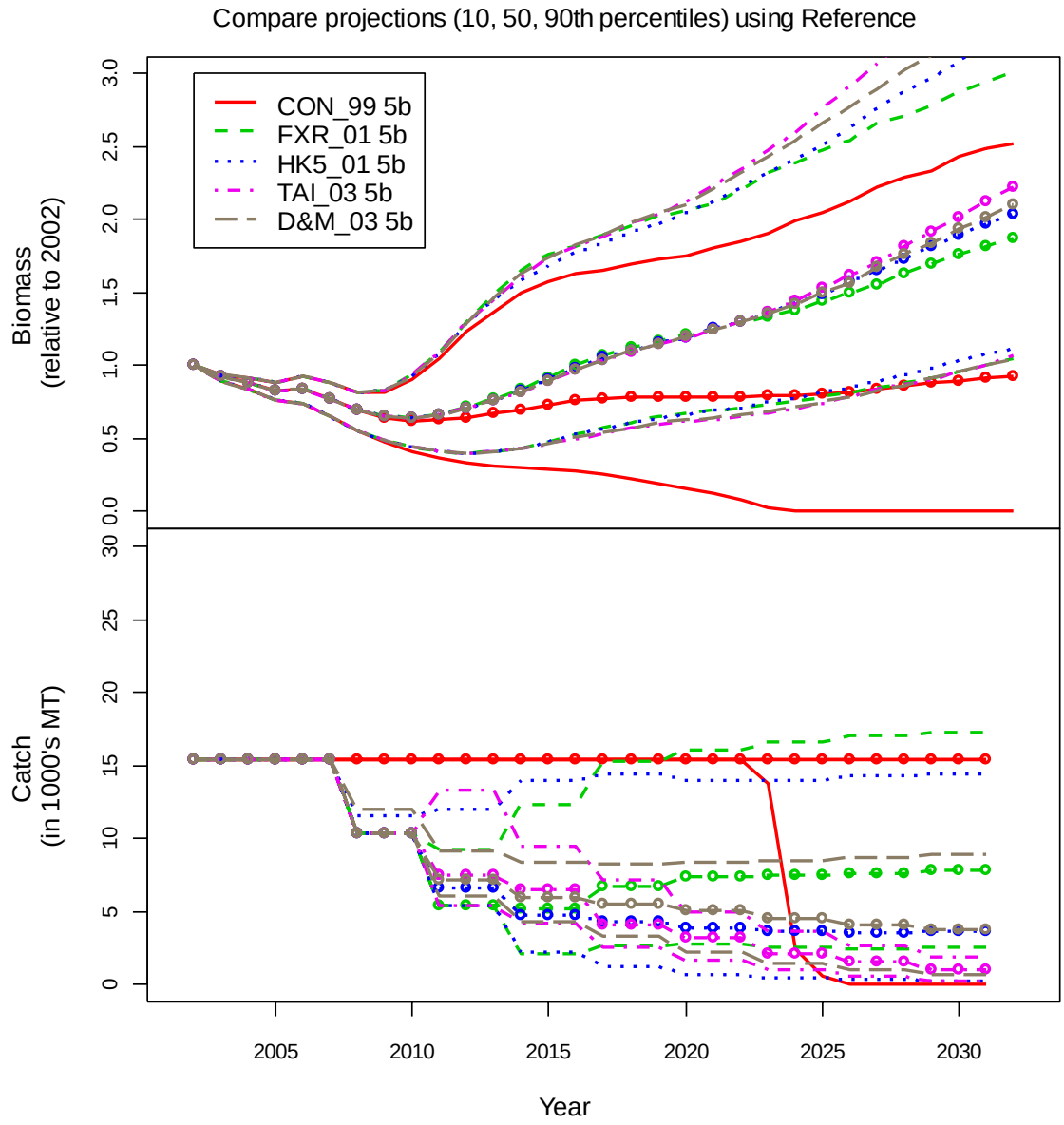

Figure 36. All percentile values based on 1.3 tuning level with 3-year TAC changes using the reference model for the subset of seven DRs.

Robustness trials

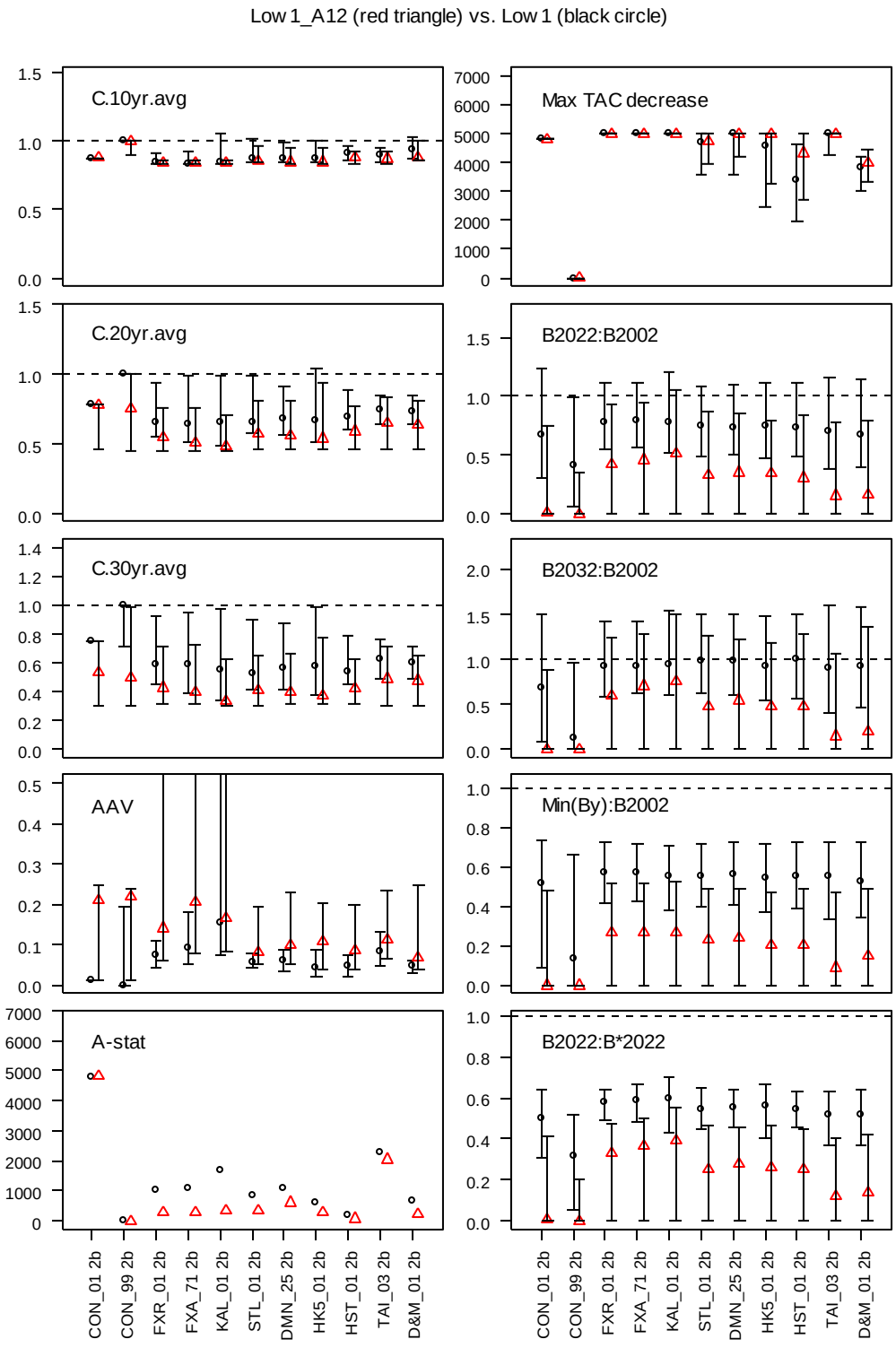

Figure 37. Performance statistics for 1.1 tuning level with 3-year TAC changes using the reference model for the initial 10 DRs (except for D&M_02) contrasting Low1 vs Low1_A12.

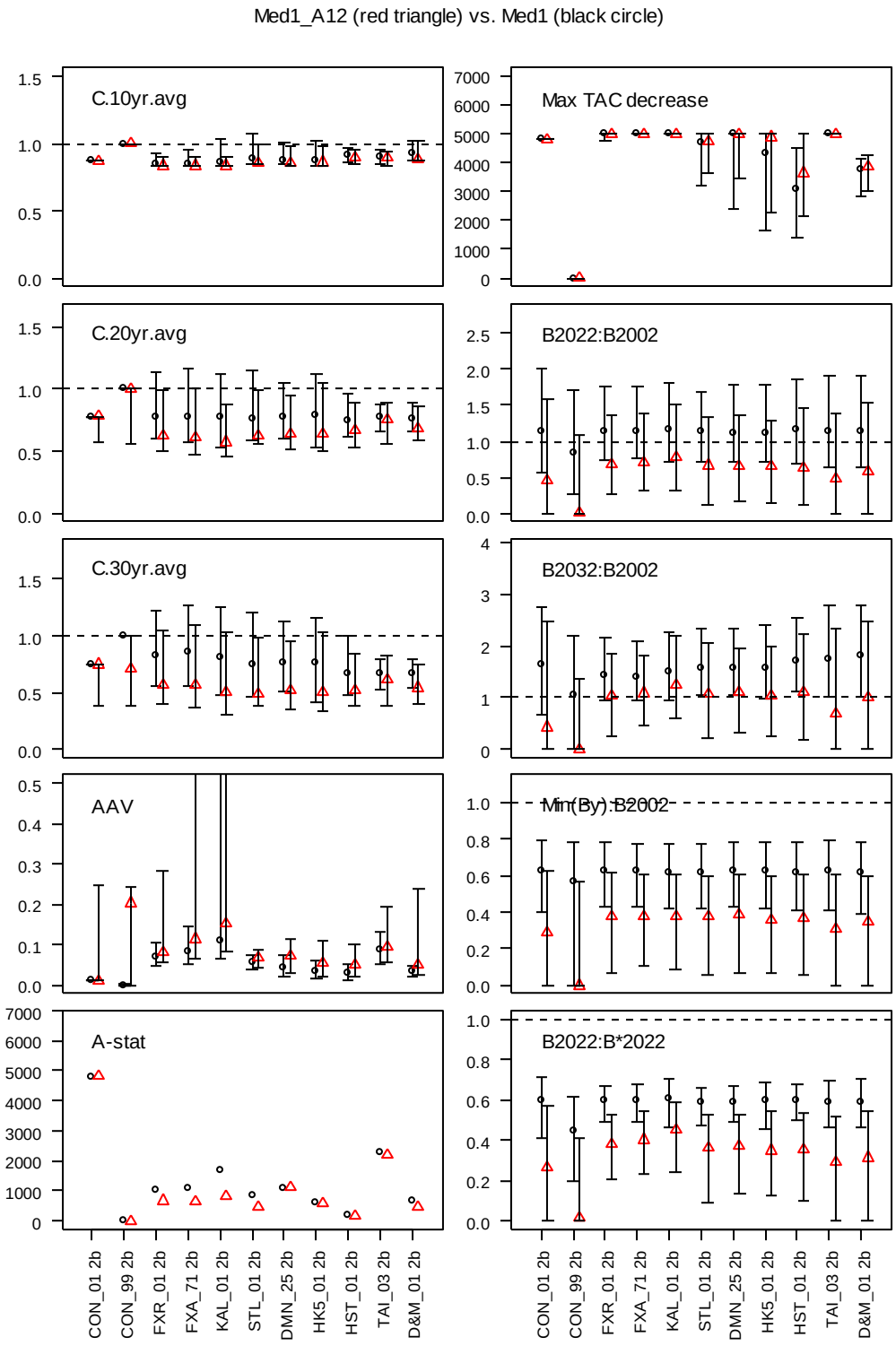

Figure 38. Performance statistics for 1.1 tuning level with 3-year TAC changes using the reference model for the initial 10 DRs (except for D&M_02) contrasting Med1 vs Med1_A12.

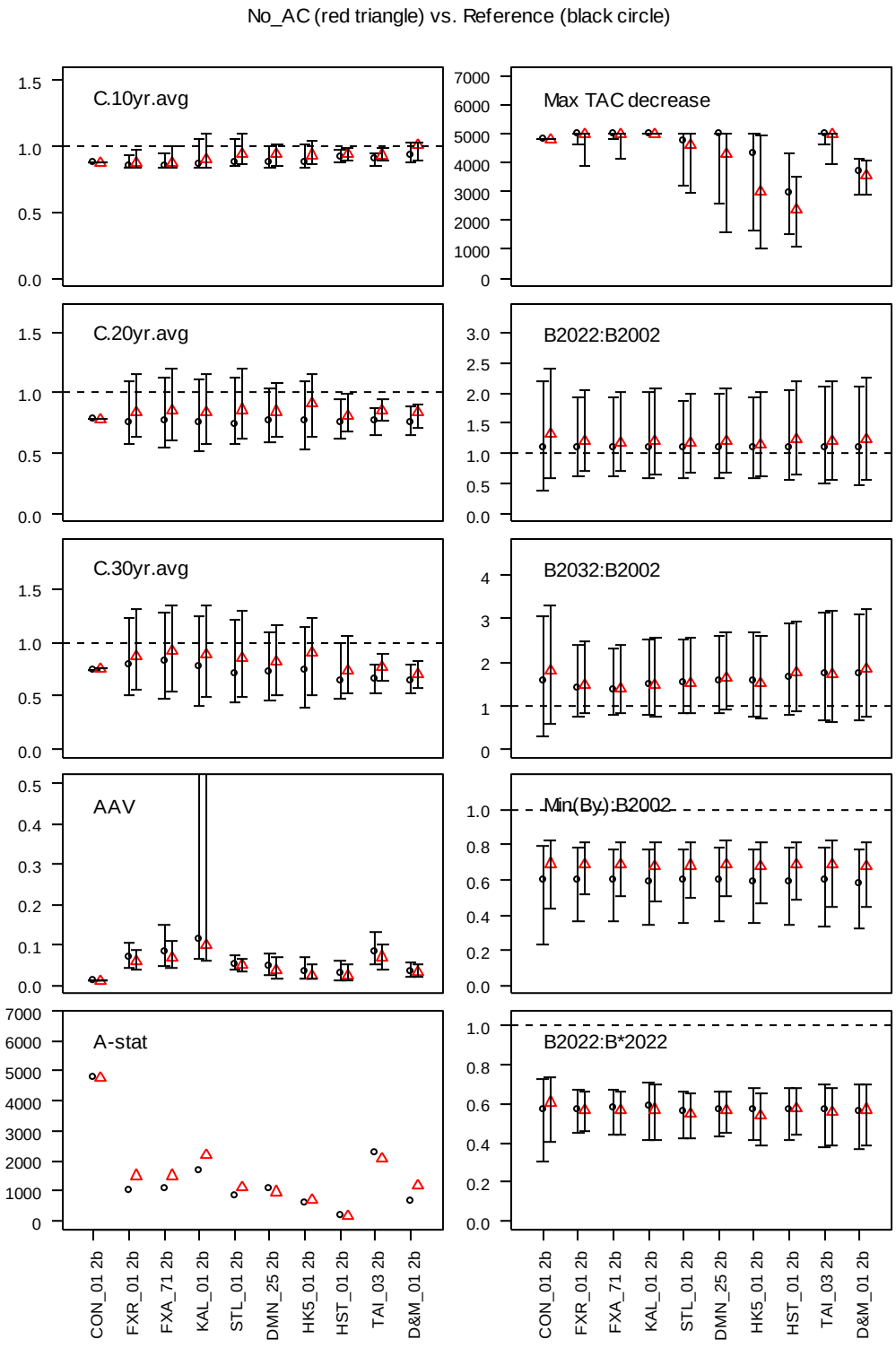

Figure 39. Performance statistics for 1.1 tuning level with 3-year TAC changes using the reference model for the initial 10 DRs (except for D&M_02) contrasting the no autocorrelation option (NO_AC) vs the reference model.

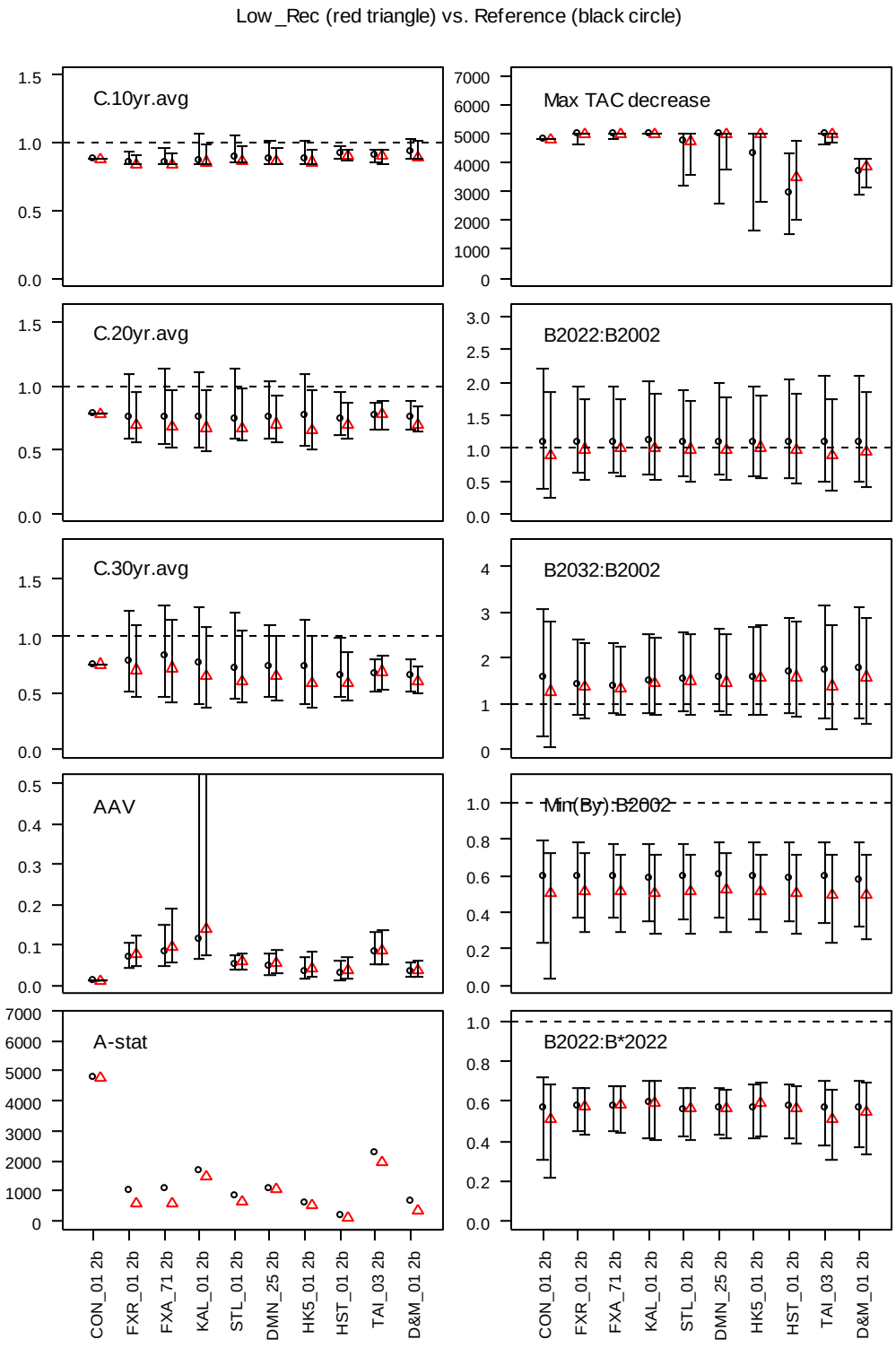

Figure 40. Performance statistics for 1.1 tuning level with 3-year TAC changes using the reference model for the initial 10 DRs (except for D&M_02) contrasting the low recruitment (Low_Rec) vs the reference model.

Alternative TAC-change intervals

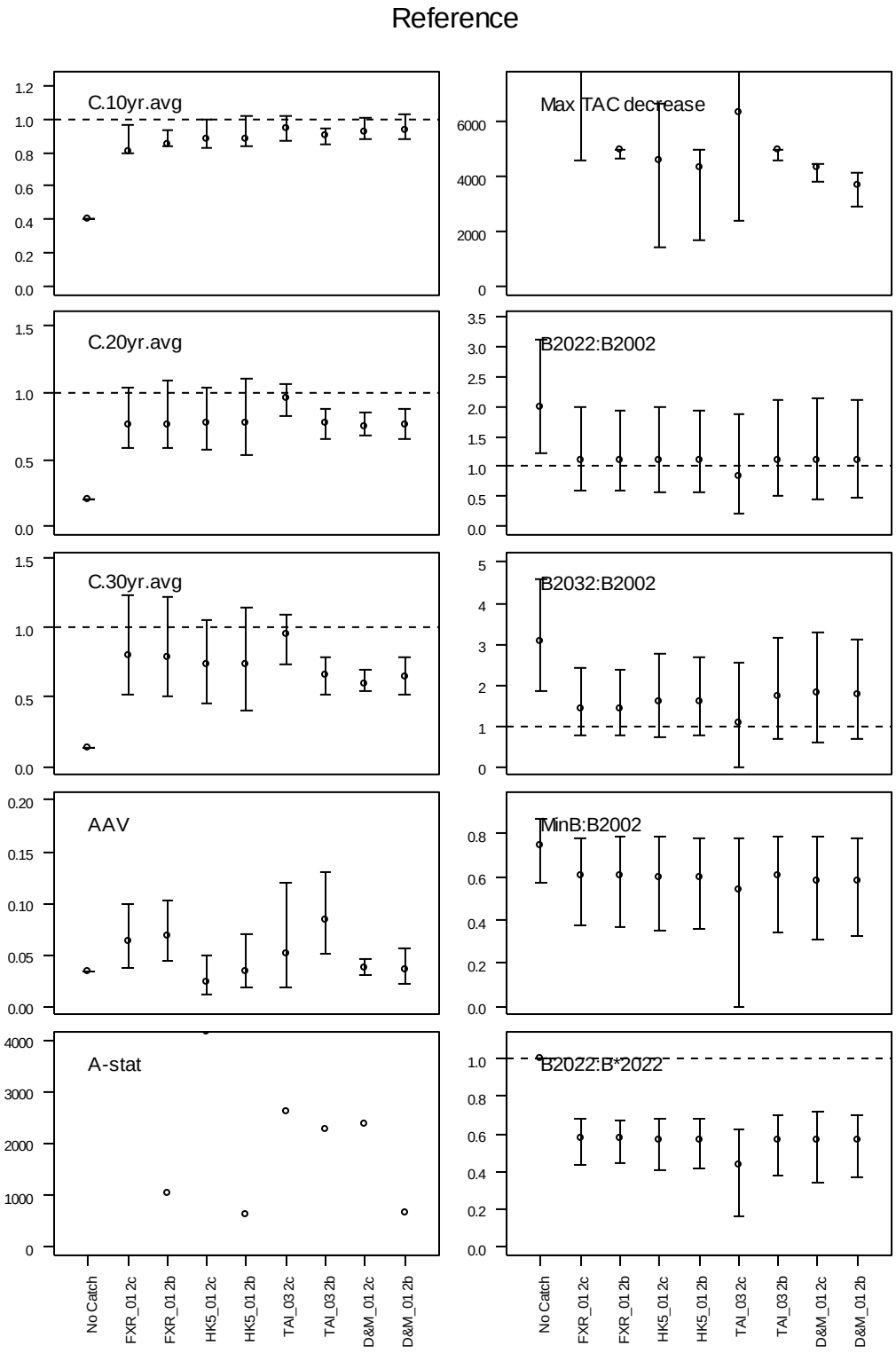

Figure 41. Performance statistics for 1.1 tuning level with 5-year (2c) and 3-year (2b) TAC changes using the reference model for the final 4 DRs.

Final four DRs

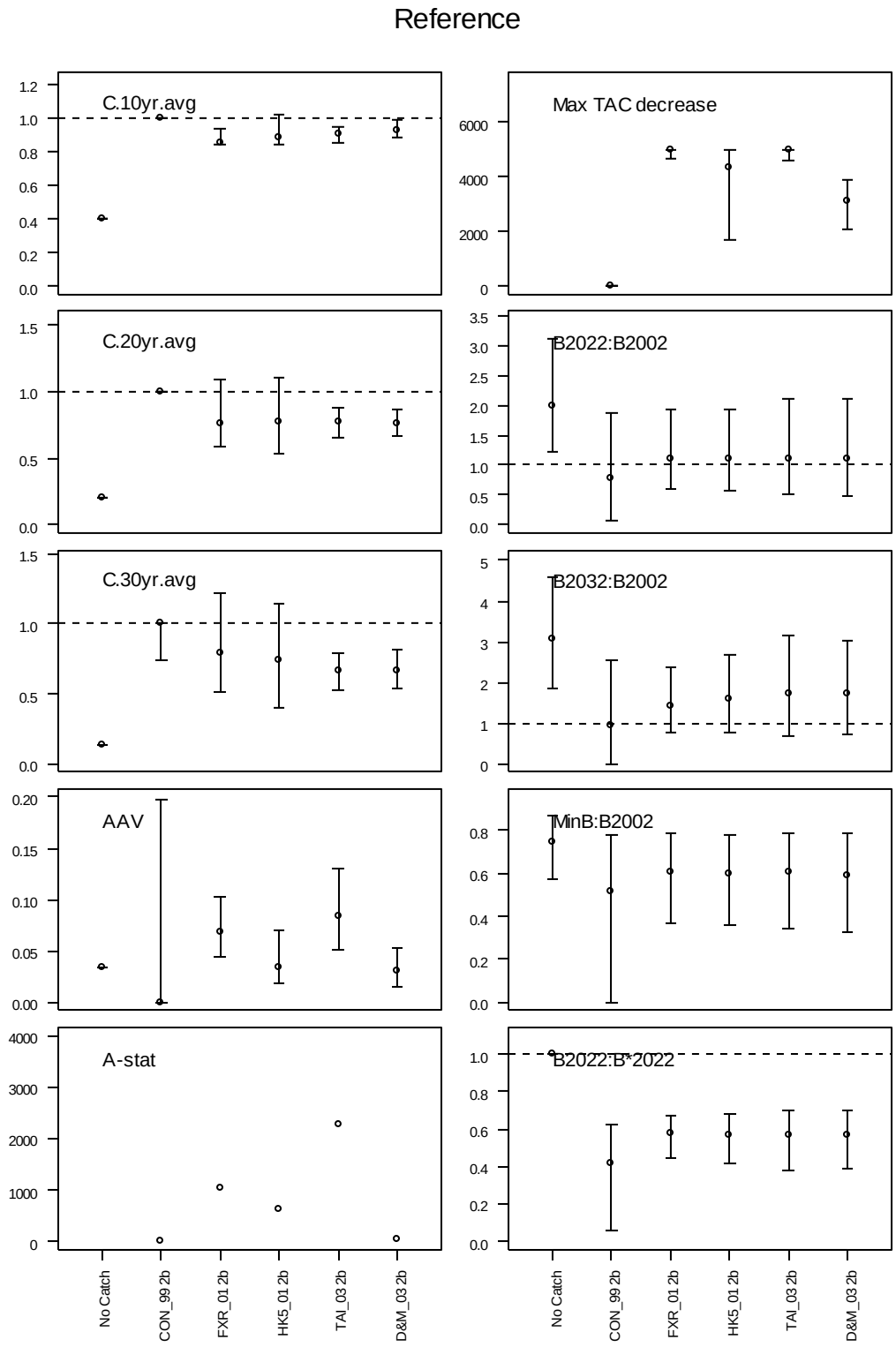

Figure 42. Performance statistics for 1.1 tuning level with the 3-year (2b) TAC changes using the reference model for the final 4 DRs.

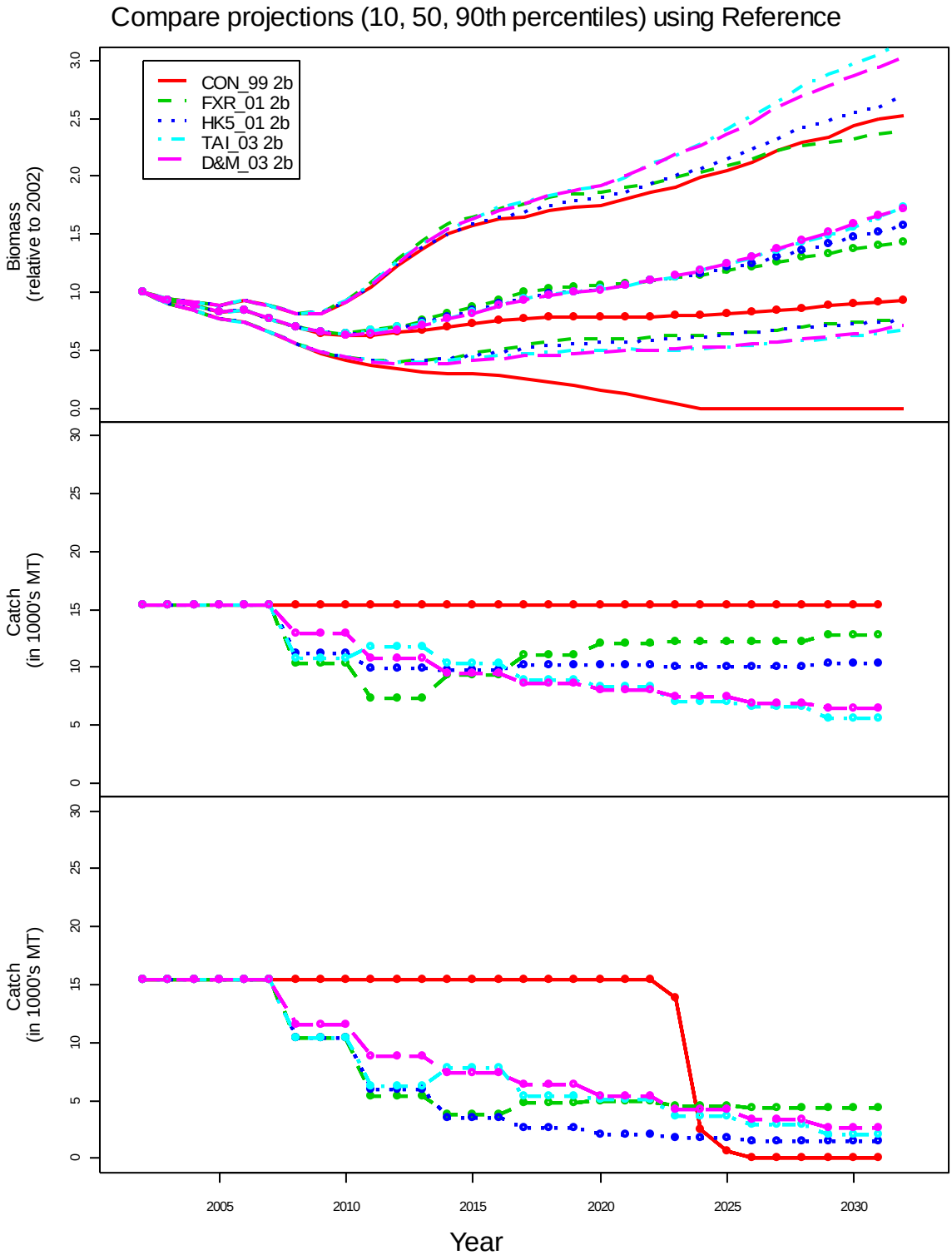

Figure 43. All percentile values for biomass (top panel) and median and lower 10th percentile for catch (middle and lower pane) based on 1.1 tuning level with 3-year TAC changes using the reference model for the final 4 DR.

Catch priority (tuned to 0.9)

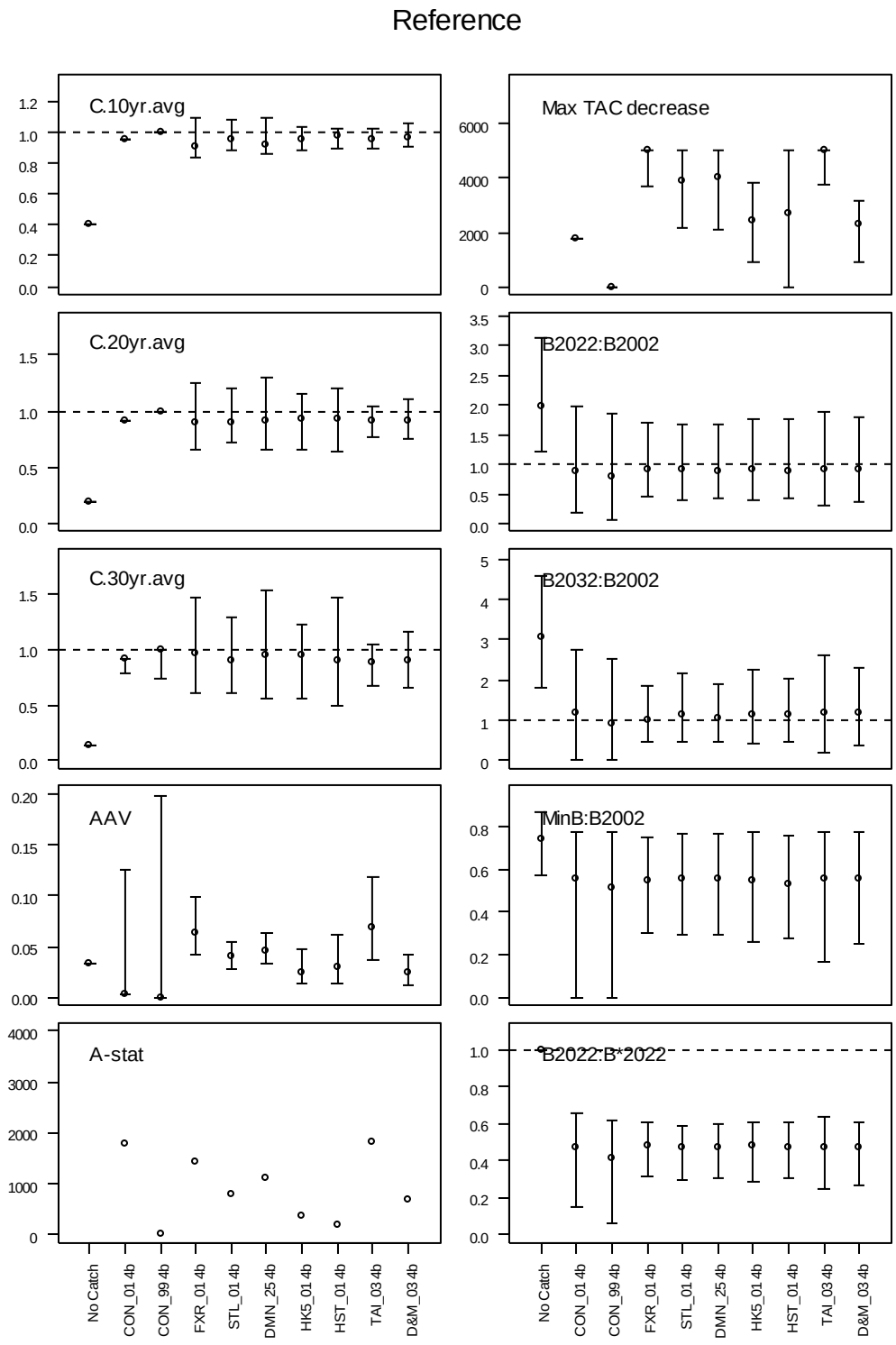

Figure 44. Performance statistics for 0.9 tuning level with 3-year TAC changes using the reference model for the final four DRs.

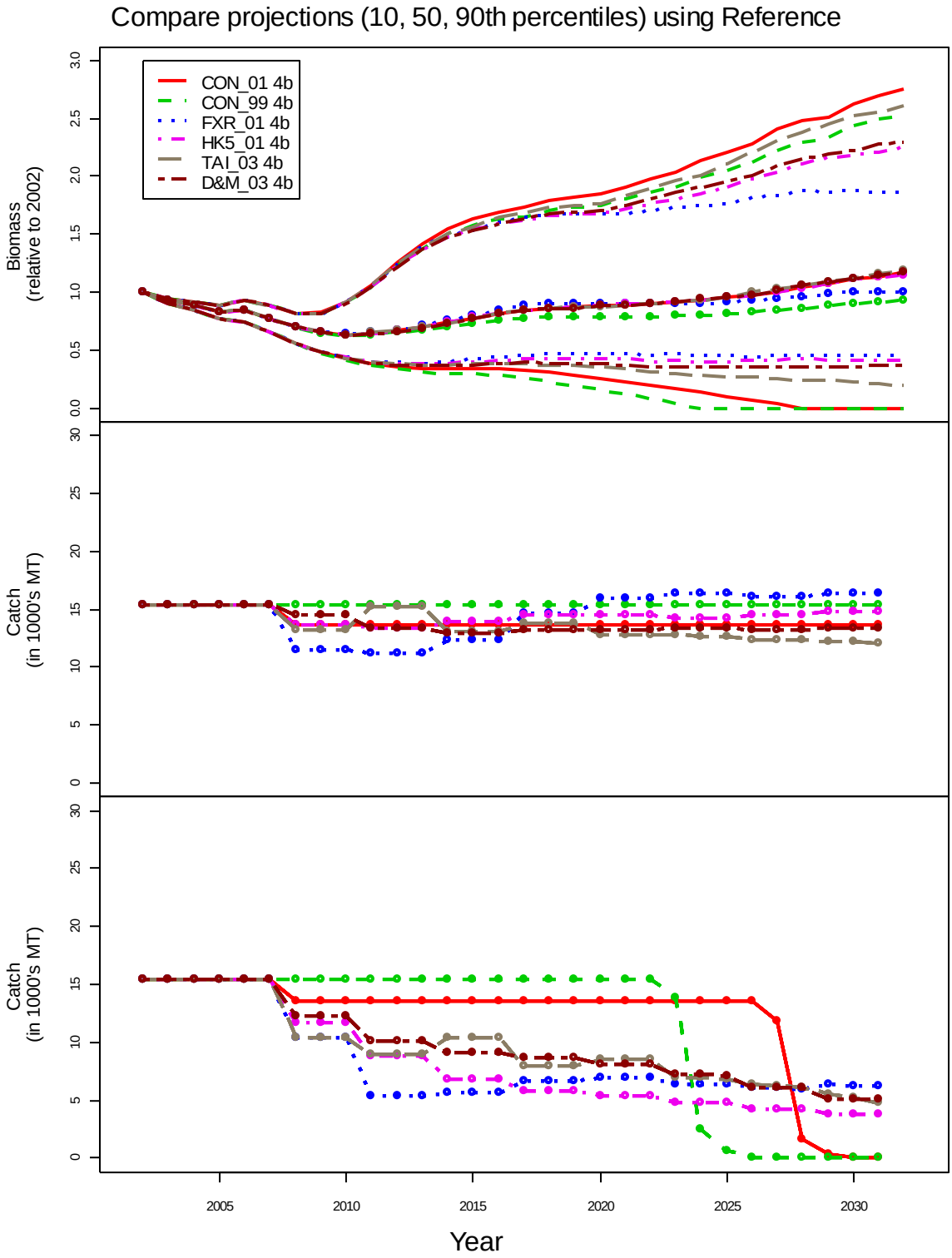

Figure 45. All percentile values for biomass (top panel) and median and lower 10th percentile for catch (middle and lower pane) based on 0.9 tuning level with 3-year TAC changes using the reference model for the final four DRs.

Biomass priority (tuned to 1.3)

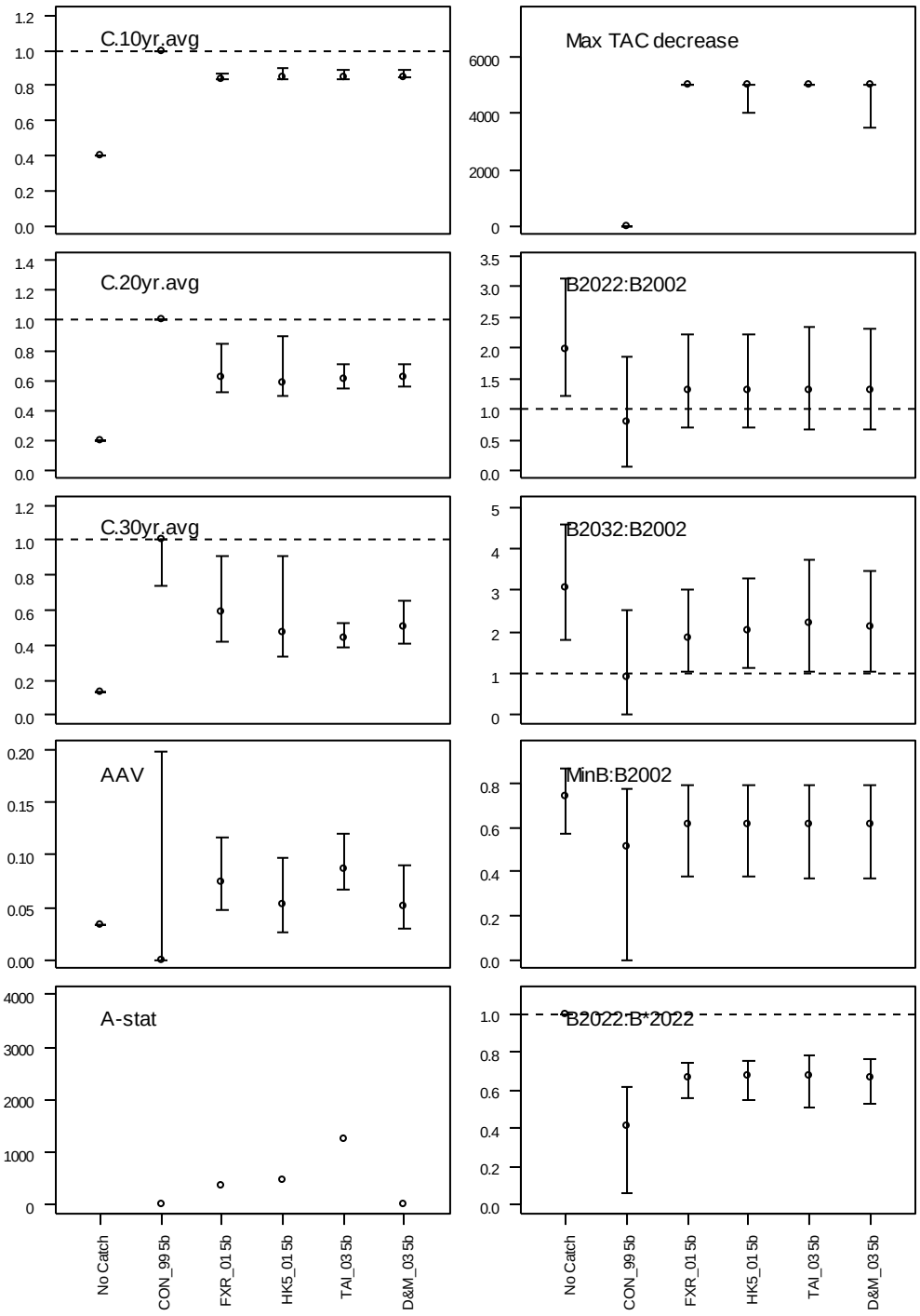

Figure 46. Performance statistics for 1.3 tuning level with 3-year TAC changes using the reference model for the final four DRs.

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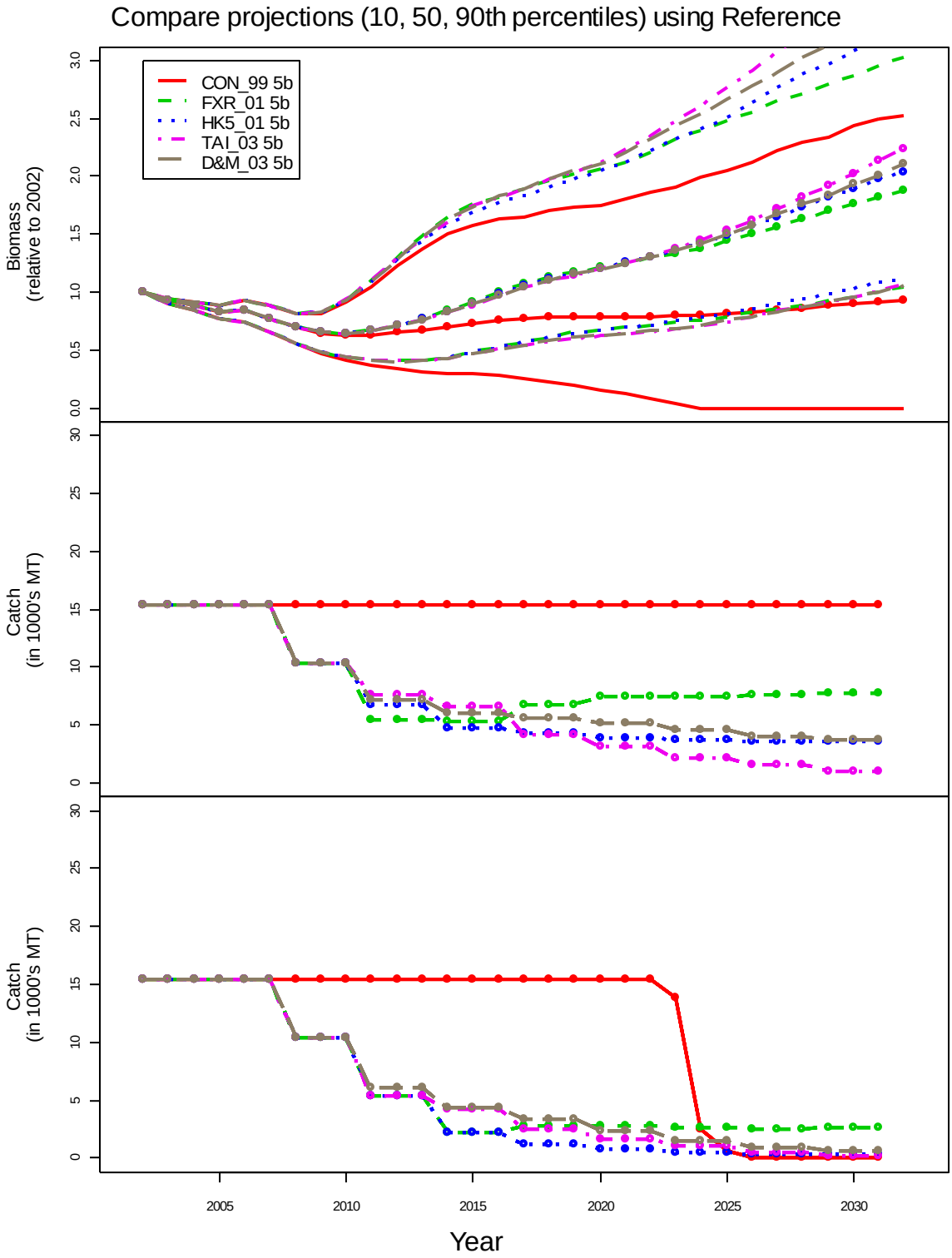

Figure 47. All percentile values for biomass (top panel) and median and lower 10th percentile for catch (middle and lower pane) based on 1.3 tuning level with 3-year TAC changes using the reference model for the final four DRs.

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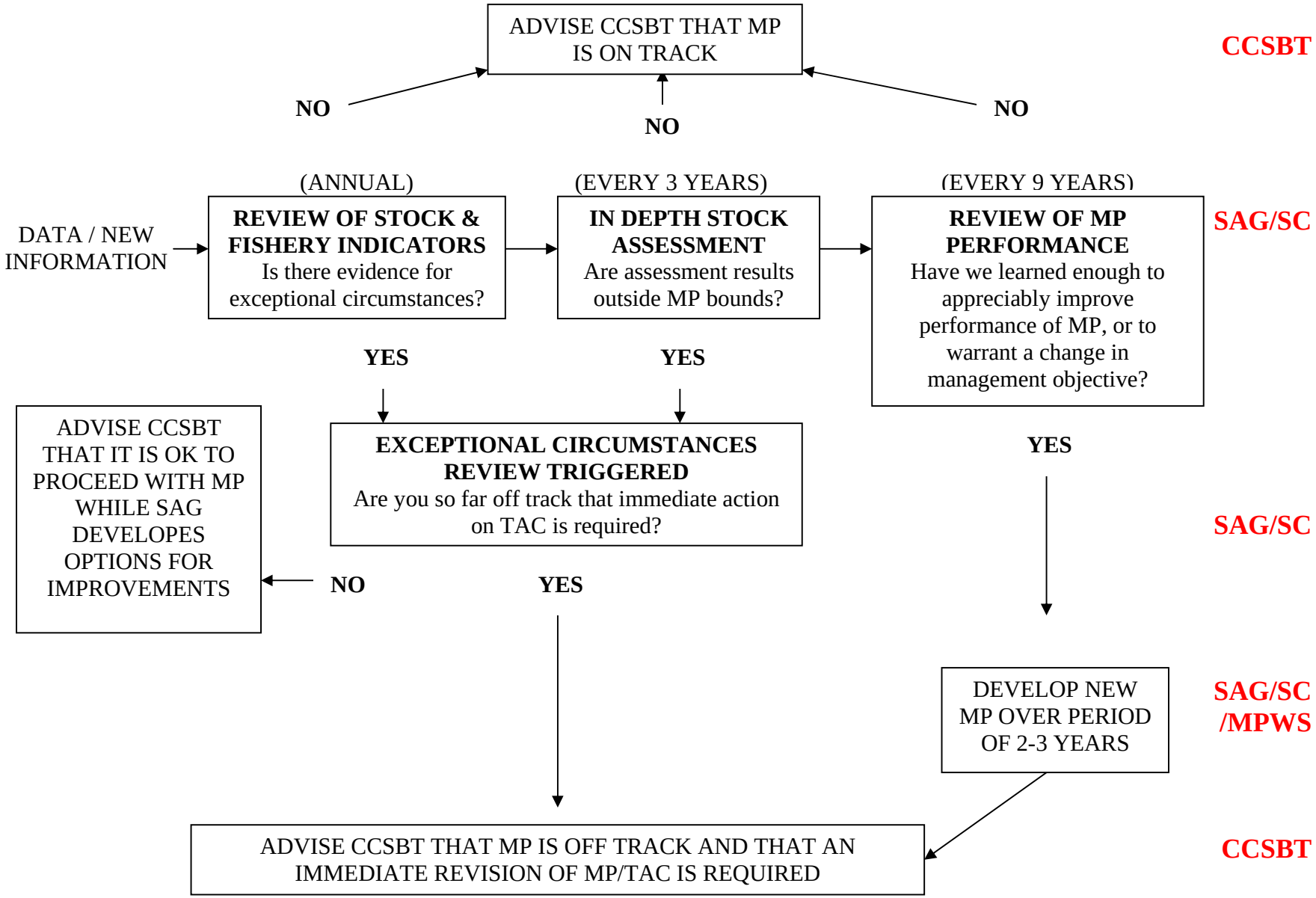
Attachment 5

Decision Tree Framework



Report of 3rd MP Workshop to CCSBT

Draft 2

History of SBT Management

- The low level of SBT spawning stock biomass in relation to historical levels is recognized and there is an associated risk of further recruitment declines (SC6 Report).
- CCSBT has adopted a re-building objective since establishment of the Commission: Rebuilding of SBT spawner biomass to 1980 levels by 2020.

History of SBT Management

- At current catch levels there is little chance that the SBT spawning stock will be rebuilt to the 1980 levels by 2020, and substantial quota reductions would be required to achieve that goal (SC6 Report).
- There have been problems with agreeing on TACs based on an annual assessment process.

Advantages of MPs

- Provides a better chance of achieving management objectives (pre-testing to identify robust strategies).
- Provides greater certainty for all stakeholders (agreed rules for decision making).
- Designed to achieve an agreed balance between competing management objectives.
- Designed to be robust to current scientific uncertainty.
- Demonstrates to the community that you are managing responsibly.

Challenges with Implementing a Management Procedure

- There are technical challenges in actually developing and testing an Operating Model and Decision Rule.
- Scientists and Commissioners are required to make a number of decisions and choices related to:
  - The management objective.
  - Choice of Decision Rules
  - Adjustment of Decision Rule re catch and rebuilding priorities
- Each decision involves trade-offs between catch and risk to the stock.

Management Procedure Progress

Substantial progress made at the MP I (2002) and MP II (2003) workshops, and MP development is on schedule:

- All aspects of the operational and projection models have been finalised and coded.
- Alternative scenarios of stock productivity have been represented and their weightings agreed
- Initial candidate MPs have been tested, catch vs rebuilding priorities proposed, and performance statistics chosen.
- Members have finalised development and testing of proposed candidate MPs at this MP III Workshop.
- A selection of final candidate MPs is now being presented for initial consideration by the Commission.

Industry/ Management Consultation

- Industries are sensitive to market price and are concerned that increases in global TAC could result in lower prices.
- Longline industries are sensitive to changes in catch rates. If catch rates decline, there may be reductions in catch even without reductions in the TAC.
- A period of stable catch before first TAC change would be highly desirable.

Implications for MP Design

These industry preferences suggest certain implications for the design of suitable management procedures for SBT:

The objectives of the chosen management procedure should be asymmetric, with slow increases in TAC in high productivity scenarios, while providing for TAC decreases in low productivity scenarios.

In low productivity scenarios an ideal management procedure would have a gradual decrease in TAC with substantial notification in advance.

What MP working group needs from Commission at this meeting

- Specific feedback on merits of candidate MPs
- How should they be adjusted
- Priority re catch and rebuilding

Summary of Candidate MPs

- Decision Rule characteristics
  - Differ in how and what data are used to calculate TAC
    - Some empirical, others model-based
    - All use Japanese longline CPUE data
      - But in some cases age-specific components
  - All MP's have some form of limit on TAC changes
- Also subject to adjustment of catch versus rebuilding priorities
- We explored many decision rules and have chosen 4 that have a range of characteristics

Decision Rule Features

- DR A
  - Model-based, uses catch and aggregated CPUE
- DR B
  - Uses age-4 CPUE for recruitment, aggregated CPUE for stock trend
- DR C
  - Based on aggregated CPUE and incorporates economics
- DR D
  - Model-based, uses catch, catch-at-age, and aggregated CPUE data

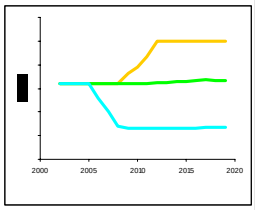
Changing priorities

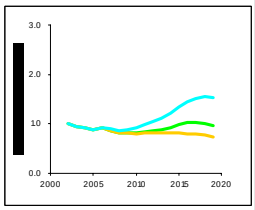
Each decision rule can be adjusted to be 'aggressive' (catch orientated: orange), moderate (green) or 'cautious' (re-building oriented: blue).

This adjustment turns a decision rule into a fully defined MP.

Generally, aggressive MPs result in higher catch but lower stock biomass.

Cautious MPs result in lower catch but higher biomass.

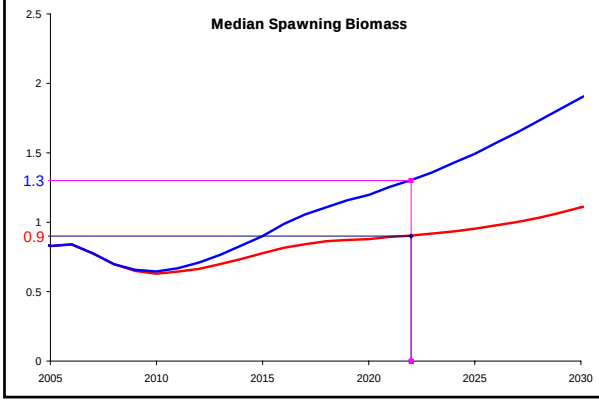




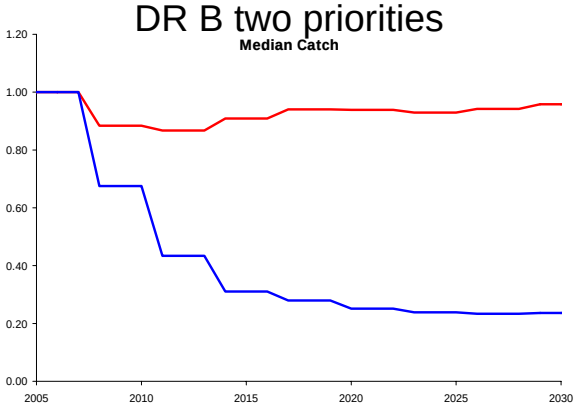
Generating Management Procedures

- Each decision rule was adjusted to produce 3 alternative management procedures, spanning a range of tradeoff between catch and rebuilding
- Ultimately both a decision rule and a value for the range of priority between catch and rebuilding must be chosen

DR B two priorities



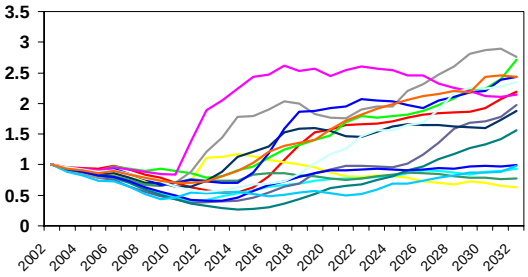
DR B two priorities



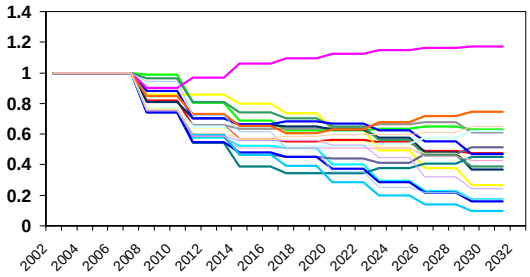
Averages are not sufficient

- The results of using an MP are uncertain, and will vary about the average.
- We are interested in how low the **biomass** might go because of possibility of stock collapse at low abundance and economic collapse of the fishery at low CPUE
- We are interested in how low **catch** could go because of risk to economics of the fishery

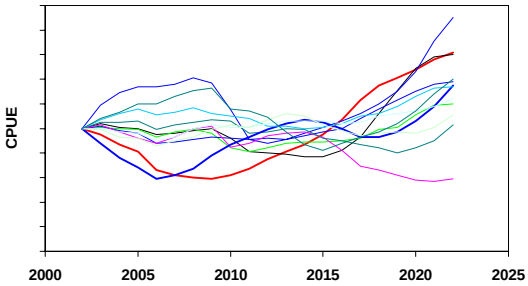
Alternative biomass realizations



Alternative catch/TAC realizations



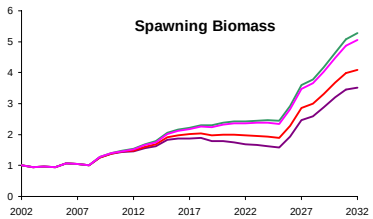
Understand CPUE “risk”

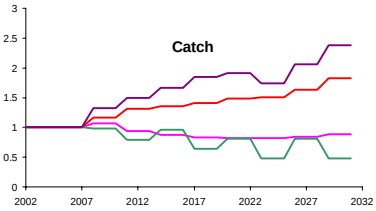


Break here for 1 on 1 briefings

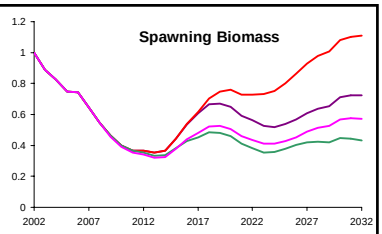
How the MP’s behave

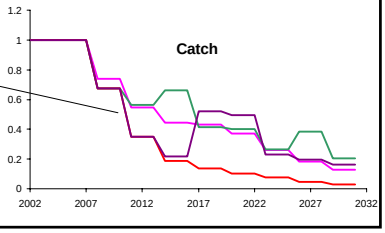
Increasing biomass





Decreasing Biomass





Note: that inter-annual catch variability differs between MPs

The Reference Case

- For comparing the MP’s we developed a reference case

The reference case

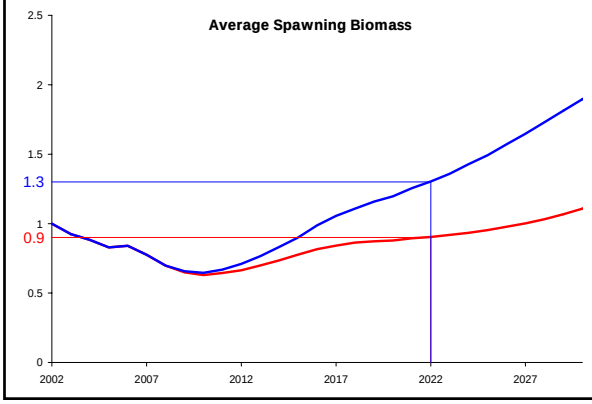
- Basic features
  - Wanted a wide range of scenarios
  - Some scenarios are more likely than others
  - Used data to 2000 to begin the projections and assign probabilities to alternative scenarios
- Most projections say current catches lead to stock decline

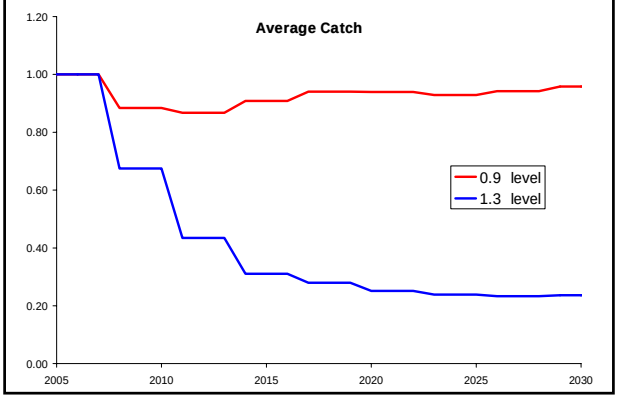
The purpose of this meeting

- To describe a set of candidate MPs and their characteristics
- To highlight the trade-offs CCSBT will have to decide upon
- To look at how the different MPs behave in different circumstances and get feedback from CCSBT on preferences for Decision Rules and adjustment for rebuilding versus catch priorities

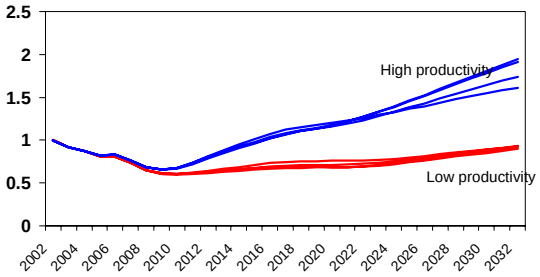
Results for a single decision rule depend upon tradeoff

- Shown is Decision Rule B two different tradeoffs



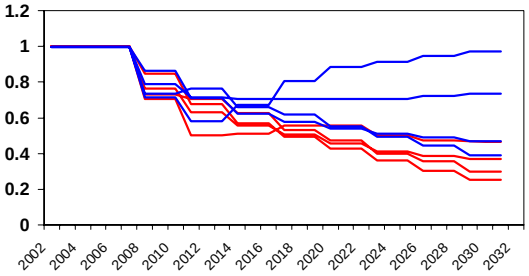


Average biomass trends under low and high productivity cases



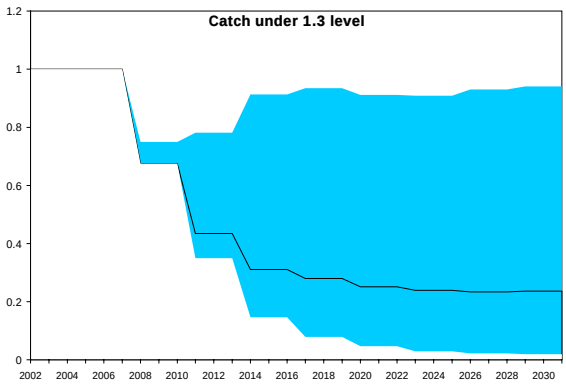
By the four management procedures

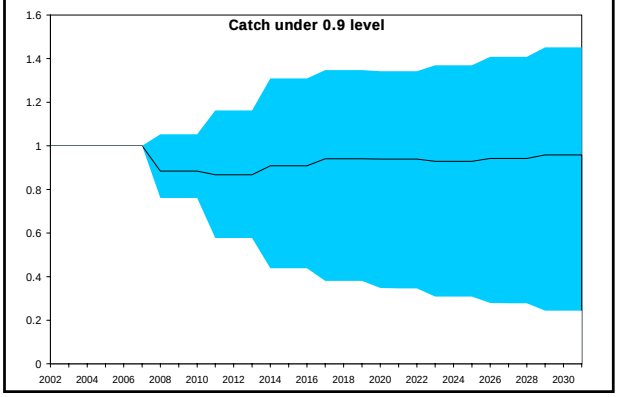
Average catches differ between Management procedure

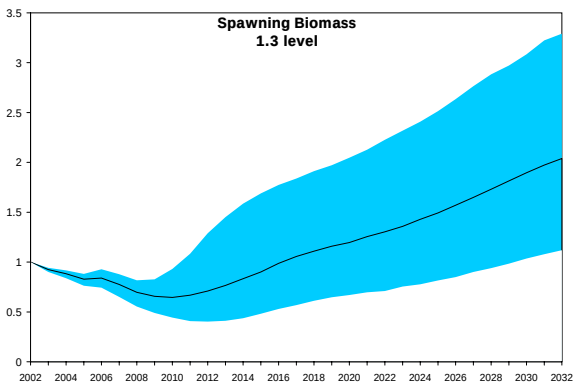


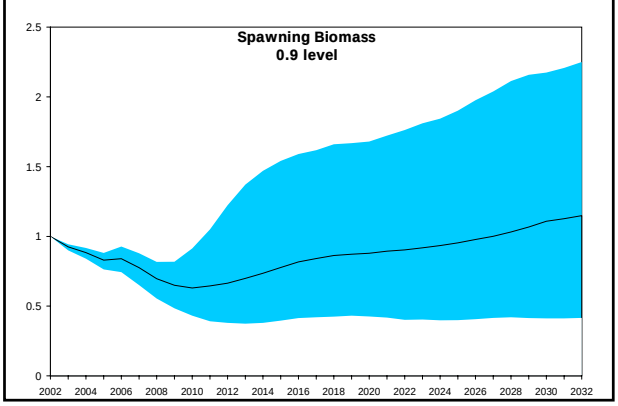
The range of outcomes is broad even for an individual MP

results to follow from Decision Rule B









Trade off between early and late catch reduction in declining scenarios

- Tradeoff between early catch reductions and lower risk vs later catch reductions and higher risk is a MP choice
- The MP's presented span a range of these choices

Robustness trials

- In addition to reference scenarios we tested MP's against other low productivity and high productivity alternatives
- These are called "robustness trials"
- Robustness trials indicated similar trade-offs between MP's as in reference scenarios
- No MP's performed well in the most pessimistic robustness trial

Evaluation of MPs

- The reference case proved to be a valuable tool for evaluating the alternative MPs
- The reference case provides a basis to understand the trade-offs between different performance statistics

The reference case

- Contradiction between advice on stock status in 2001, 2002 and 2003 and reference case
  - Current data – used in May 2002 and May 2003 to say "we see no need to modify advice given last year" not used in reference case
  - Preliminary CPUE data from 2001 and 2002 are inconsistent with predictions of CPUE declines from reference case … this may change when data are finalized
  - Other information now available was not used in reference case

The reference case

- Reference case will be updated with new data together with other models during the next SAG
- The probabilities of reaching rebuilding targets under different candidate MPs should be updated
- The SAG will conduct an in-depth evaluation of the consistency of the reference case predictions with the assessment results
- Based on this the SAG will advise on whether the reference case is adequate for final decisions

Future process

Proposed MP Review Process

Review of Fishery Indicators — Each Year
Check to see if there are exceptional circumstances

In Depth Stock Assessments — Every 3 Years
Check to see if results are within the bounds of the Management Procedure

Management Procedure Review — Every 9 Years
Have we learned enough to significantly improve the Management Procedure, or to warrant a change in management objective?

Review of Fishery Indicators

Do the exceptional circumstances take you outside the MP bounds and require immediate action on TAC? eg.

- Recruitment failure,
- significant declines in CPUE,
- large increases in non-member catch)

If Yes – refer to the CCSBT.
If No – implement MP as planned.

In Depth Stock Assessments

Are the stock assessment results outside the bounds of the Management Procedure so that immediate action on the TAC is required?

If yes – refer to the CCSBT

[If stock assessment results suggest that no immediate action on TAC is required but adjustment (tuning) of MP is, SAG/SC is tasked to undertake changes.]

Management Procedure Review

If review suggests that improvements to performance of the MP can be achieved, or that the objectives need changing – refer to the CCSBT.

If not, continue on with MP.

Commission Decisions

- Decisions on priorities
  - Choice between catch and rebuilding priorities
  - Choice between short term catch stability and risk
- Choice of decision rule
- Choice of start year
- Choice of interval between TAC changes
- Choice of maximum TAC changes
- Definition of Review Process

End of presentation

Attachment 7

Report of the Data Exchange Working Group

Some CCSBT members have revised their historic catch effort and catch at size data series since the 2001 stock assessment. These revised data have been submitted to the Secretariat and have recently been distributed to members.

A small group met to discuss which historical data series (the original or the revised) should be used for the 2004 assessment. The group agreed to the following points:

- The 2004 assessment will use the same historic datasets that were used for the 2001 assessment. These are data up to and including December 2000.
- As the original historic data is not held by the Secretariat, members will provide these data to the Secretariat as a matter of priority and the Secretariat will forward these data to members as part of the 2004 data exchange.
- Prior to SAG5, members will:
    - Document the level and types of changes in their revised historic datasets and describe the reason for these changes;
    - Check the revised historic data distributed by the Secretariat and confirm that this is an accurate "copy" of their revised data.
- An agenda item to "Review revised historic data sets" will be added to the agenda for SAG5.
- Following a successful review at SAG5, it is intended that the revised historic data will become the "official" data for assessments in future years.
- Any future revisions of past data should be accompanied by documentation on the level and types of changes together with a description of the reason for changes.