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**Analysis of stock status and related indicators for key shark species of the
Western Central Pacific Fisheries Commission**

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Executive Summary

1 Introduction

The status of the many shark species, espically those designated as (*key shark species*) in the western and central Pacific Ocean was is under review and instead of doing a southern blue shark stock assessment you all asked for this. An indicator analysis of blue, mako, thresher, silky and oceanic white tip sharks in the waters of the WCPO. We didn't do any fancy assessment work or models, but rather make colorul plots and tabulate laregly useless statistics (the geometric mean of the sandardized counts of other sharks has decreased relative to the base year but is comparable to the initial year). All in all this paper should give you a good understanding of the uncertainty regarding any species population viability, and even more confusioin regarding what we can, have or would do about it. Becausees sharks are often caught as bycatch in the Pacific tuna fisheries (though some directed mixed species fisheries, sharks and tunas/billfish, do exist) sharks are doomed.

While we cannot specify a percent reduction in fishing mortality of approximately needed for any specific species to reach MSY levels in the western central Pacific Ocean, we do know that- based on modeling of the factors influenciing the catch rate - the most effective way to improve population outlook would be the banning of shark lines.

2 General Methods

2.1 Description of Data Sources

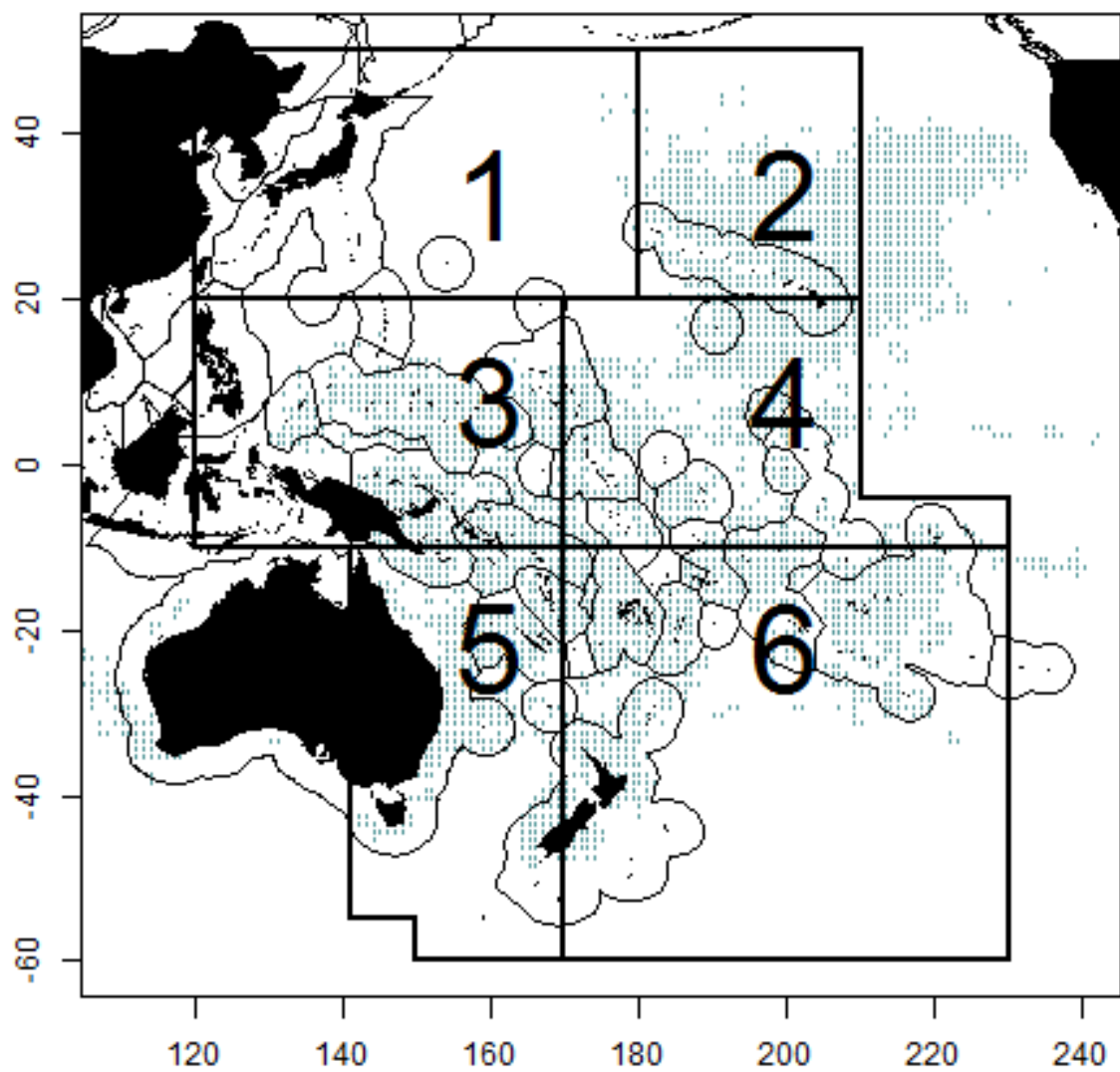


Figure 1: Map of WCPO and regions used for the analysis.

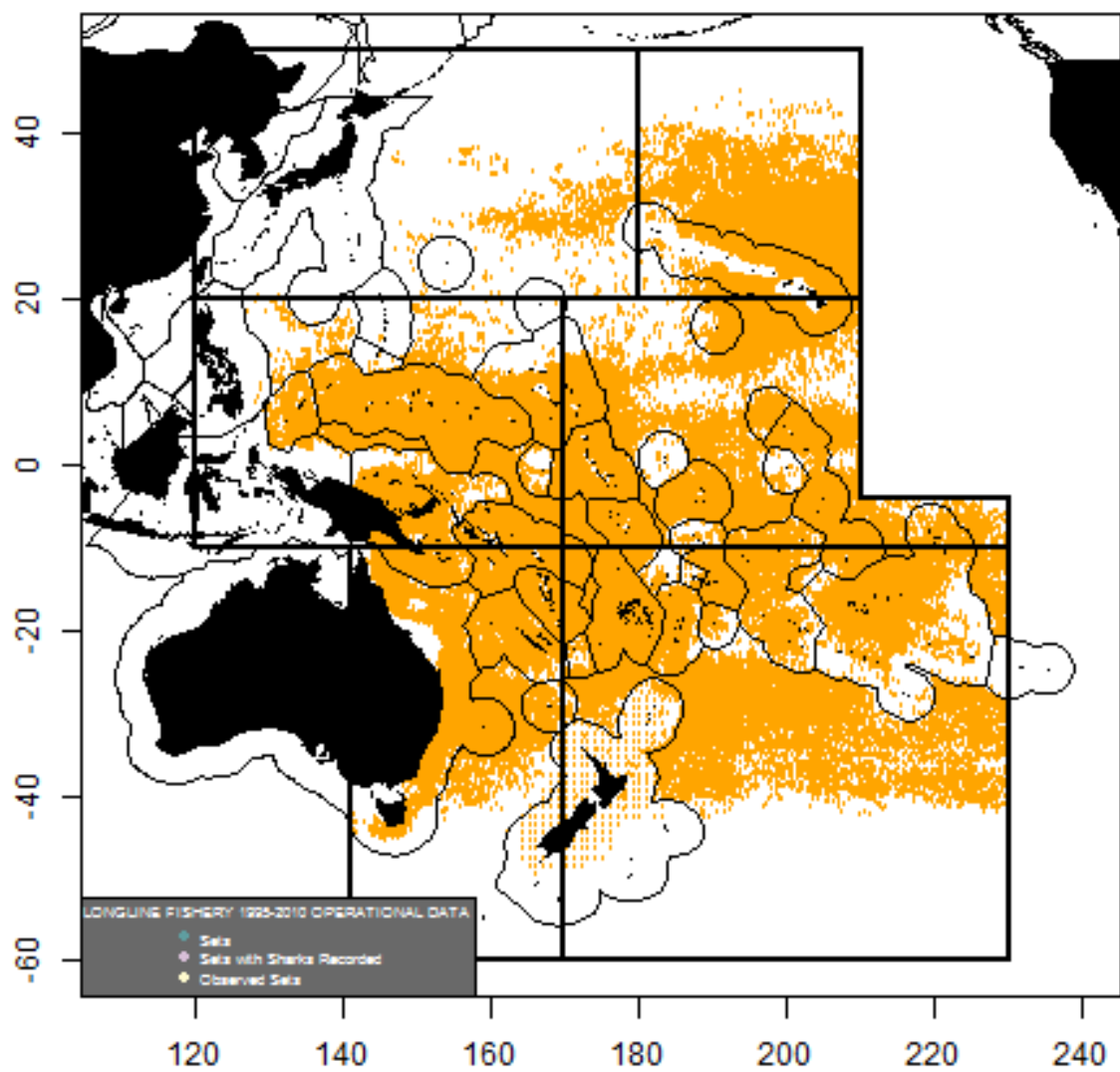


Figure 2: Map of WCPO and observed effort and observed shark catch.

2.2 Data formatting

2.3 Limitations - Caveats

3 Distribution Indicator Analyses

3.1 Introduction

3.2 Methods

3.3 Results

3.3.1 Fishing Effort

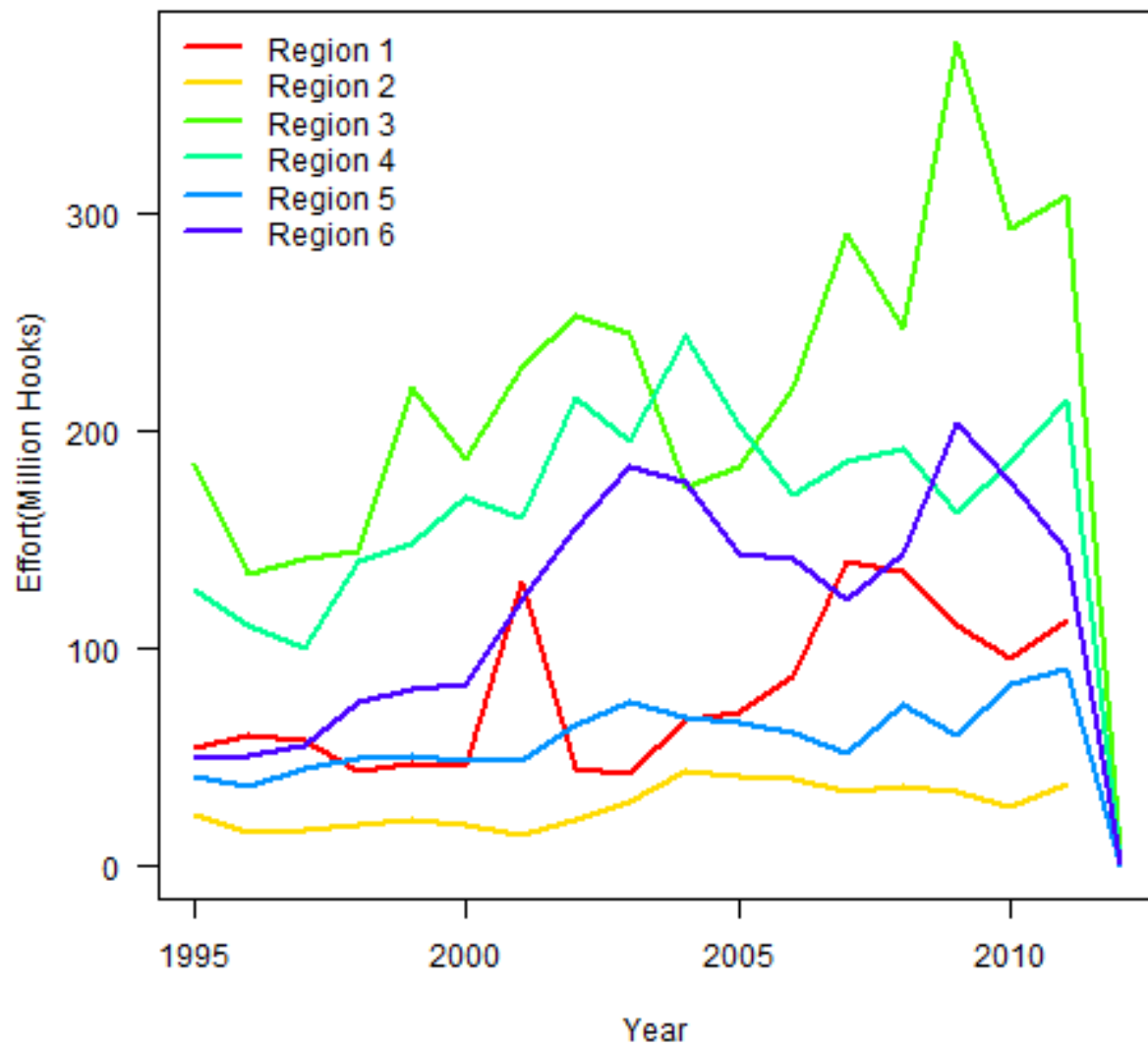


Figure 3: Aggregate effort by region. needs updating

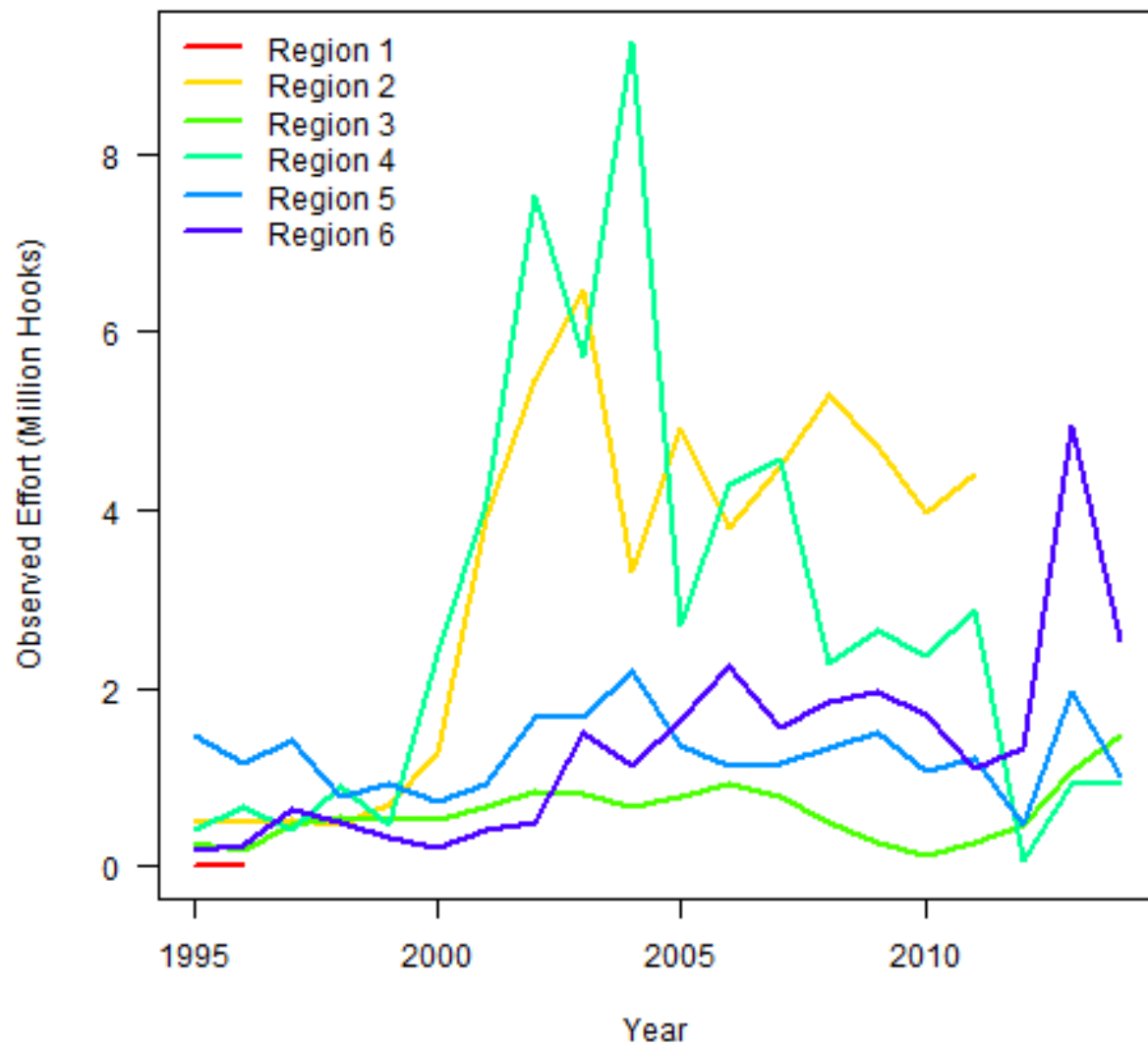


Figure 4: Observed effort by region.

LOGSHEET- NOT UPDATED

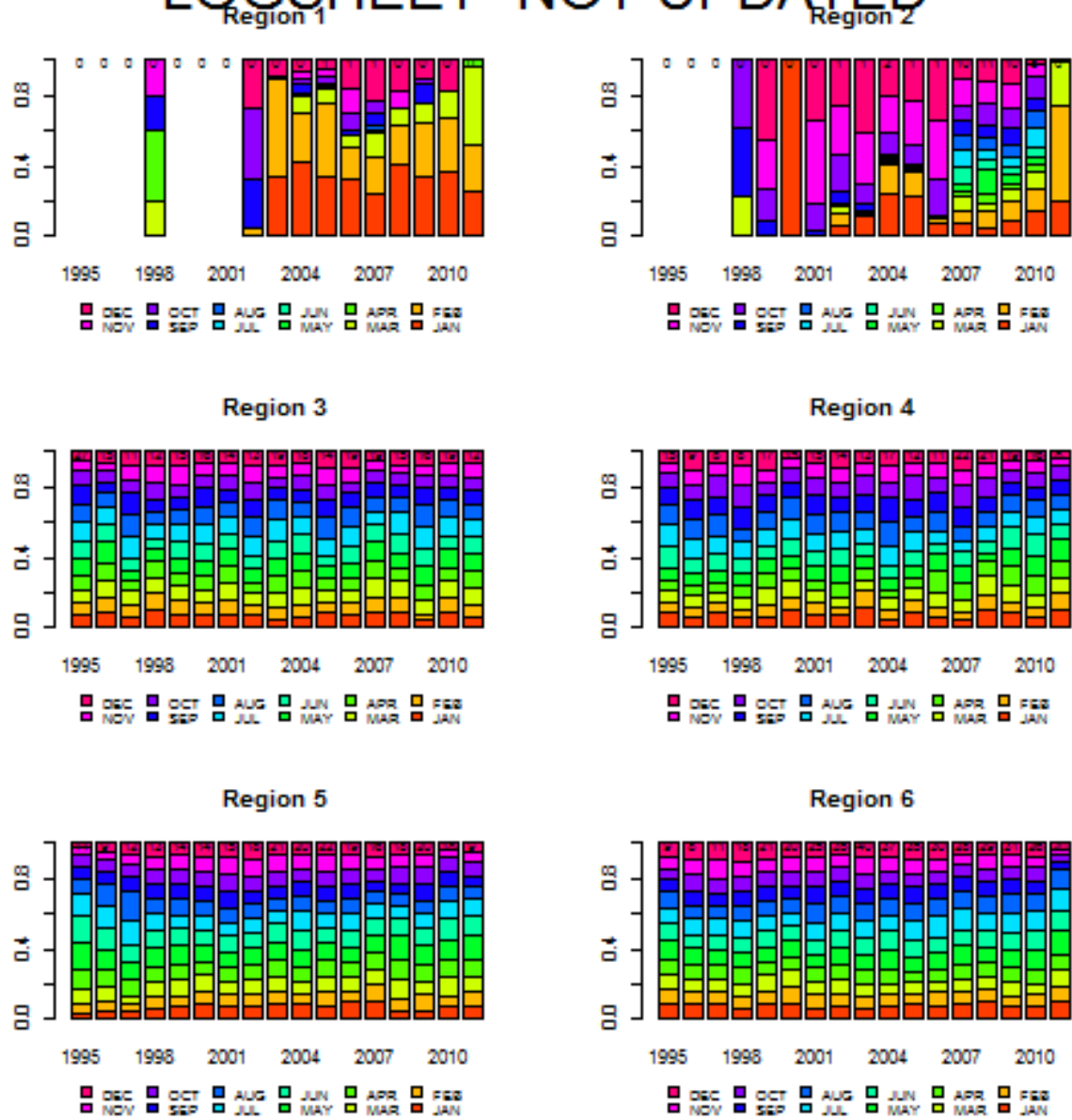


Figure 5: Logsheets effort by month.

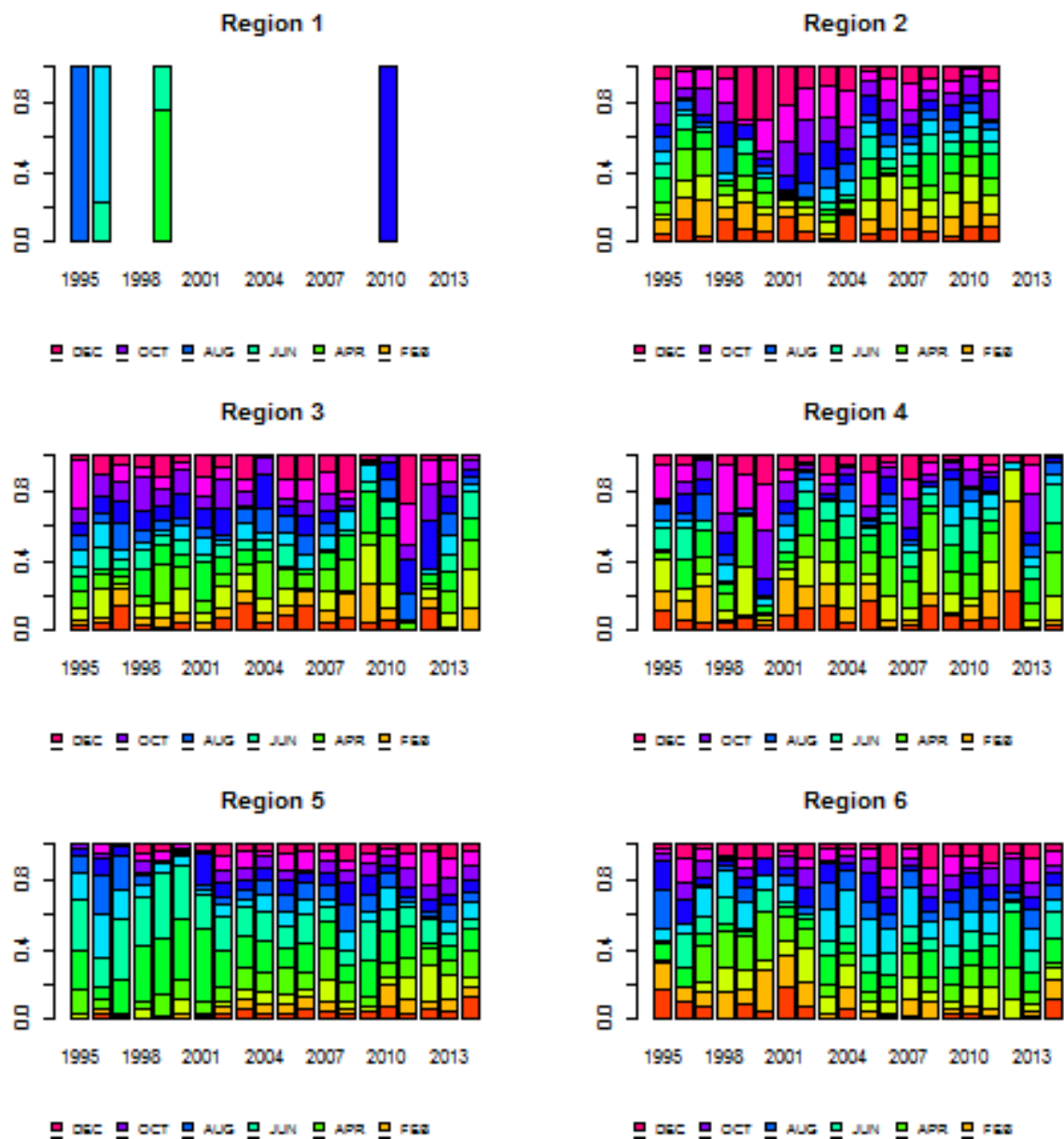


Figure 6: Observed effort by month.

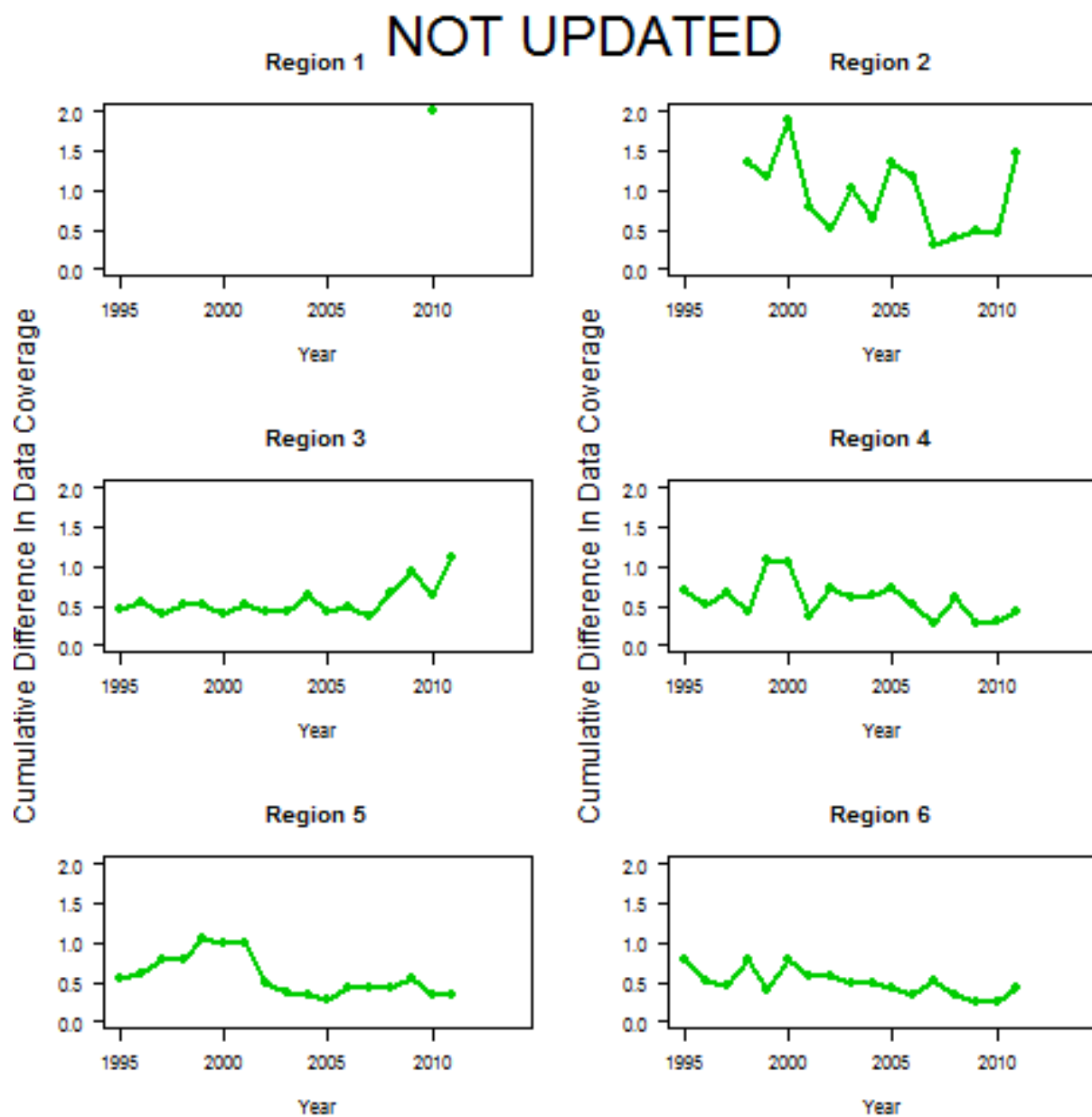


Figure 7: Absolute percent difference in effort between reported (logsheets) effort and observed effort.

3.3.2 Blue Shark



Figure 8: Blue shark distribution indicators. Proportion of positive sets, observer data.

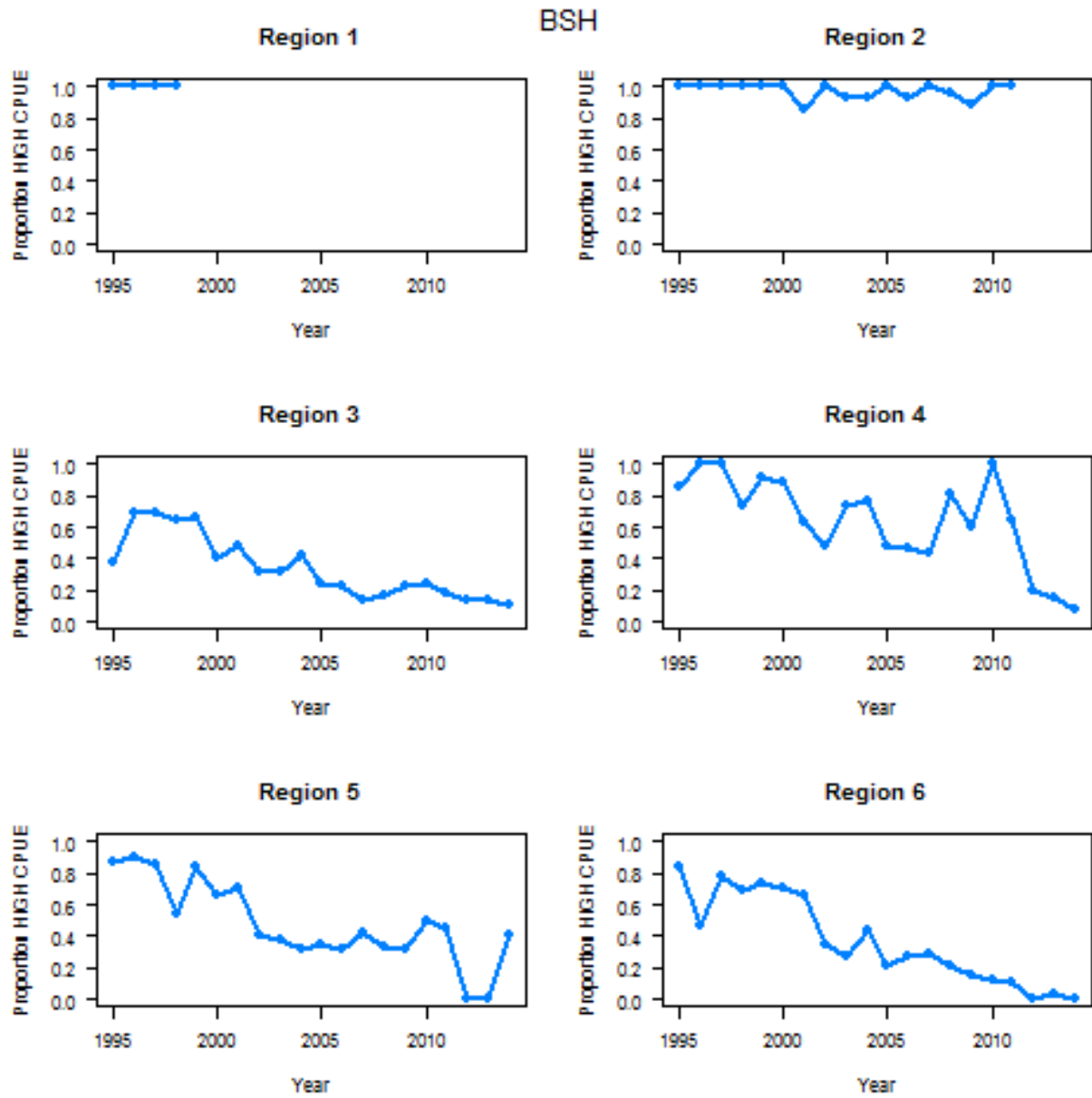


Figure 9: Blue shark distribution indicators. Proportion of 5 degree squares having CPUE greater than 1 per 1000 hooks region, observer data.

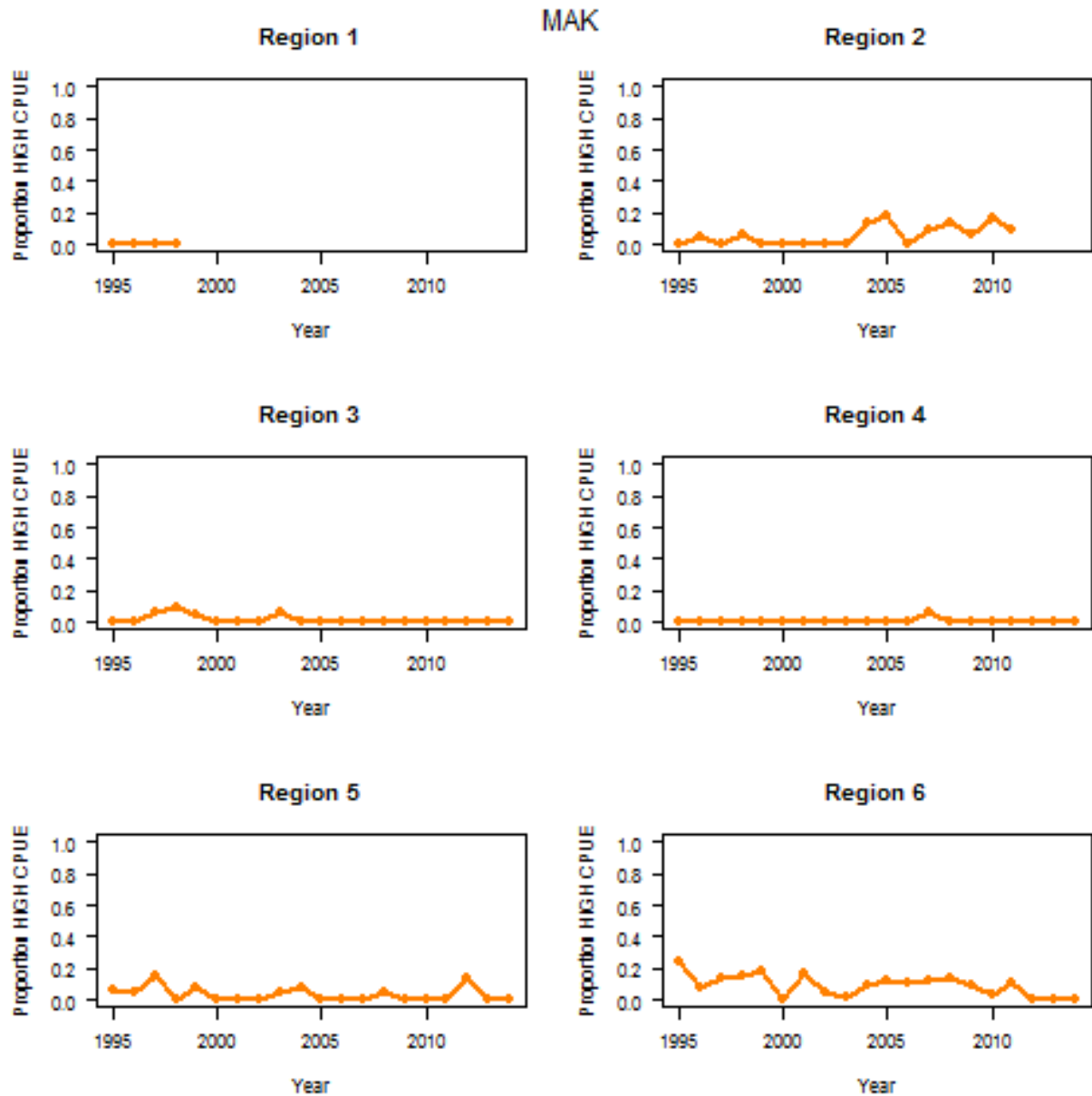


Figure 10: Mako shark distribution indicators. Proportion of 5 degree squares having CPUE greater than 1 per 1000 hooks region, observer data.

3.3.3 Mako Shark

3.3.4 Silky Shark

3.3.5 Oceanic Whitetip Shark

3.3.6 Thresher Shark

3.4 Conclusions

4 Species Composition Indicator Analyses

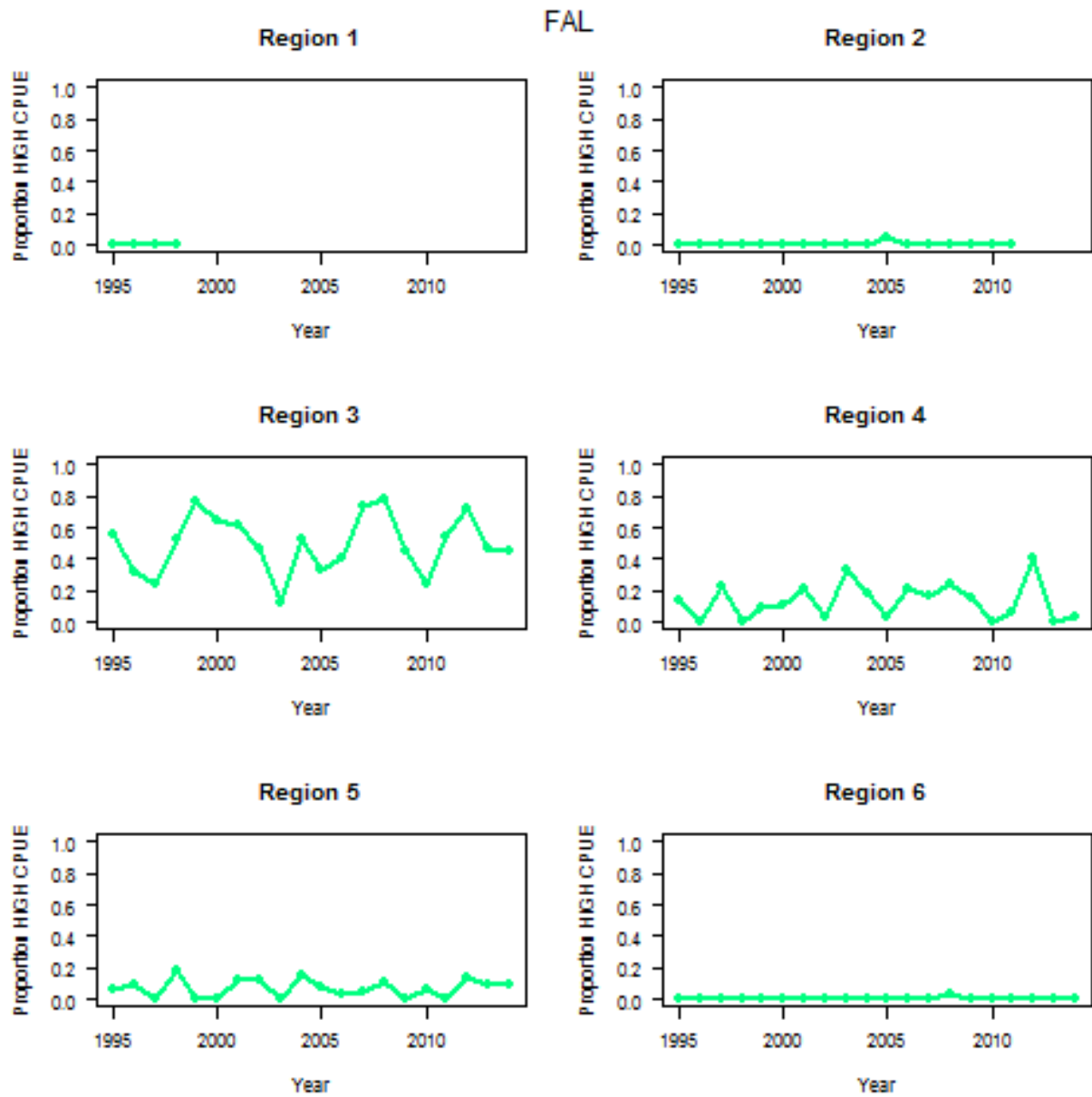


Figure 11: Silky shark distribution indicators. Proportion of 5 degree squares having CPUE greater than 1 per 1000 hooks region, observer data.

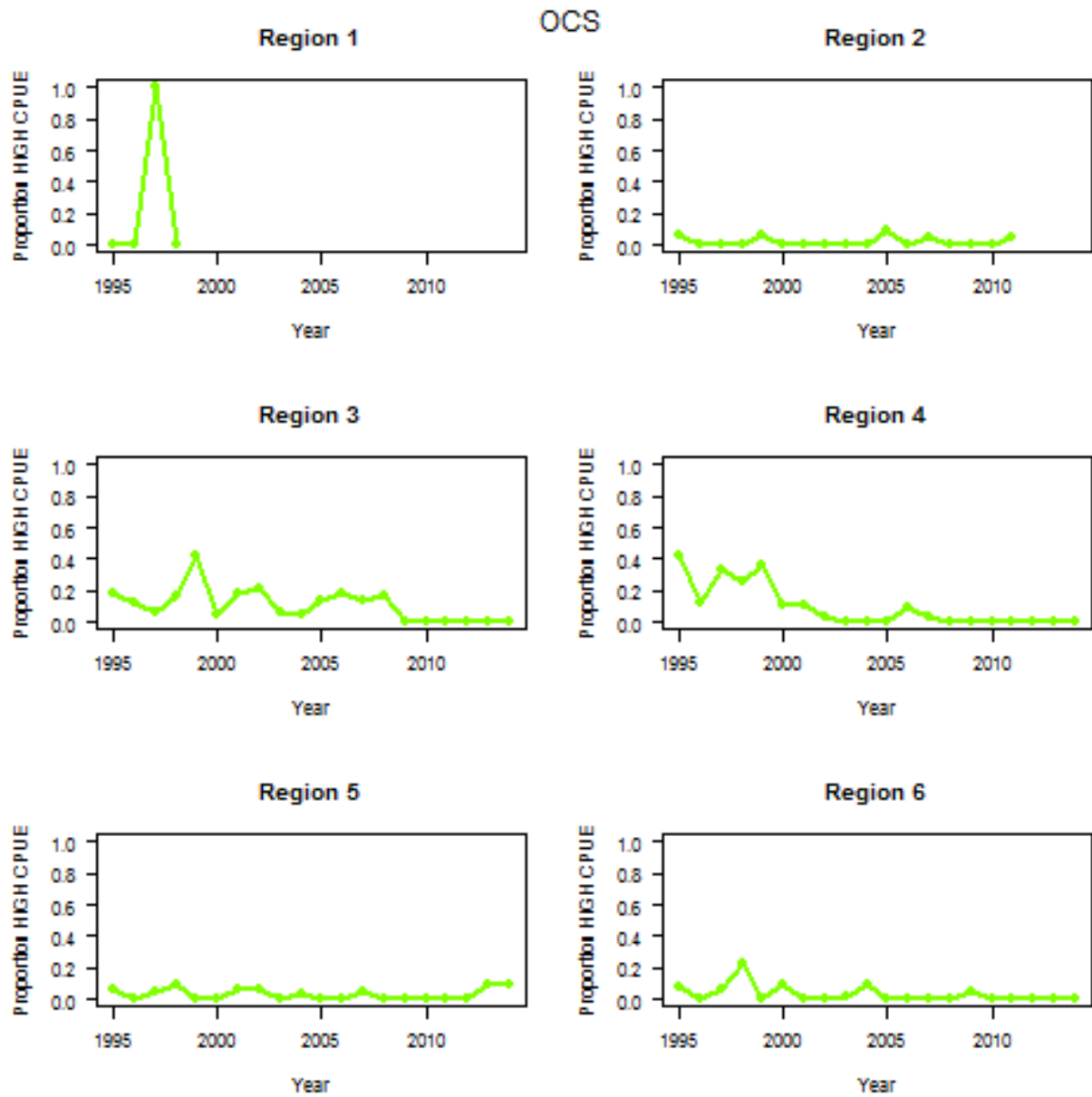


Figure 12: Oceanic whitetip shark distribution indicators. Proportion of 5 degree squares having CPUE greater than 1 per 1000 hooks region, observer data.

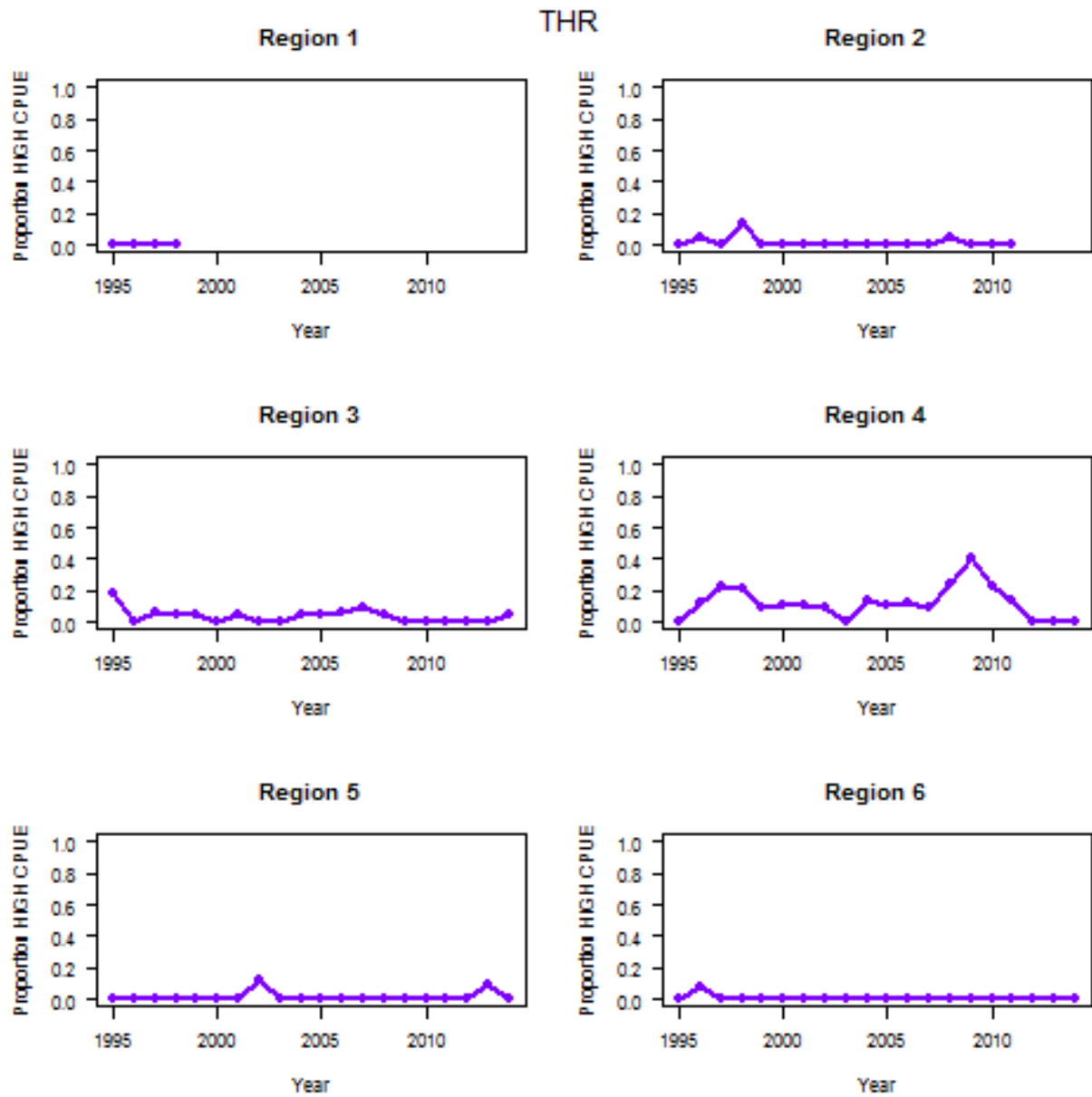


Figure 13: Thresher shark distribution indicators. Proportion of 5 degree squares having CPUE greater than 1 per 1000 hooks region, observer data.

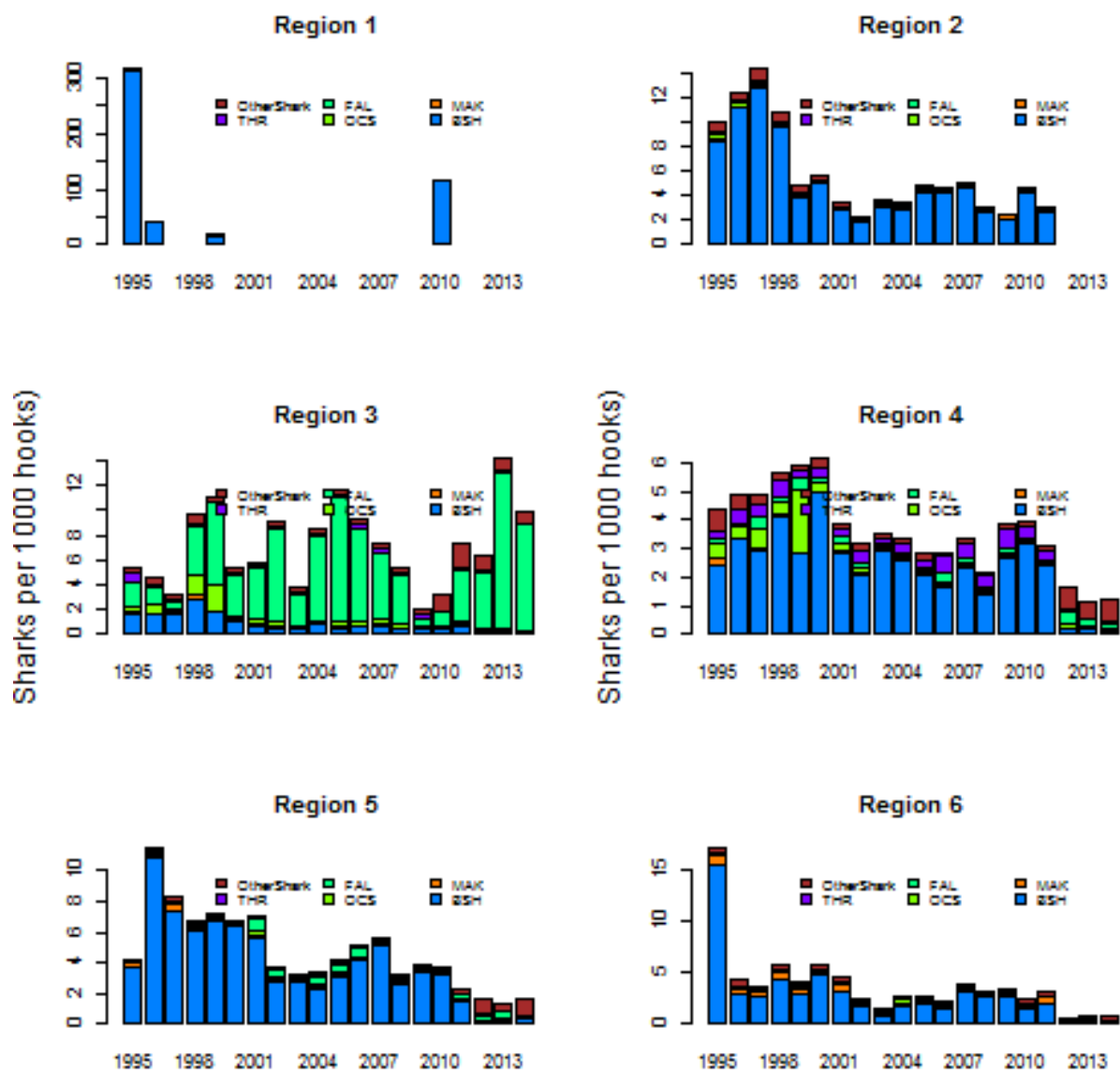


Figure 14: Catch Composition Indicators. Sharks Per. 1000 hooks by region, observer data.

5.3.1 Blue Shark



Figure 15: Blue shark CPUE indicators. Proportion of positive sets, observer data.

5.3.2 Mako Shark

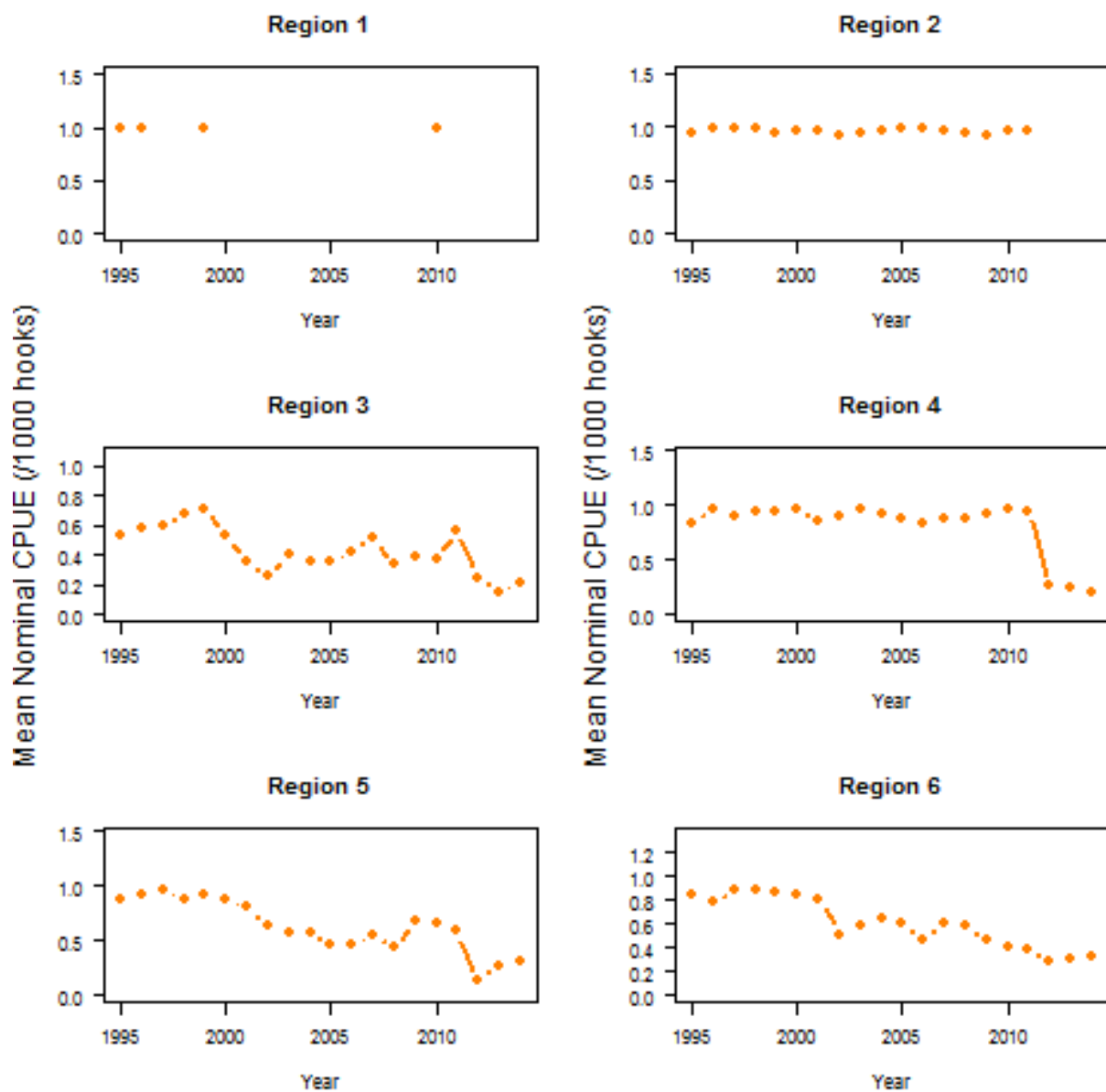


Figure 16: Blue shark CPUE indicators. Nominal CPUE, sharks per 1000 hooks, observer data.



Figure 17: Mako shark CPUE indicators. Proportion of positive sets, observer data.

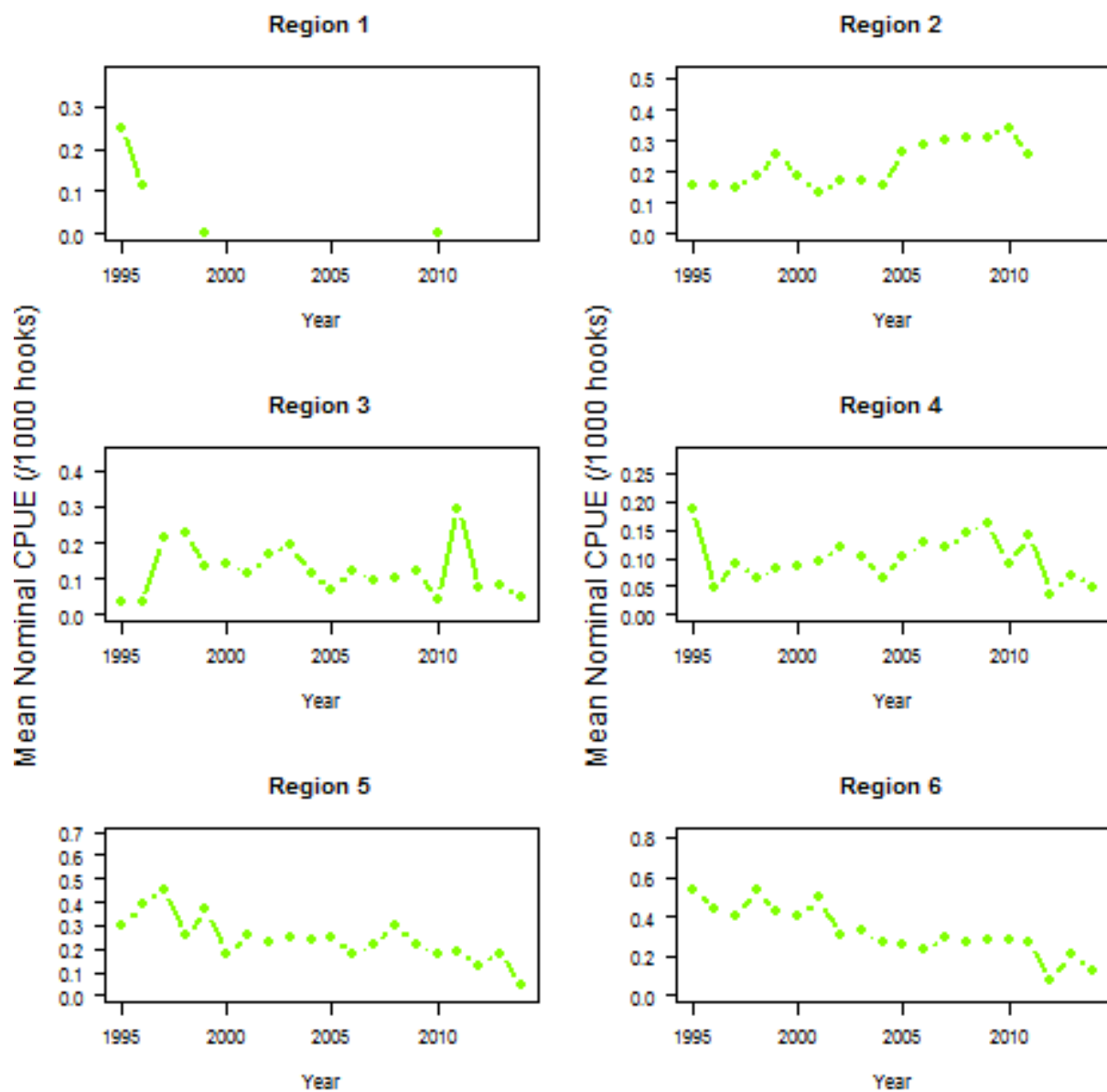


Figure 18: Mako shark CPUE indicators. Nominal CPUE, sharks per 1000 hooks, observer data.

5.3.3 Silky Shark

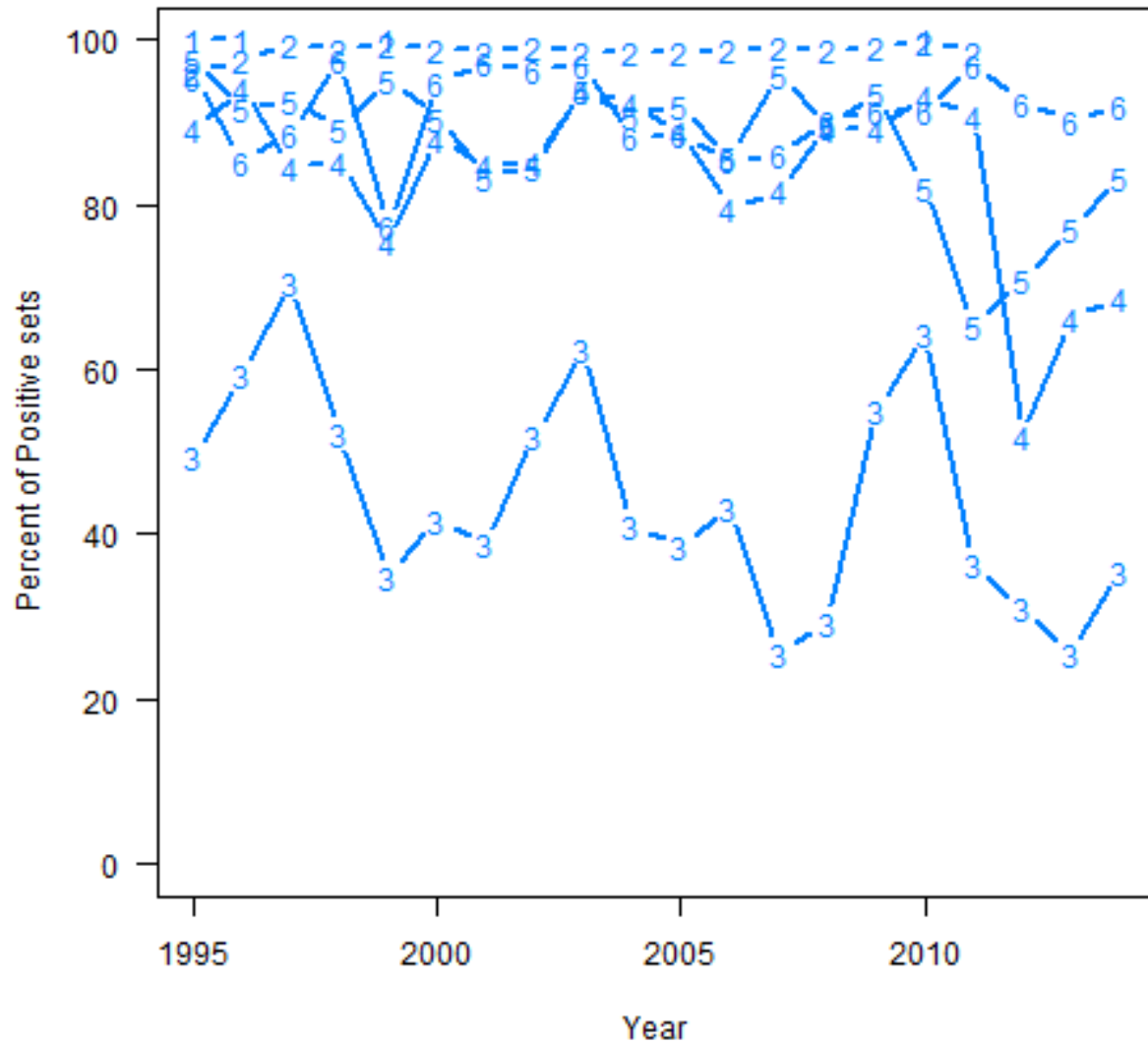


Figure 19: Silky shark CPUE indicators. Proportion of positive sets, observer data.

5.3.4 Oceanic Whitetip Shark

5.3.5 Thresher Shark

5.4 Conclusions

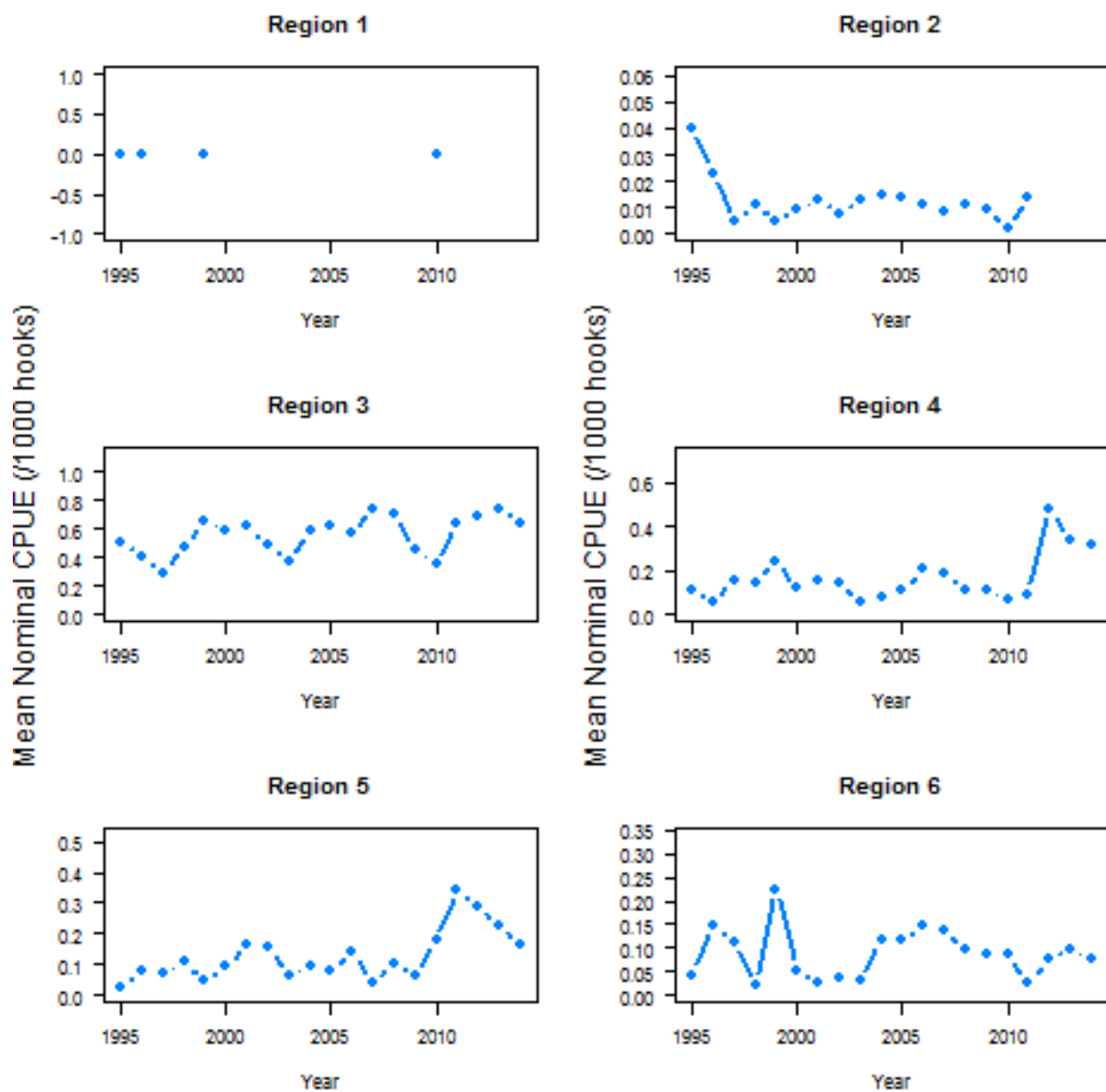


Figure 20: Silky shark CPUE indicators. Nominal CPUE, sharks per 1000 hooks, observer data.

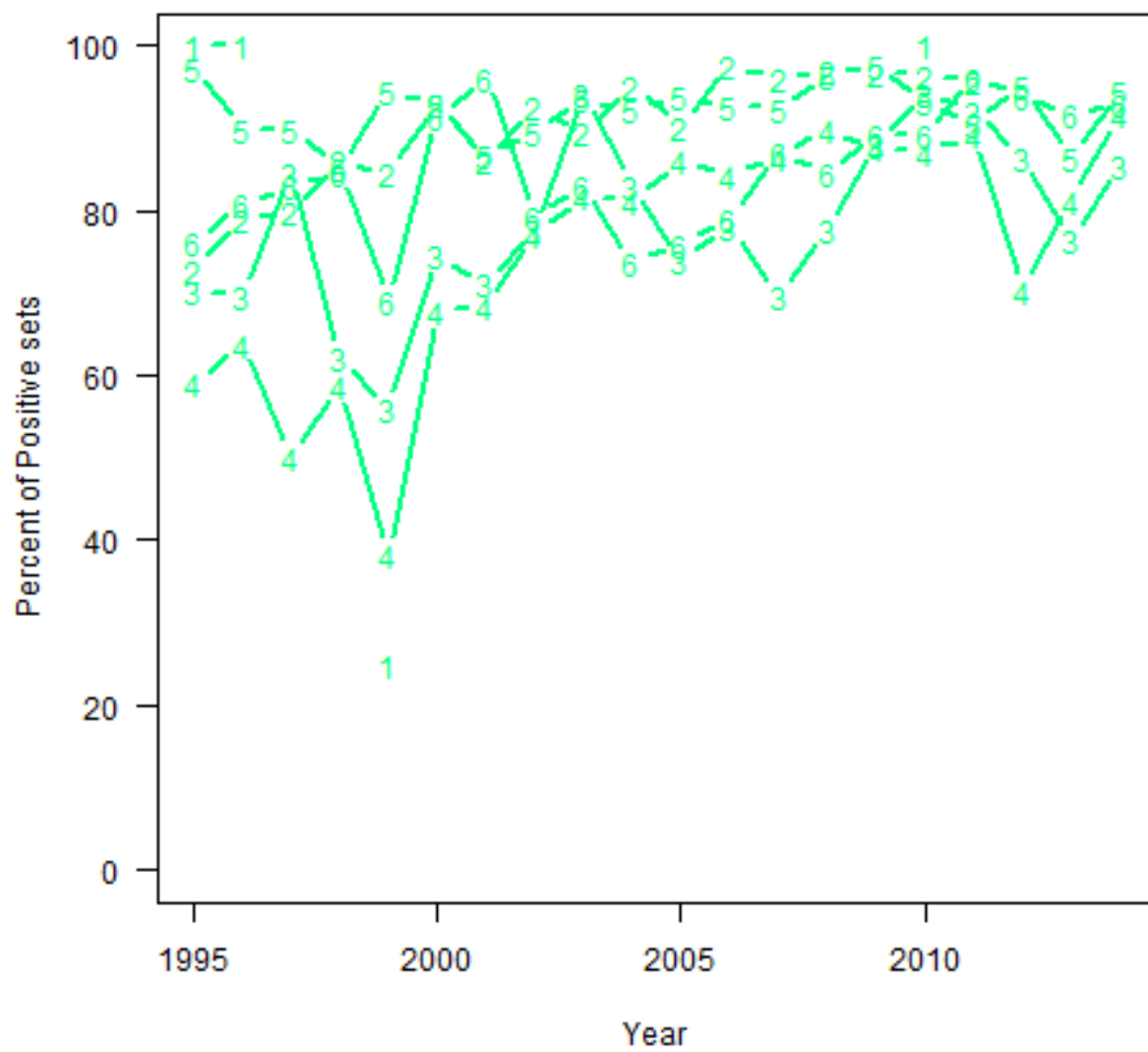


Figure 21: Oceanic whitetip shark CPUE indicators. Proportion of positive sets, observer data.

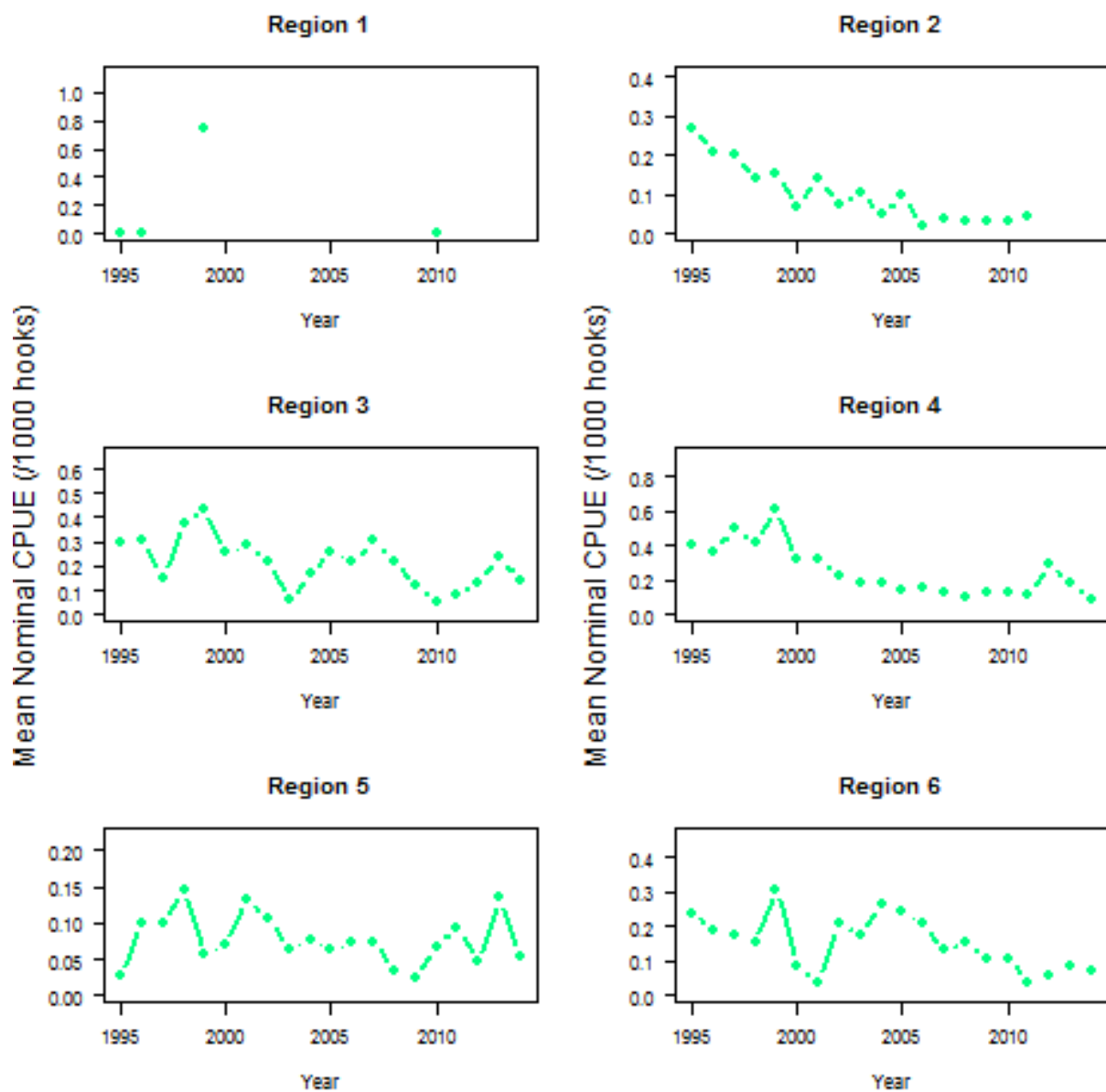


Figure 22: Oceanic whitetip shark CPUE indicators. Nominal CPUE, sharks per 1000 hooks, observer data.

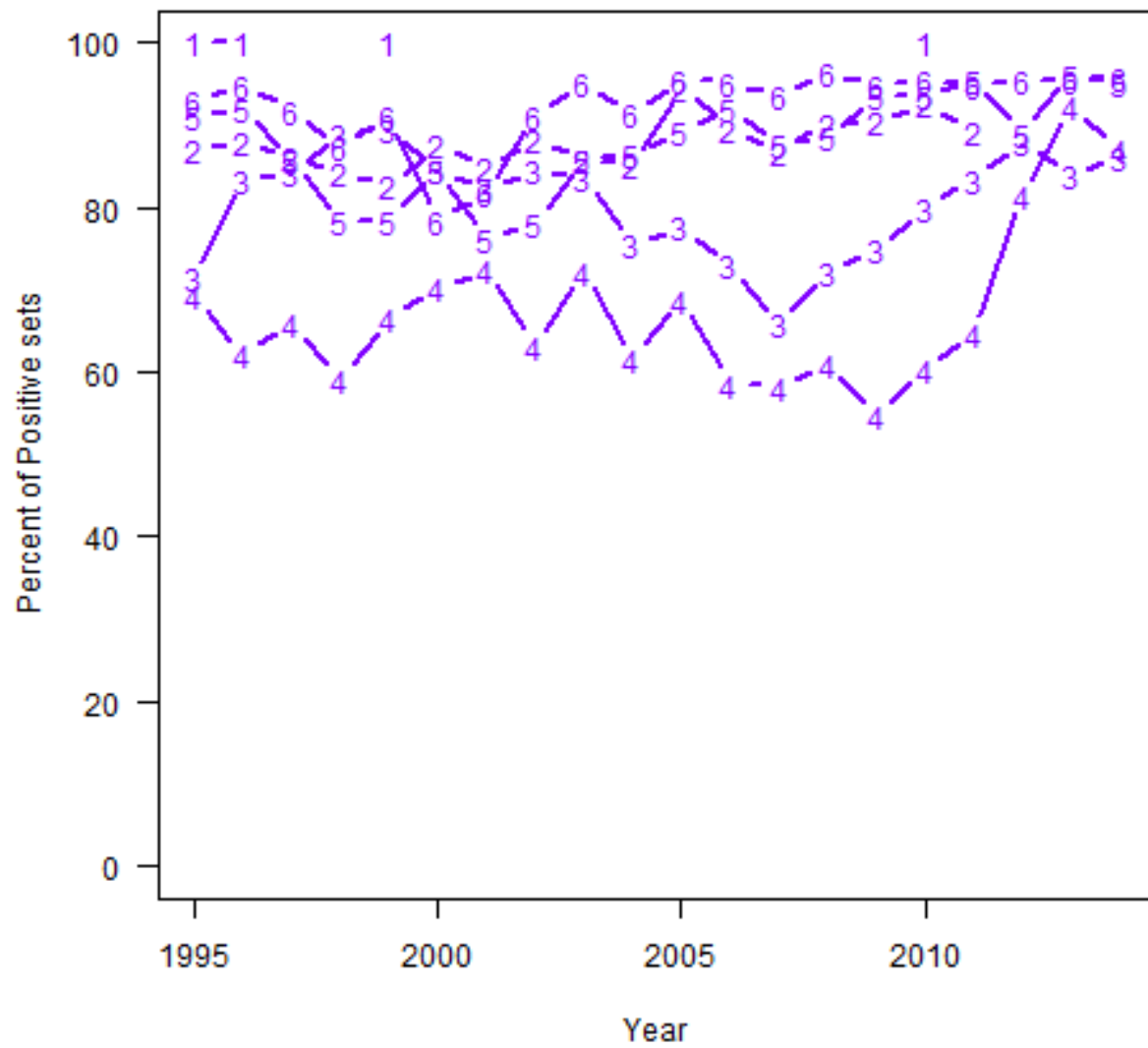


Figure 23: Thresher shark CPUE indicators. Proportion of positive sets, observer data.

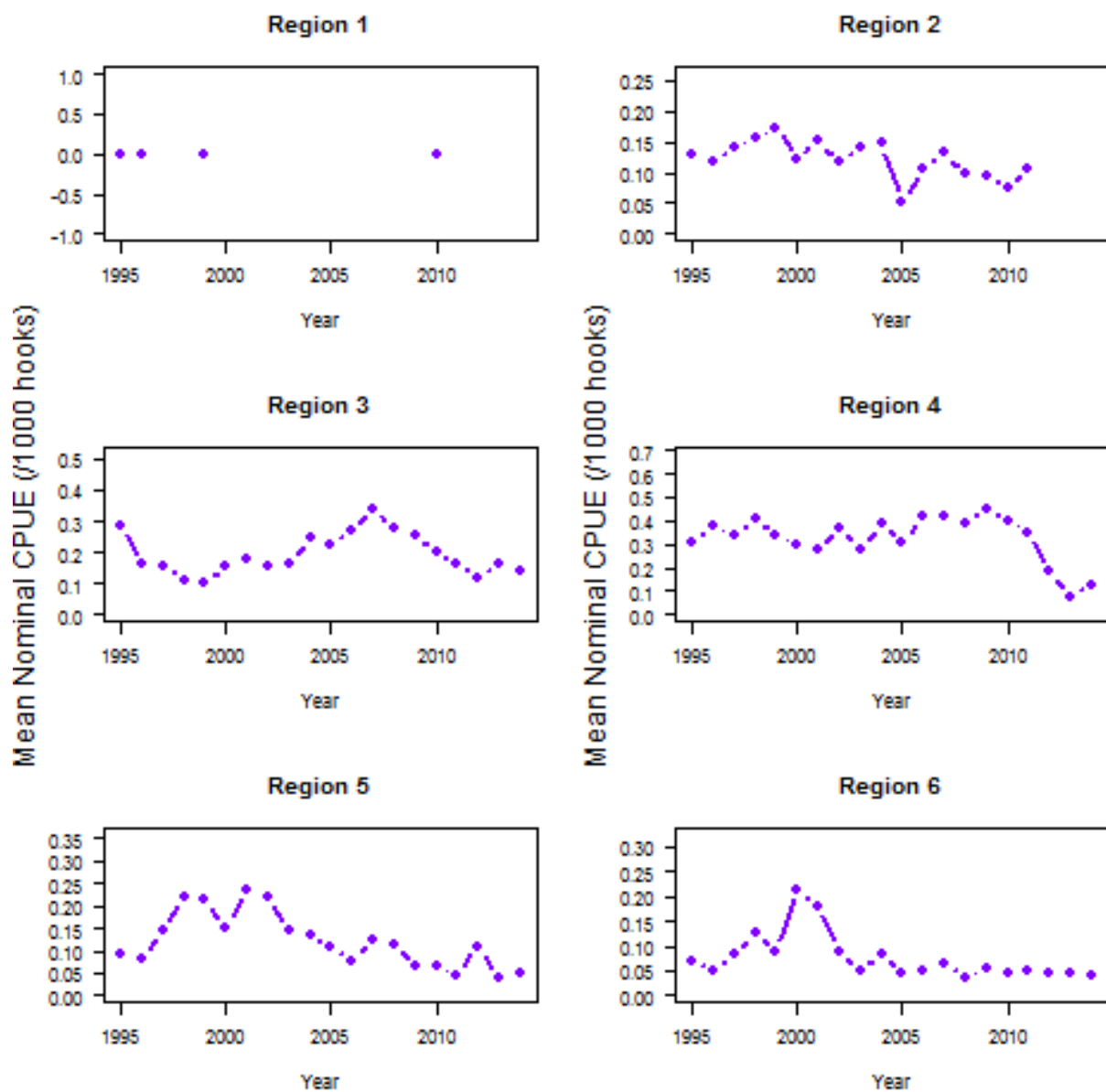


Figure 24: Thresher shark CPUE indicators. Nominal CPUE, sharks per 1000 hooks, observer data.

6 Biological indicator analyses

6.1 Introduction

6.2 Methods

6.3 Results

6.4 Conclusions

- 7 Feasibility of Stock Assessments
- 8 Impact of Recent Shark Management Measures
- 9 Recommendations for Future Indicator Work
- 10 Management Implications

Acknowledgements

- 11 Appendices