TECHNICAL AND COMPLIANCE COMMITTEE
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REPORT ON PROGRESS FOR IMPLEMENTING THE SAMPLING METHODOLOGY FOR CCFS

WCPFC-TCC21-2025-09
11 September 2025

Submitted by TCC Chair and Secretariat

Purpose

1. This paper provides updates on the development of the scheme to address the imbalance in the online Compliance Case File System (CCFS), and it will highlight areas for consideration and advice by TCC, to guide the future implementation of the scheme.

Background

2. The Compliance Monitoring Scheme (CMS) CMM (CMM 2023-04) was amended by the Commission at WCPFC20 with the inclusion of paragraph 15(b) that tasks the Secretariat to develop and utilize, in consultation with the Scientific Services Provider, a scheme for randomly sampling observer-related cases from the CCFS system for the purse seine fishery on a trip basis designed to achieve the level of coverage in the CMR for Regional Observer Programme (ROP) purse seine trips determined for the longline fishery by the Scientific Services Provider for the most recent year for which this data is available.[1] The amendments in CMM 2023-04 are intended to accord with the CMS principle of fairness[2] by applying a scheme that addresses the issue of imbalance in the CCFS arising from the difference between the purse seine fishery which has high observer coverage and the longline fishery where the observer coverage as a proportion of effort is low.

3. The imbalance between purse seine and longline observer coverage is not a new issue. For example, at WCPFC19 in December 2022, the Commission endorsed the following TCC recommendation: "*TCC18 noted the imbalance between the information available for monitoring compliance between the longline and purse seine fisheries and recommended that the Commission recognise the need to address this imbalance.*"[3]

TCC20 Discussions

4. At TCC20, the Secretariat presented TCC20 working paper 09, which included an update on the development of a sampling methodology for the CCFS. The paper outlined a simplified approach whereby a single percentage (the average longline observer coverage rate from 2018–2023 (6.2%)) was applied to subset purse seine trips. This approach was noted as potentially consistent with the tasking in CMM 2023-04, paragraph 15(b), to address the imbalance in the CCFS arising from the comparatively different levels of purse seine and longline observer coverage. The analysis demonstrated that while CCM-initiated (Article 25(2)) cases are fully preserved, a substantial proportion of observer-initiated cases are excluded, and that outcomes can vary depending on the issue as well as the effects of random sampling. These differences may influence the interpretation of case trends and conclusions drawn from reports based on the subsampled dataset. In this context, the Secretariat sought guidance from TCC on how the sampling approach should be applied and how the subsampled dataset should be used in future CCFS-based reporting prepared for the Commission.

5. Key points raised during the discussions at TCC20 included:

   - **Recognition of Secretariat's Work:** Appreciation was expressed for efforts to address the imbalance in observer coverage between longline and purse-seine fisheries, while noting that the CMS process alone cannot fully resolve the issue.

[1] Referred to as "subsampling" or "subset" approach in this paper.

[2] CMM 2023-04 paragraph 3(iii) *Fairness: Promote fairness, including by: ensuring that obligations and performance expectations are clearly specified, that assessments are undertaken consistently and based on a factual assessment of available information; that CCMs are given the opportunity to participate in the process; and that there is a reasonable balance between fisheries and CCMs in the assessment process*;

[3] WCPFC19 Summary Report para 351 (i).

- **Need for Stronger Monitoring:** Several interventions highlighted the importance of strengthening minimum monitoring standards in longline fisheries to achieve more balanced representation.
- **Clarifications on Observer Coverage:** Explanations were provided that observer coverage rates reflect the full fleet, that COVID-19 significantly reduced purse-seine observer deployment, and that delays or gaps in logbook submission affect data completeness.
- **Support for a Simple Sampling Approach:** There was broad support for a straightforward methodology to address imbalance, with suggestions to use annual longline coverage rates rather than multi-year averages, and to treat prepared subsample results as an "initial data exploration."
- **Recommendations on Data Treatment:** Suggestions that favor retention of historic subsamples (rather than resampled each year), that sampled cases are used in dCMRs under relevant CMM provisions, and that excluded cases be shown only to illustrate the effect of sampling, not for further analysis.
- **Concerns on Representativeness and Coverage:** Some participants raised doubts about the adequacy of the sampling approach, recommending that additional factors (such as catch levels) be considered to ensure representativeness and that actual coverage rates, not assumed 100% levels, be applied.
- **Risks of Losing Critical Case Types:** Concerns were raised that subsampling could exclude most observer-initiated cases, including serious issues such as observer obstruction, potentially limiting TCC's ability to identify systemic compliance concerns.

6. The agreed recommendations from TCC20 were:

> TCC20 supported the Secretariat's efforts in seeking to improve the methodology used to sub-sample the CCFS so that it is reflective of the proportion of longline and purse seine observer coverage rates. TCC20 noted the results of the initial sub-sampling and **tasked** the Secretariat to work with the Scientific Services Provider to refine the methodology.
>
> TCC20 **tasked** the TCC Chair and Secretariat to prepare a paper to further develop the sampling methodology for consideration by TCC21, taking into account the relevant parameters for implementation of a process in 2025.
>
> *Ref TCC20 Summary Report, paragraphs 112 - 113*

Updates for TCC21

7. Following the TCC20 discussions, the Secretariat, with support from consultant analyst *Saggitus*, has prepared some additional analyses to support the further development of the sampling methodology. Three different methods to approach the subset percentage were explored:
   - **Constant rate sampling** – similar to the method presented in the 2024 TCC20 paper this applies a average longline observer coverage rate as a single fixed percentage.
   - **Year specific percent sampling** – this was an option that some CCMs at TCC20 indicated as a preference, because it uses the longline percentage for each year to derive the purse seine sample.
   - **Year specific percent sampling adjusted for the purse seine observer coverage rates (Adjusted year percent sampling)** - within each year, adjust the longline percentage to account for the purse seine percentage coverage achieved.

8. The results indicate that using the *year specific adjusted method* (option 3) provides the most balanced and comprehensive dataset, and this may make it a preferred approach. The TCC20 constant rate sampling method resulted in less purse seine data compared to the other two methods and was least preferred. A more detailed report presenting the results is provided in **Annex 1**.

9. However, the option suggested during the TCC20 discussions has not yet been possible to explore further. At the time of preparing this paper, the SSP had not yet completed the work required to produce a report linking VMS trip data with observer trip data and subsequently to permit linkages to CCFS trip IDs.. If this linkage proves feasible, the analysis itself would remain unchanged, but the sampling approach would be applied to a more complete list of fishing trips undertaken by vessels (rather than just observed trip numbers). In practice, this would mean that some sampled trips could include trips without observers, as well as trips with observers but no associated CCFS cases.

10. In the meantime, the Secretariat has prepared for review by TCC21:

    i. A draft Appendix 3 for the provisional CMR, using an approach similar to last year, with the subsampling approach based on Option 2 *Year specific percent sampling* applied; and

    ii. Figures and tables illustrating the effect of this sampling approach, provided in TCC21 supplementary paper to the Annual Report on the Regional Observer Programme (TCC21-2025-RP02_suppl).

11. TCC21 is invited to note that the Secretariat (including SPC and the Consultant Analyst) will need sufficient time to complete the necessary preparations and work to support the delivery of any changes to the detailed static CCFS aggregated summary tables reports or dynamic aggregated summary spreadsheet, compared to the version which is usually presented to TCC. Given this, it would be important for any discussions and decisions about how to present a new version of paragraph 28 (ii) reports, are scheduled to occur and be completed no later than the end of the first quarter of 2026, to ensure that an output is available for TCC22.

Next steps and Recommendations

12. The results presented in **Annex 1** suggest that the reported information based on the sub-sampled approach (presented this year and based on Option 2 *Year specific percent sampling*) should not be used for reviews of CCM compliance with relevant CMMs. In practice, this indicates that further discussion and consideration is needed in regard to:

    i. the Secretariat task described in paragraph 28 (ii) of CMM 2023-04, particularly regarding the format specifications for the aggregated report; and

    ii. the TCC processes for considering the paragraph 28 (ii) report and their expected outcomes.

13. Noting that information from SPC to link VMS trips and observer trips is not yet available, the analysis indicates that the *Adjusted year specific percent sampling* may be the preferred subsampling approach. This approach could be revised once SPC information becomes available.

14. TCC21 is invited to:

    i. Task CCMs to provide feedback on the format specifications for the aggregated report, the TCC processes and the preferred subsampling approach no later than two weeks after TCC21 (by 15th October 2025); and

    ii. Task the TCC Chair to provide a report to the Commission with recommendations for an approach for the CMR in 2026.

TCC Chairs briefing note - Aggregate tables sub-sampling

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Contents

1 Introduction

The WCPFC20, following the recommendations of TCC19, made a number of decisions relating to the imbalance of the observer coverage between the purse seine fishery, that has high observer coverage, and the longline fishery, where the observer coverage is low. Part of that decision was to present some of the data summaries from the compliance case file system in a more balanced and fair manner. As a result the purse seine data were subset to ensure that summary reporting from the compliance case file system (both public and non-public formats) reflect a more equivalent proportionate rate of coverage of longline and purse seine fishing activities (Table 1). The initial methods used and the subset of data were presented to the TCC in TCC20-2024-09_rev1 *Use of ROP data in the Compliance Monitoring Scheme (CMS)*, and updates on the scheme to address imbalance in the CCFS which showed the impacts of the subsampling. However, TCC20 made few clear decisions as to how to continue to progress this issue, and some of that decision making was left to the TCC Chair, TCC Vice Chair and Secretariat to lead further work in 2025.

This paper should be read in conjunction with TCC20 TCC20-2024-09_rev1 and has been prepared with a view to assist the TCC Chair and TCC Vice-Chairs consideration of how to handle this topic as part of preparations and planning for TCC21. The paper contains additional analyses to help highlight the implications of the subsampling approach.

2 Methods

The analysis relies on subsetting the purse seine fleet such that the rate of observer effort is equivalent on purse seine vessels when compared the longline observer coverage rate. There are a number of different ways to approach the subset percentage.

1. **Constant rate sampling** - used the longline average over a stable period of longline observer coverage (2018-2023 - 6.2%) and used a single fixed percentage to derive the purse seine sample.
2. **Year specific percent sampling** - used the longline percentage for each year from Table 1 to derive the purse seine sample.
3. **Year specific percent sampling adjusted for the purse seine observer coverage rates** - within each year, adjust the longline percentage to account for the purse seine percentage cover. To make the adjustment the percent used for the subsetting was derived by dividing the longline percent by purse seine percent. If the purse seine observer coverage was 100% and the longline percent was 5% we used 5% as our value (5/100 = 5%). But if the longline value was 5% and the purse seine was 20%, the value used in the analysis was 25% (5/20 = 25%). This was done to ensure that both fleets had a balanced proportion of trips in the compliance analysis.

Using these three options the purse seine data set was subset to get a subsample and that subsample was them presented for analysis. Option 1 (Constant rate sampling) was used for the analysis that was presented to TCC20. Some CCMs at TCC20 noted their preference for option 2 (Year specific percent sampling), while option 3 (Year specific percent sampling adjusted for the purse seine observer coverage rates) was not fully

discussed by TCC20. But if the purpose of this analysis is to achieve balance, then option 3 is the most appropriate and fair approach.

To assess the impact of the subsetting for each of the three options the analysis was bootstrapped and the variation in the results analysed. The bootstrapping analysis began by subsetting the purse seine data set for each run and then posting the number of cases to a subset file. This was repeated 2000 times for option 1 and then 1000 time for options 2 and 3 (the number of runs was halved to save processing time and computer memory, but could be repeated with a bigger sample number if required). Each run the CCFS data set for the purse seine vessels was subset according the the rules for that option and then that subset sample was posted to a data table for use in the analysis.

The results were then output to a series of figures showing the number of cases by year, case type and case progress. The outputs of the analysis are presented graphically as ridgeline plots which show the distribution of the case numbers and outcomes as distributions by year as well as bar plots showing the distribution by case outcome by year.

3 Results and Discussion

During the discussions at TCC some CCMs suggest that the purse seine observer coverage rate is 100% in all years. However, Table 1 shows that the purse seine observer coverage rates are lower than 100% in most years. This suggest that the most balanced way to subset the purse seine data would be to use option 3 (Year specific percent sampling adjusted for the purse seine observer coverage rates). It should also be noted that coverage of ROP data, is also usually less than total observer coverage, because of the definition of ROP trips means that observed trips within one EEZ are excluded from the data set.

The SPC has indicated that the purse seine observer coverage rate is based off estimated trips using VMS relative to ROP data received by SPC. In some cases, the purse seine coverage may be less than 100% and that can be due to a combination of reasons including:

- trips may have had an observer, but SPC have not received placement information or observer data, so SPC does not know that the trip occurred (these are unknowns are largely limited to the most recent year of data and most often resolved later on);
- potential non-fishing trips identified using VMS (e.g., vessels transiting only and not fishing), which would inflate the estimated number of total trips (improvements to the VMS algorithms are being made);
- trips which had an observer but for some reason, SPC has never received the logbook data, or it was unusable; and
- impacts and waivers due to COVID (discrete time period).

Figure 1 to Figure 12 show the results for the bootstrap analysis for the constant rate 6.2% percent sampling rate. Figure 13 to Figure 24 show the results for the year specific percent sampling. Figure 25 to Figure 36 show the results for the year specific percent sampling adjusted for the purse seine observer coverage rates.

All of these data show that the sub-sample chosen can have a big impact on the outcome and your eventual perception of the data set. In some instances in some years the distribution of the data are very wide. For example in Figure 1 for new cases and Figure 9

for ongoing cases in 2019 the distribution of data are very wide and the number of cases in the analysis is highly varied depending on the subset chosen. This high level of variation is also evident in the high level of outliers in the box plot outcomes such as those seen in Figure 26 where the number of cases appearing in the analysis could vary between 15 and 80 depending on the data selection chosen in the random sample.

The TCC deliberations did note that once a dataset has been randomly selected, that years data (a list of case numbers) should be maintained going forward. While this will assist in maintaining consistency between analyses from year to year and allowing the TCC to track case progress for those cases, it will not ensure that the cases being displayed in the analysis are representative of the full data set.

As the sub-sampling is random and the sampling rates are relatively low this could result in the selection of a data set that is not representative of the overall data in some years. While the sub-sampling approach can be used for public presentation of a summary of the trends in compliance it should not be used for assessing a CCMs compliance record.

Generally speaking, the constant rate sample resulted in less purse seine data compared to the other two methods and the purse seine adjusted method (option 3) provided the biggest data set. While option 3 and option 2 (unadjusted year specific percent sampling) were broadly similar to in their outcomes, the option 3 method is considered to provide the best balance and should be considered preferable.

Lastly, it should be noted that at the time of the analysis, the VMS trip data could not be linked to the observer trip data and then to the CCFS trip numbers. We are working with SPC to see if this could be resolved. If that is resolved the analysis will remain unchanged but the data that we use to identify trips within the CCFS will be based on the VMS trip numbers not the observer trip numbers. The outcome of that would be less data as we will be sampling trips with no observers (particularly in the COVID years), and as such will ultimately have less data which increases the importance is using the purse seine adjusted method which results in the greatest number of trips entering the sample data set.

4 Recommendations

1. Use the sub-sampling approach with care.
2. The subs-sampling approach should not be used for monitoring CCM compliance with the WCPFC CMMs. In practice, this suggests that further discussion and consideration is needed in regard to:
   (a) the Secretariat task described in paragraph 28 (ii) of CMM 2023-04 in terms of the format specifications for the aggregated report; and
   (b) to the TCC processes that are intended for considering the paragraph 28 (ii) report and their expected outcomes.
3. The sub-sampling approach can be used for public presentation of a summary of the trends in compliance.
4. When sub-sampling the compliance data, if the objective is to achieve balance in the observer coverage, the most appropriate approach is to use the year specific

percent sampling adjusted for the purse seine observer coverage rates.

5. In considering next steps, it should also be noted that the Secretariat (including SPC and the Consultant Analyst) will need sufficient time to complete the necessary preparations and work to support the delivery of any changes to the detailed static CCFS aggregated summary tables reports or dynamic aggregated summary spreadsheet, compared to the version which was presented to TCC20/21. Given this, it would be important for any discussions and decisions about how to present a new version of the paragraph 28 (ii) reports, are scheduled to occur and be completed no later than the end of the first quarter of 2026, to ensure that an output is available for TCC22.

Table 1: Observer coverage (percentage) estimated from VMS trips from 2015-2023. Data provided by SPC.

Year	Purse seine	Longline
2015	58	0.6
2016	74	2.9
2017	76	4.9
2018	91	4.4
2019	75	5.0
2020	38	6.3
2021	14	5.9
2022	13	7.1
2023	49	6.3

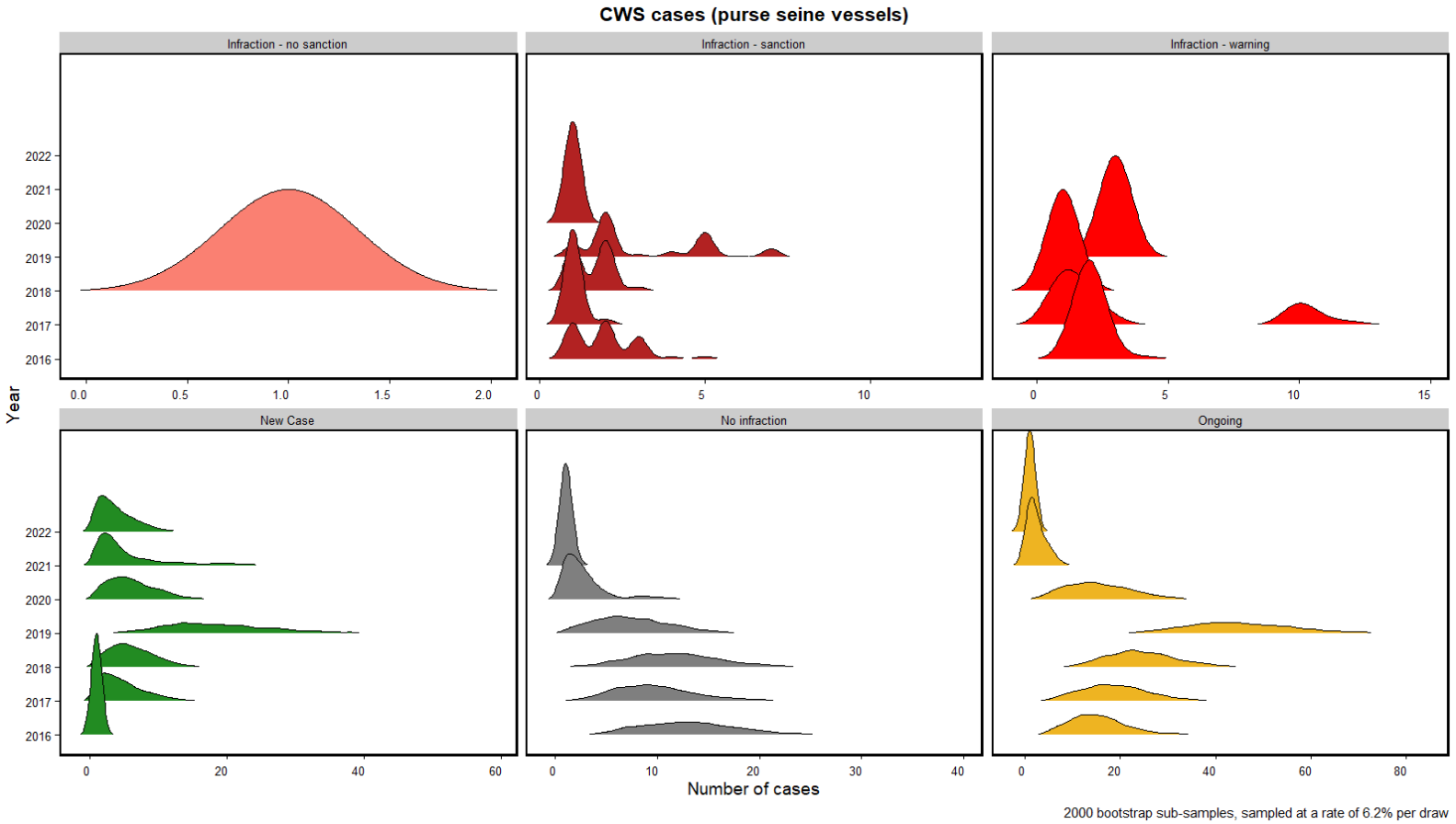

Figure 1: Ridgeline plot of cetacean protection in the purse seine fishery case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a rate of 6.2%.

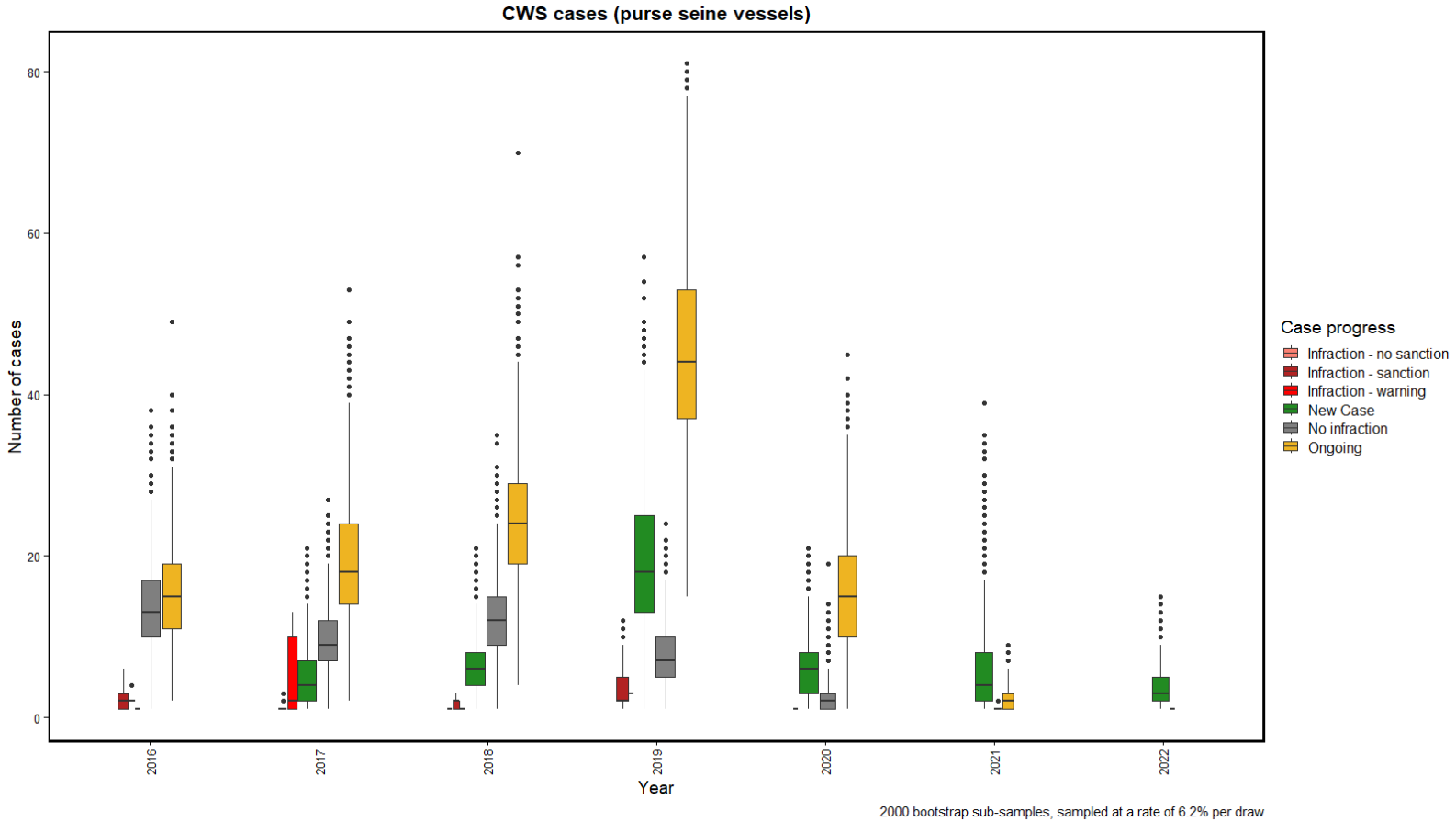

Figure 2: Box plot showing cetacean protection in the purse seine fishery case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a rate of 6.2%.

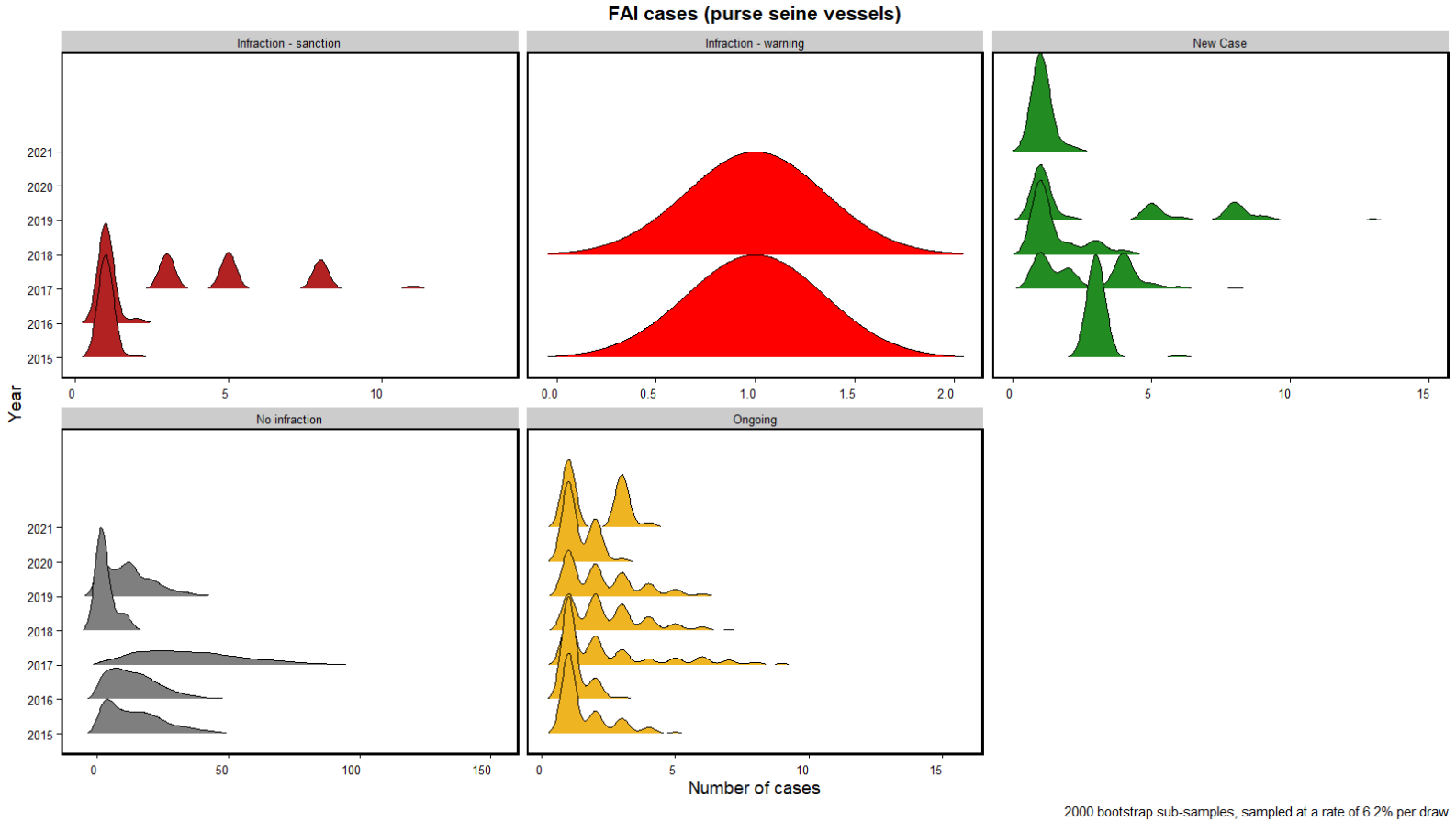

Figure 3: Ridgeline plot of FAD set management case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a rate of 6.2%.

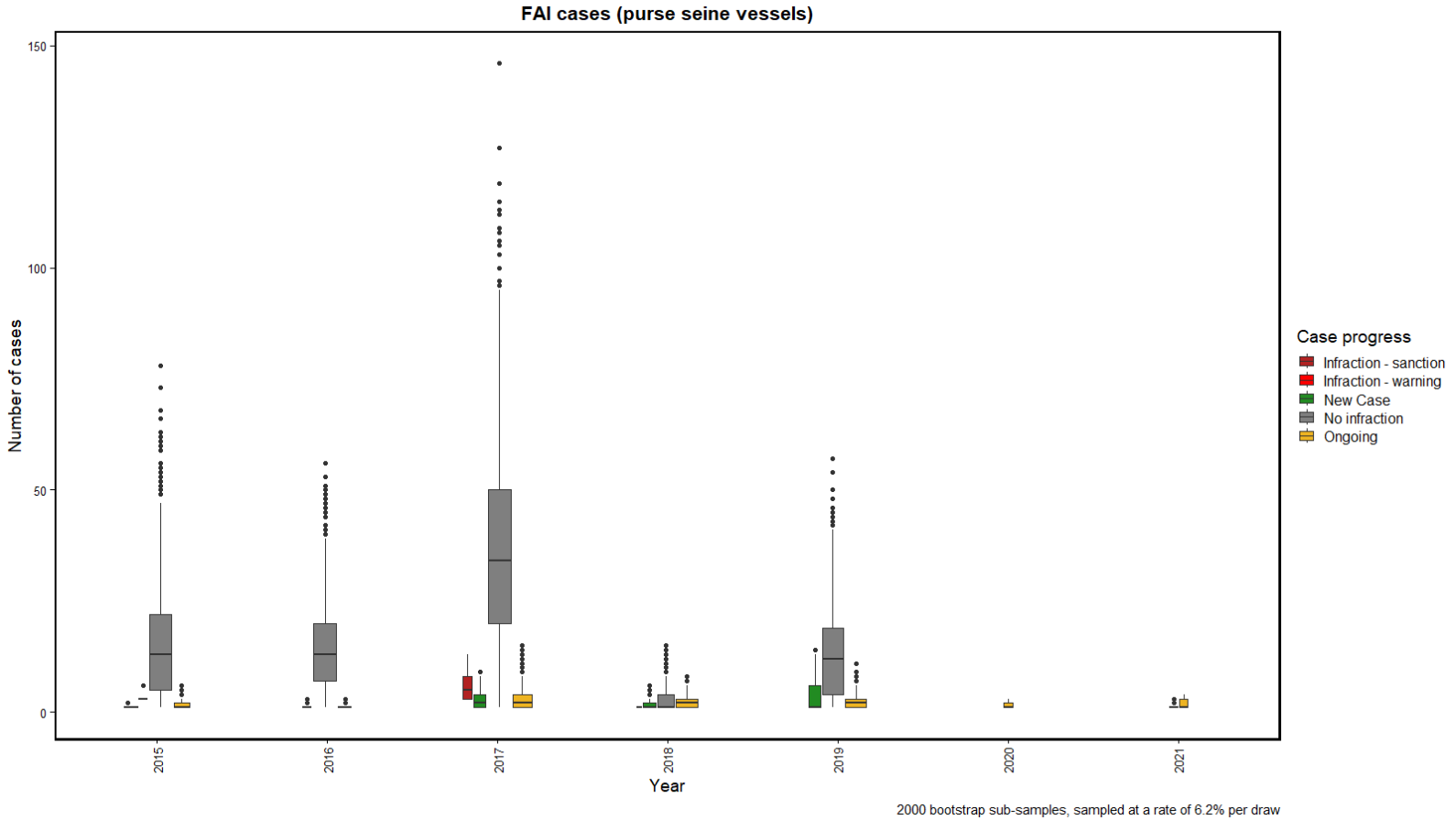

Figure 4: Box plot showing FAD set management case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a rate of 6.2%.

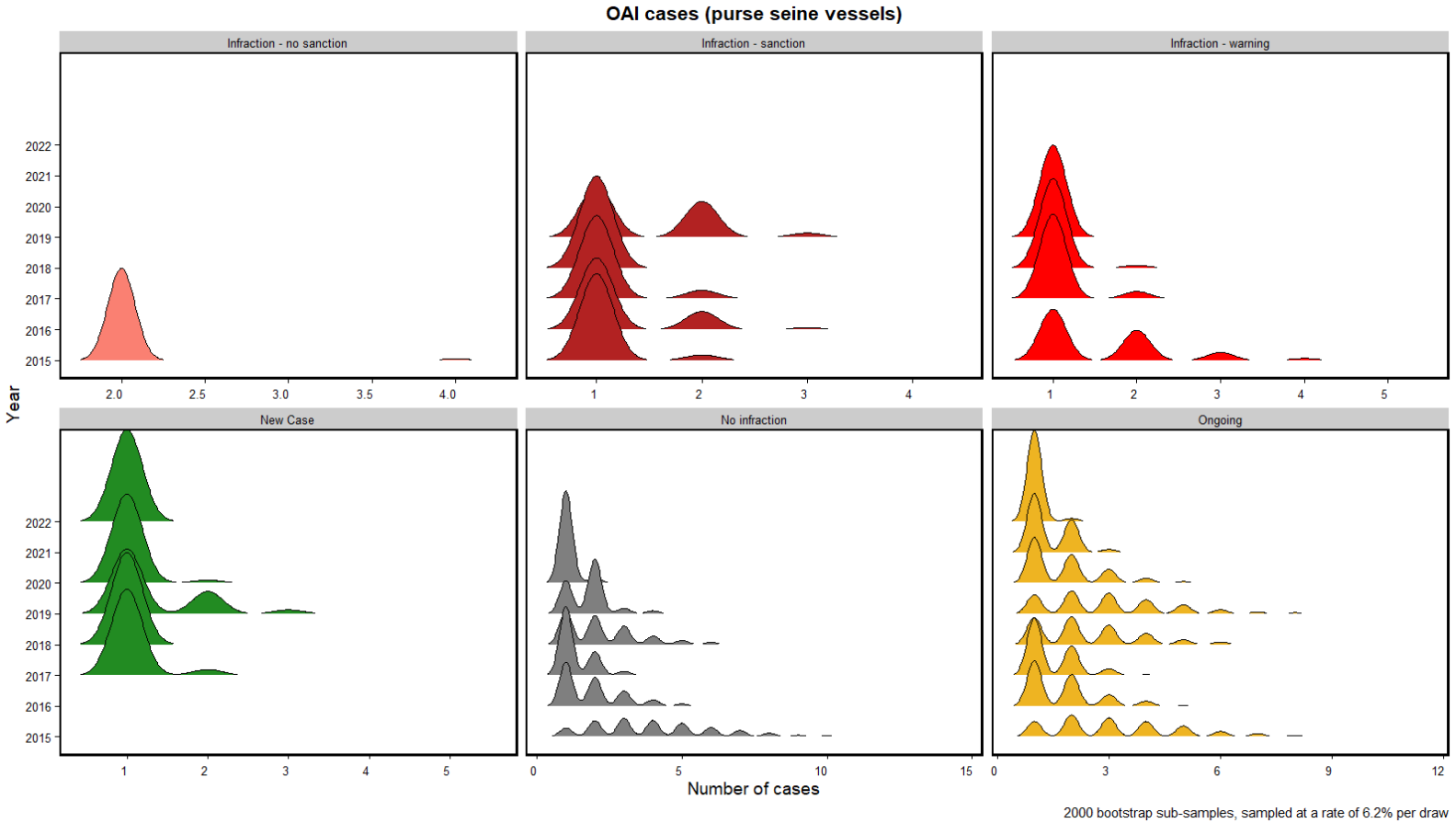

Figure 5: Ridgeline plot of observer welfare and safety case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a rate of 6.2%.

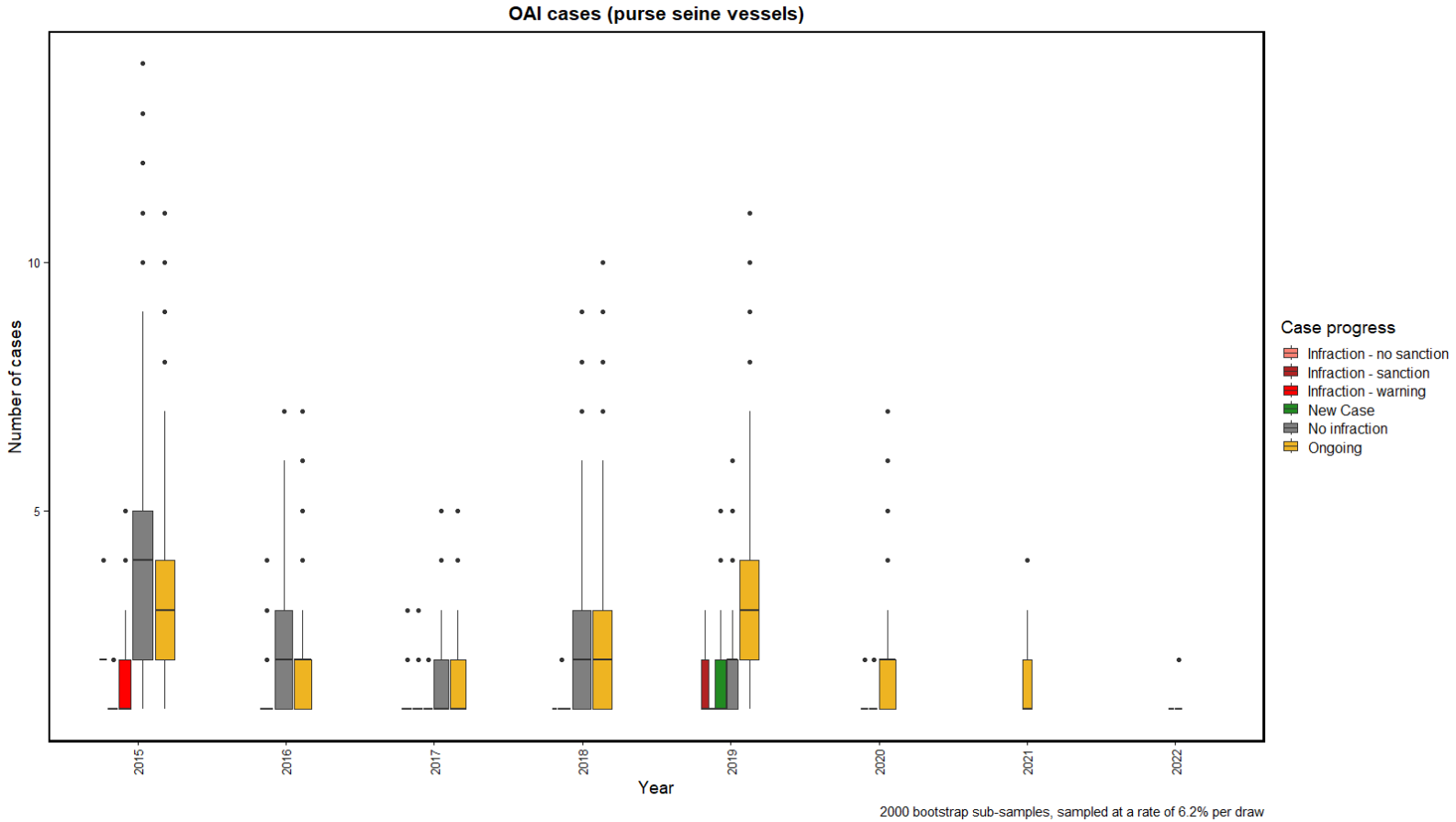

Figure 6: Box plot showing observer welfare and safety case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a rate of 6.2%.

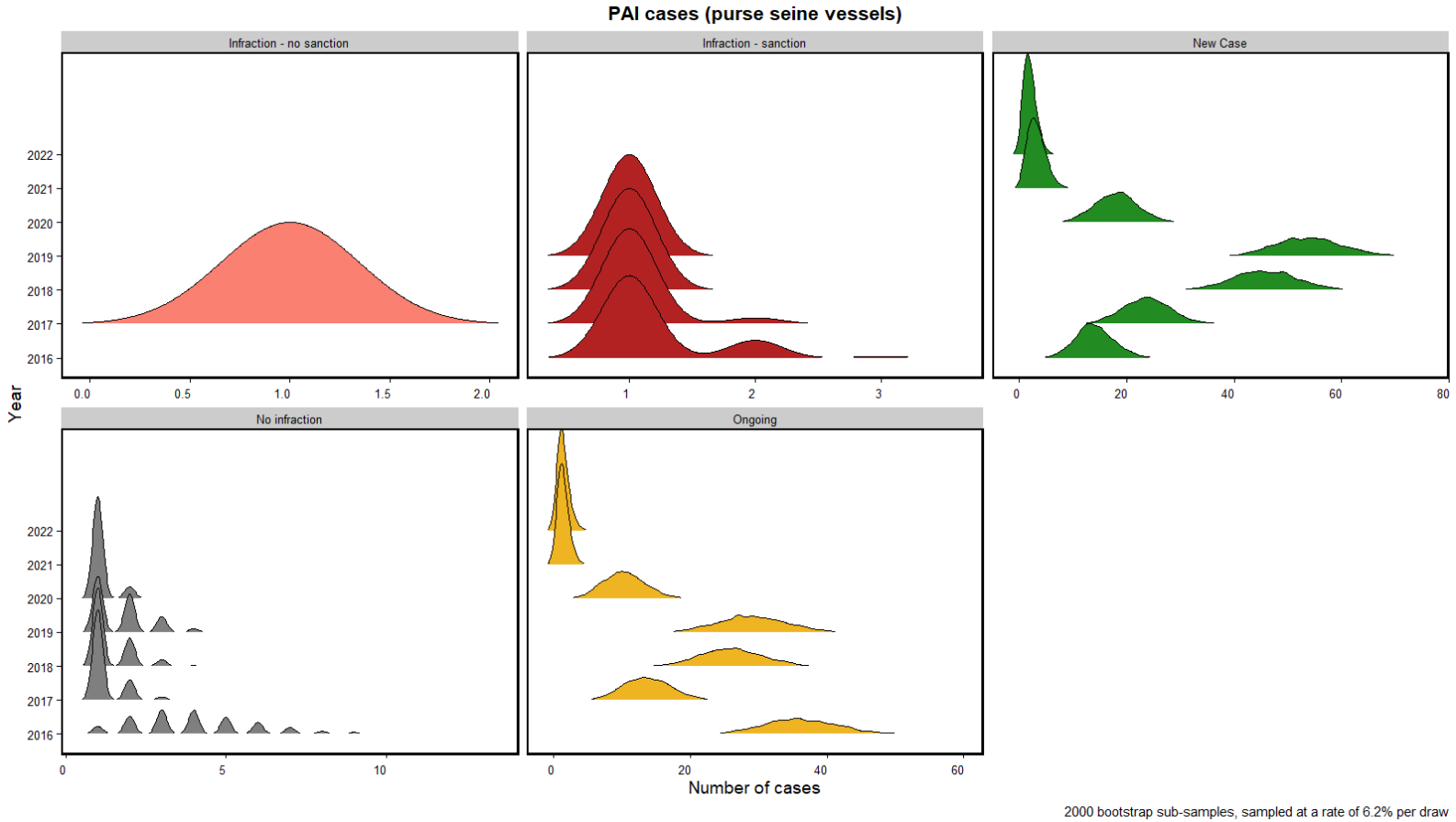

Figure 7: Ridgeline plot of ROP pre-notification case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a rate of 6.2%.

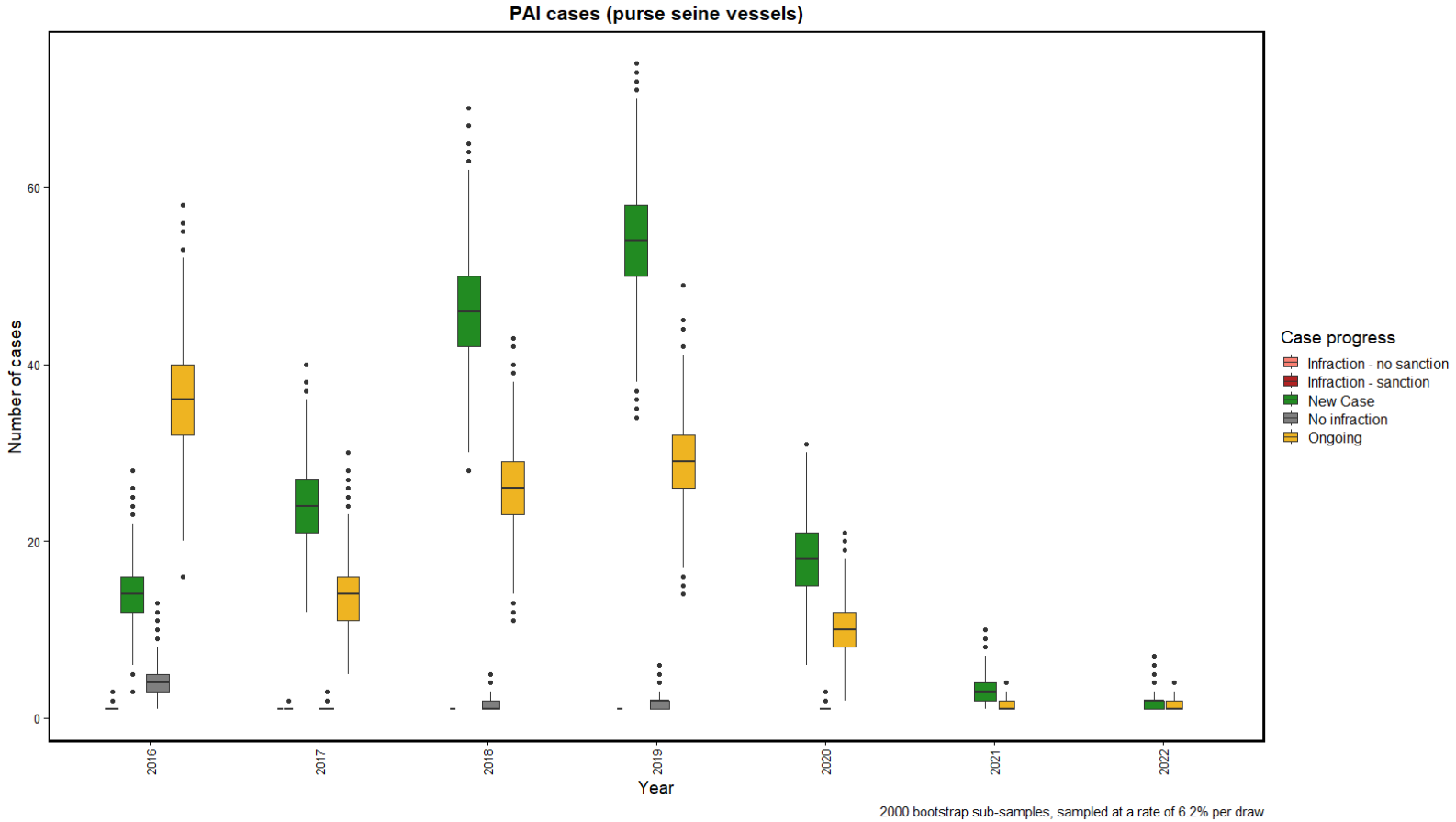

Figure 8: Box plot showing ROP pre-notification case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a rate of 6.2%.

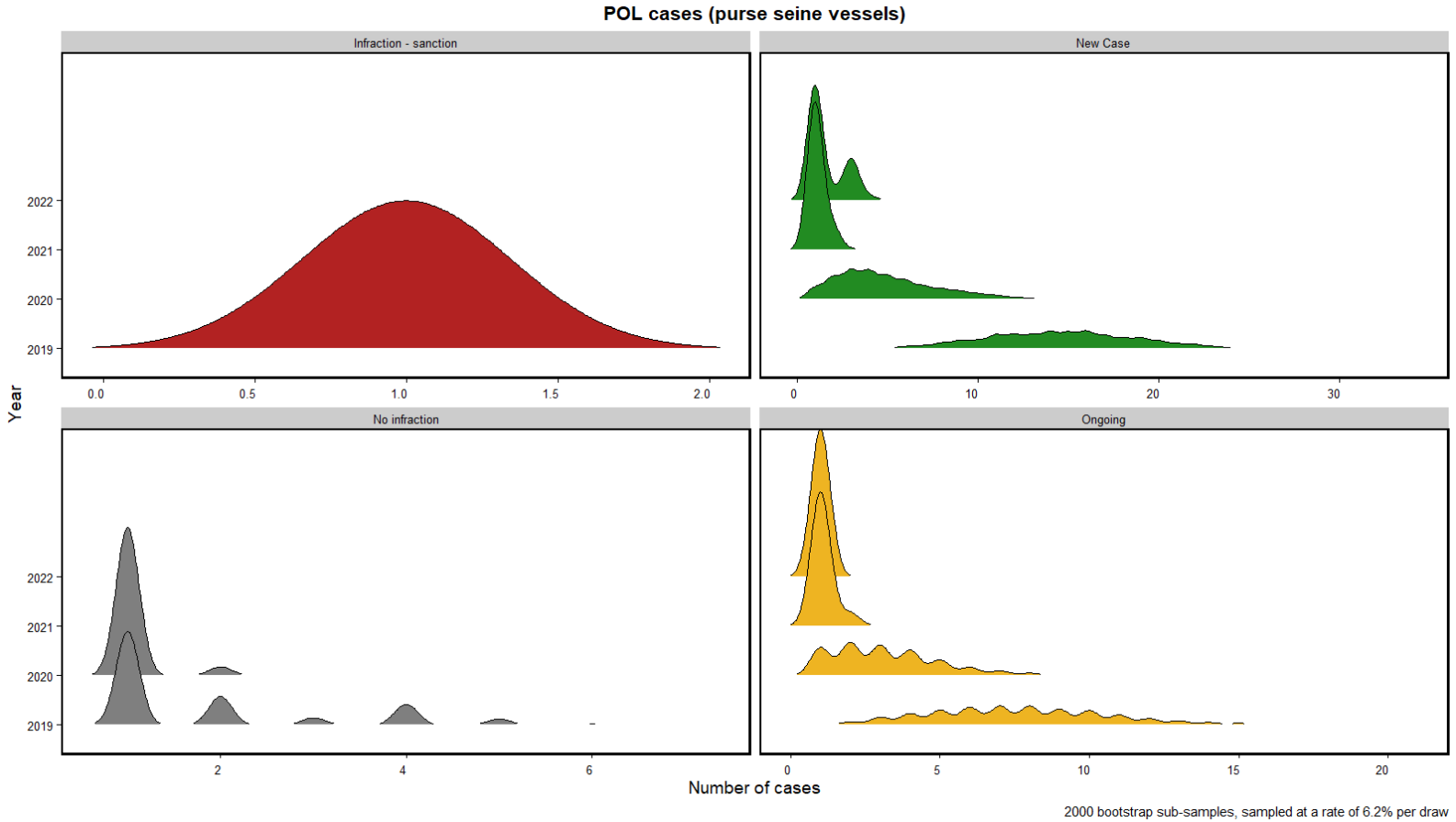

Figure 9: Ridgeline plot of marine pollution case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a rate of 6.2%.

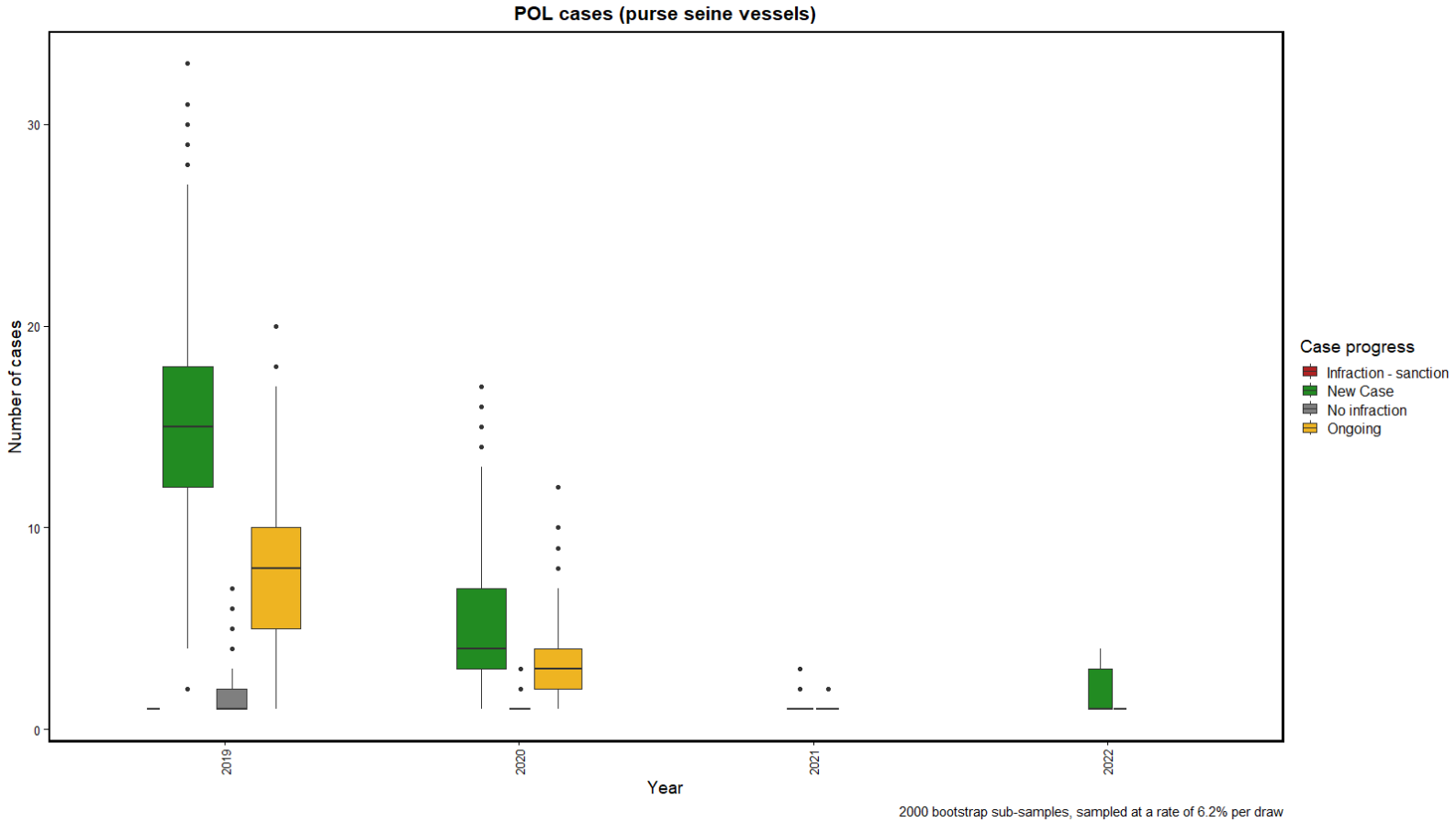

Figure 10: Box plot showing marine pollution case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a rate of 6.2%.

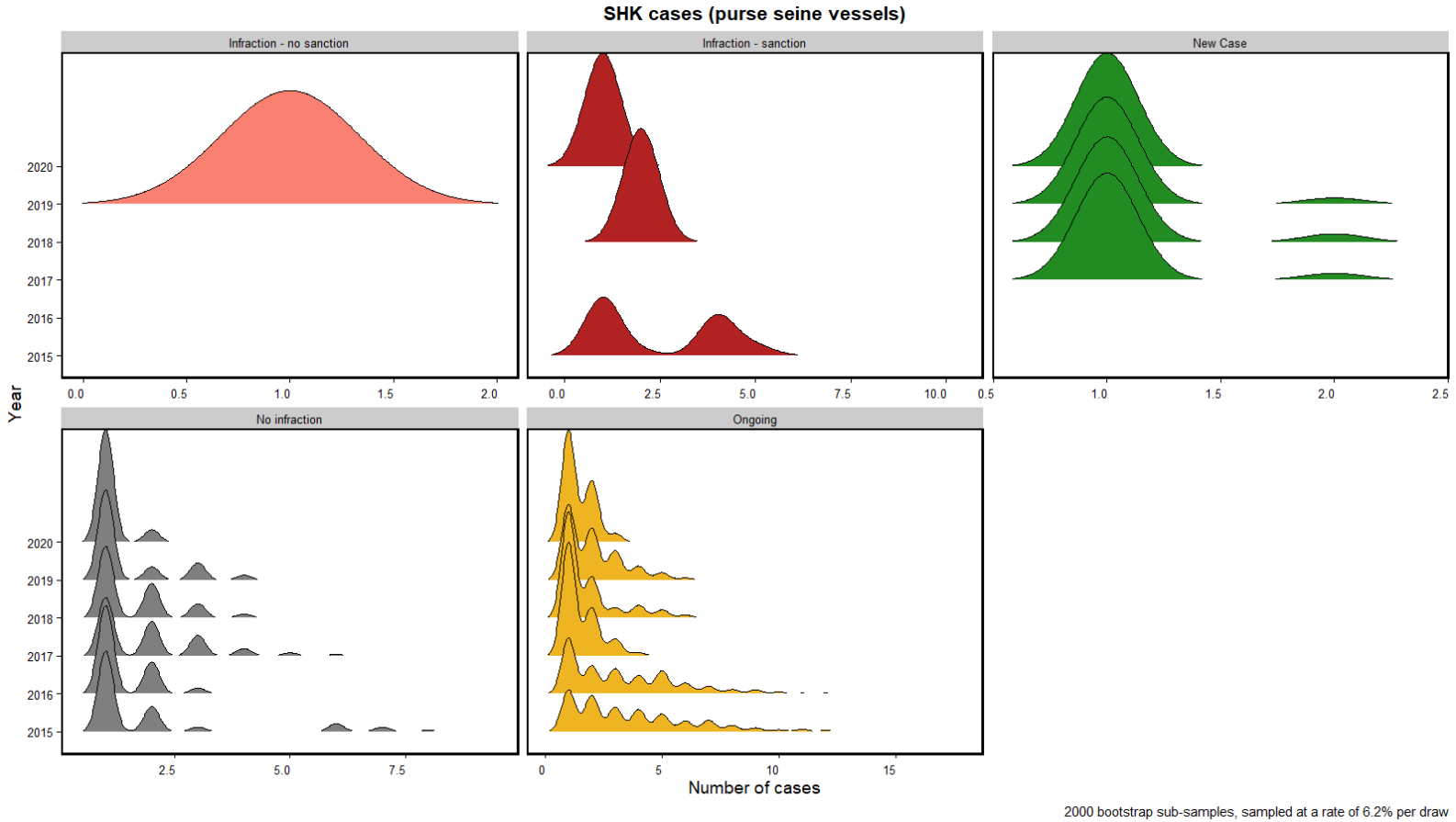

Figure 11: Ridgeline plot of shark mitigation case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a rate of 6.2%.

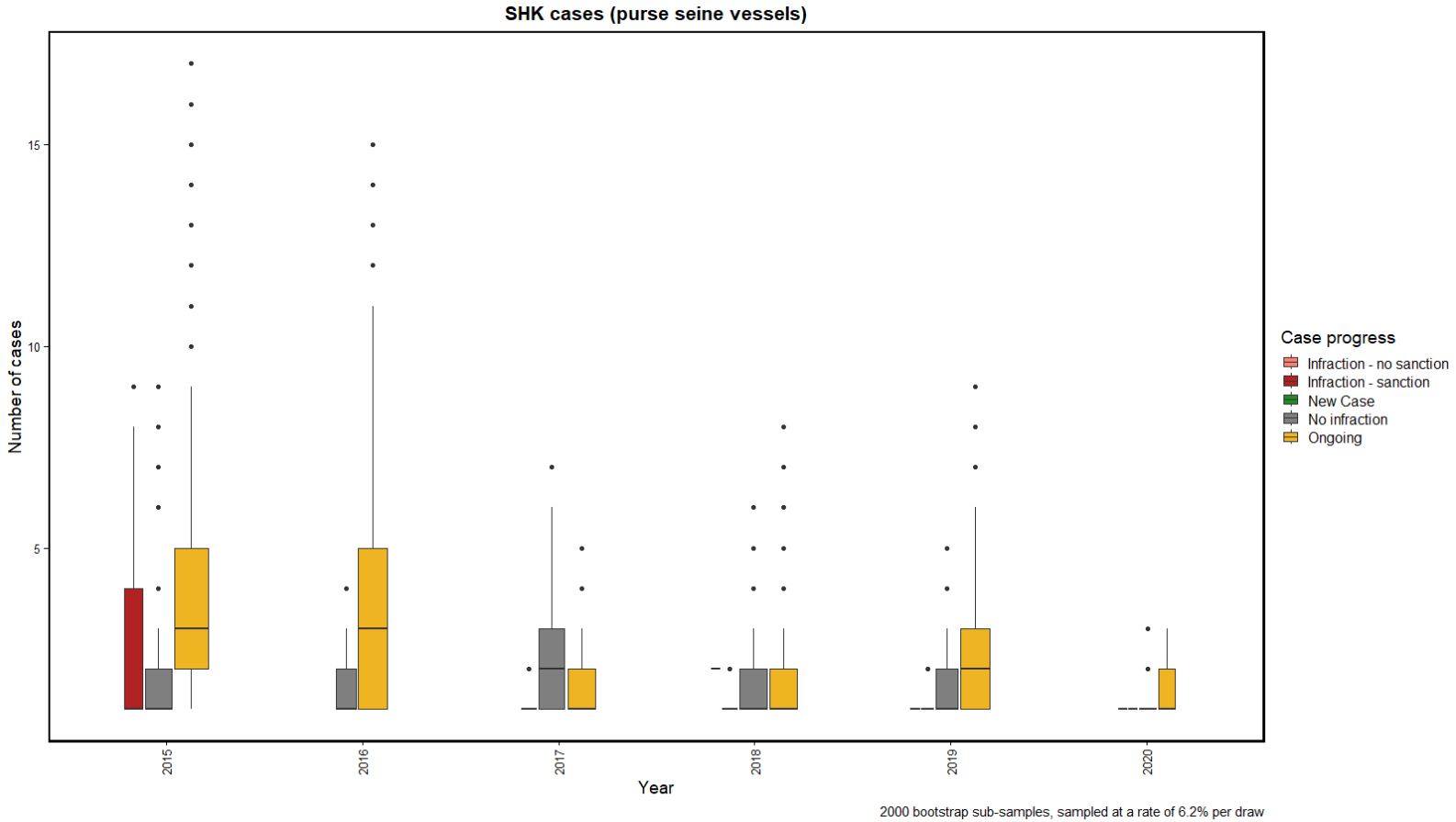

Figure 12: Box plot showing shark mitigation case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a rate of 6.2%.

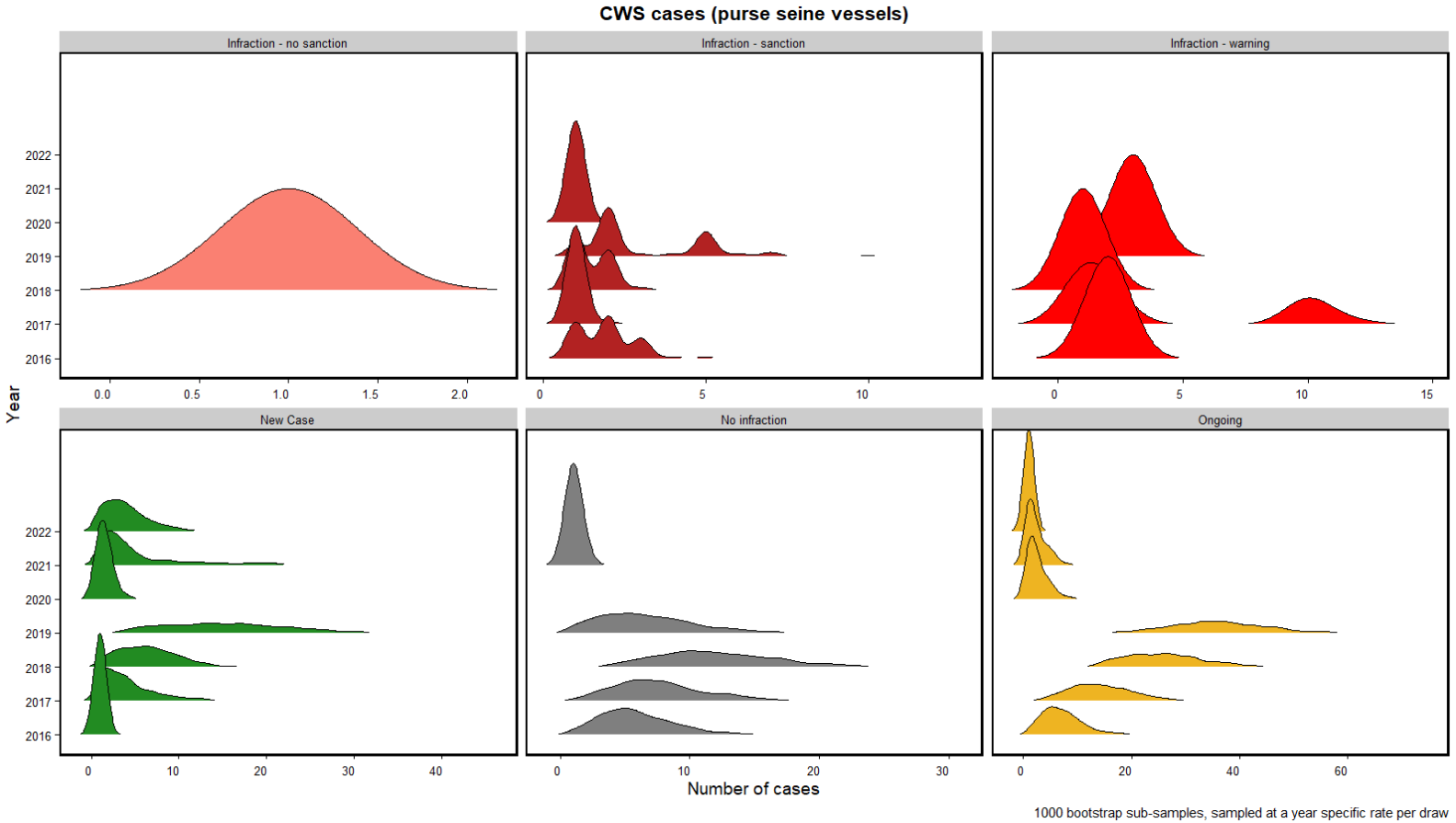

Figure 13: Ridgeline plot of cetacean protection in the purse seine fishery case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a year specific rate for each year.

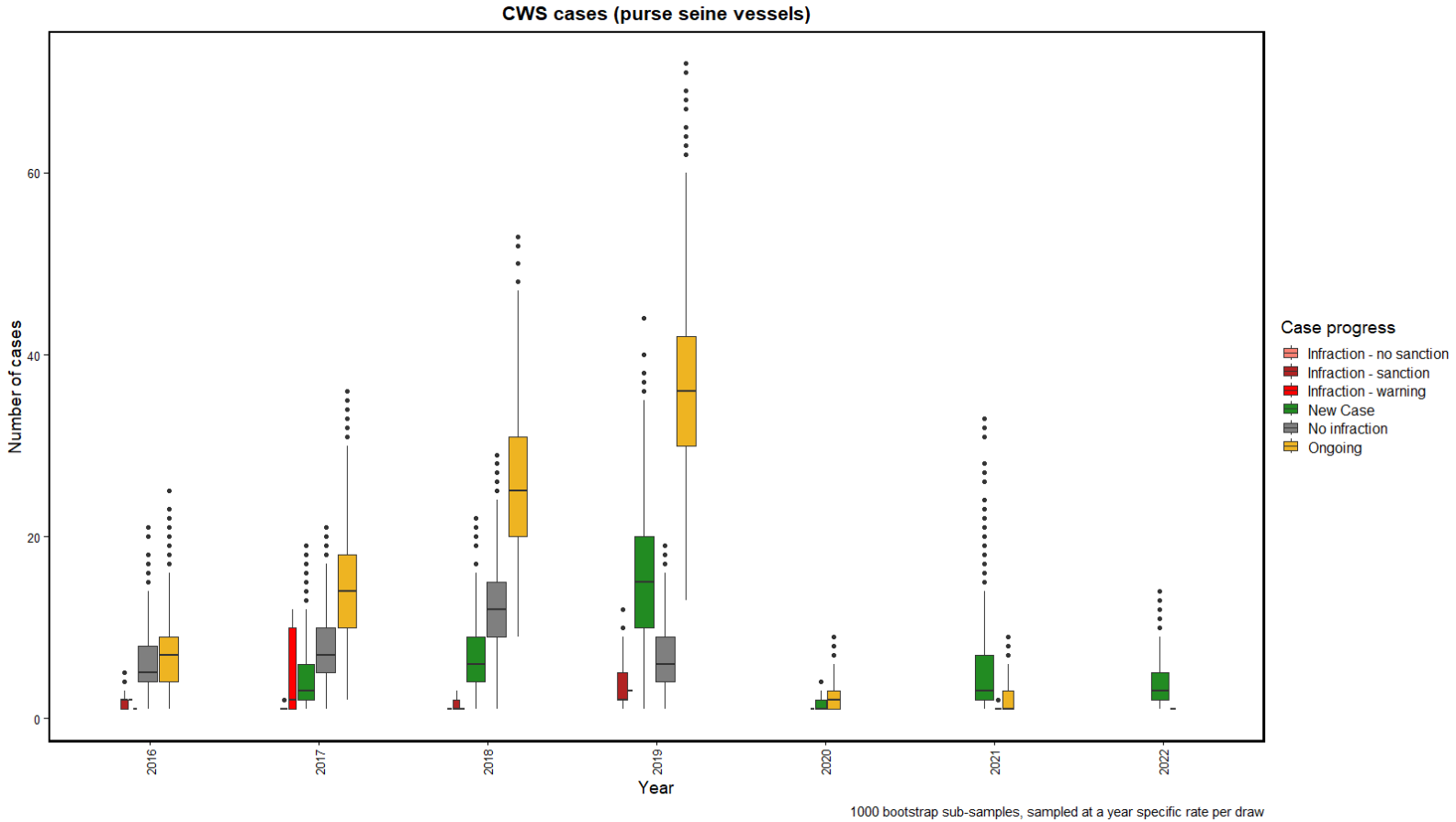

Figure 14: Box plot showing cetacean protection in the purse seine fishery case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a year specific rate for each year.

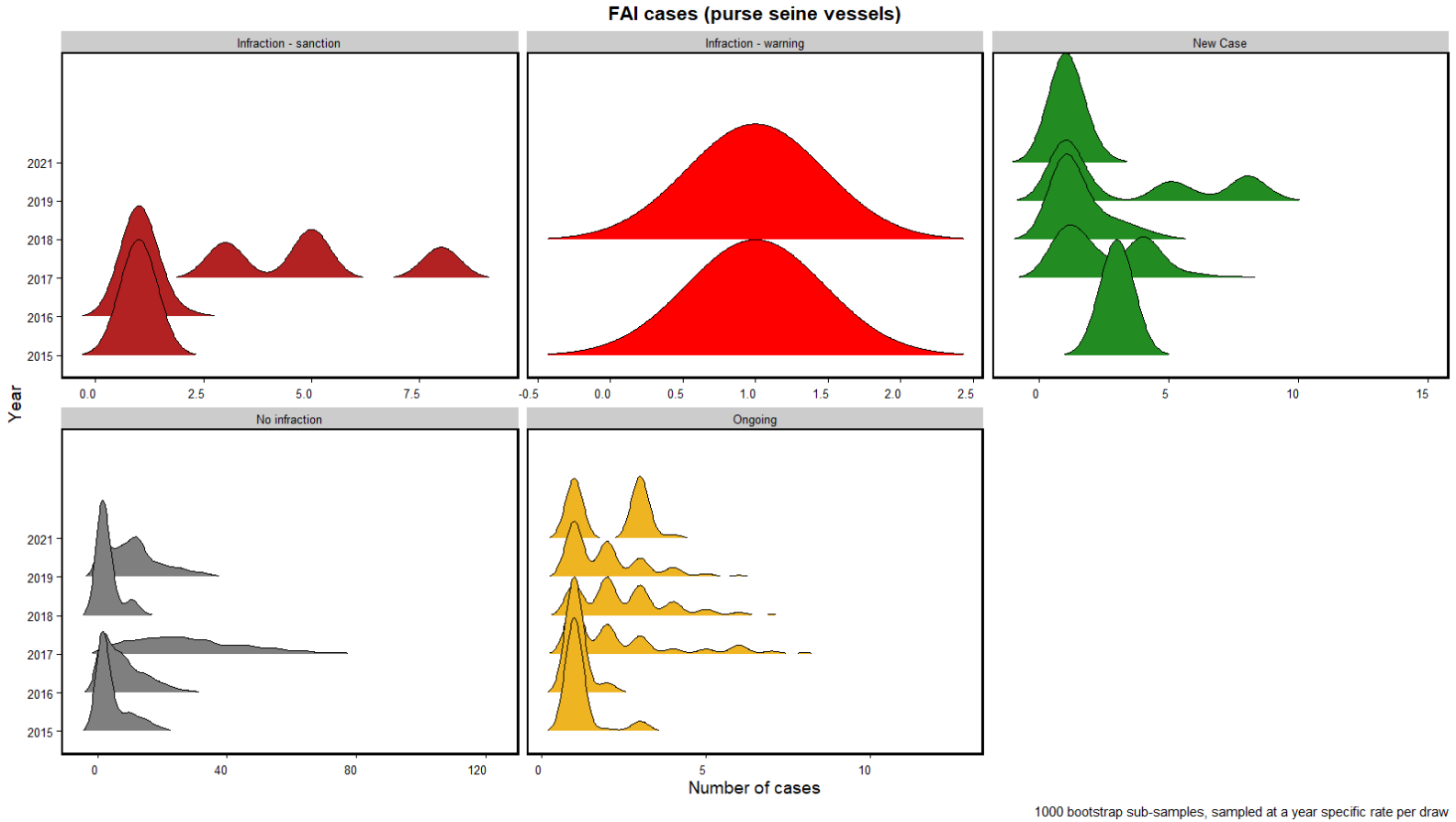

Figure 15: Ridgeline plot of FAD set management case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a year specific rate for each year.

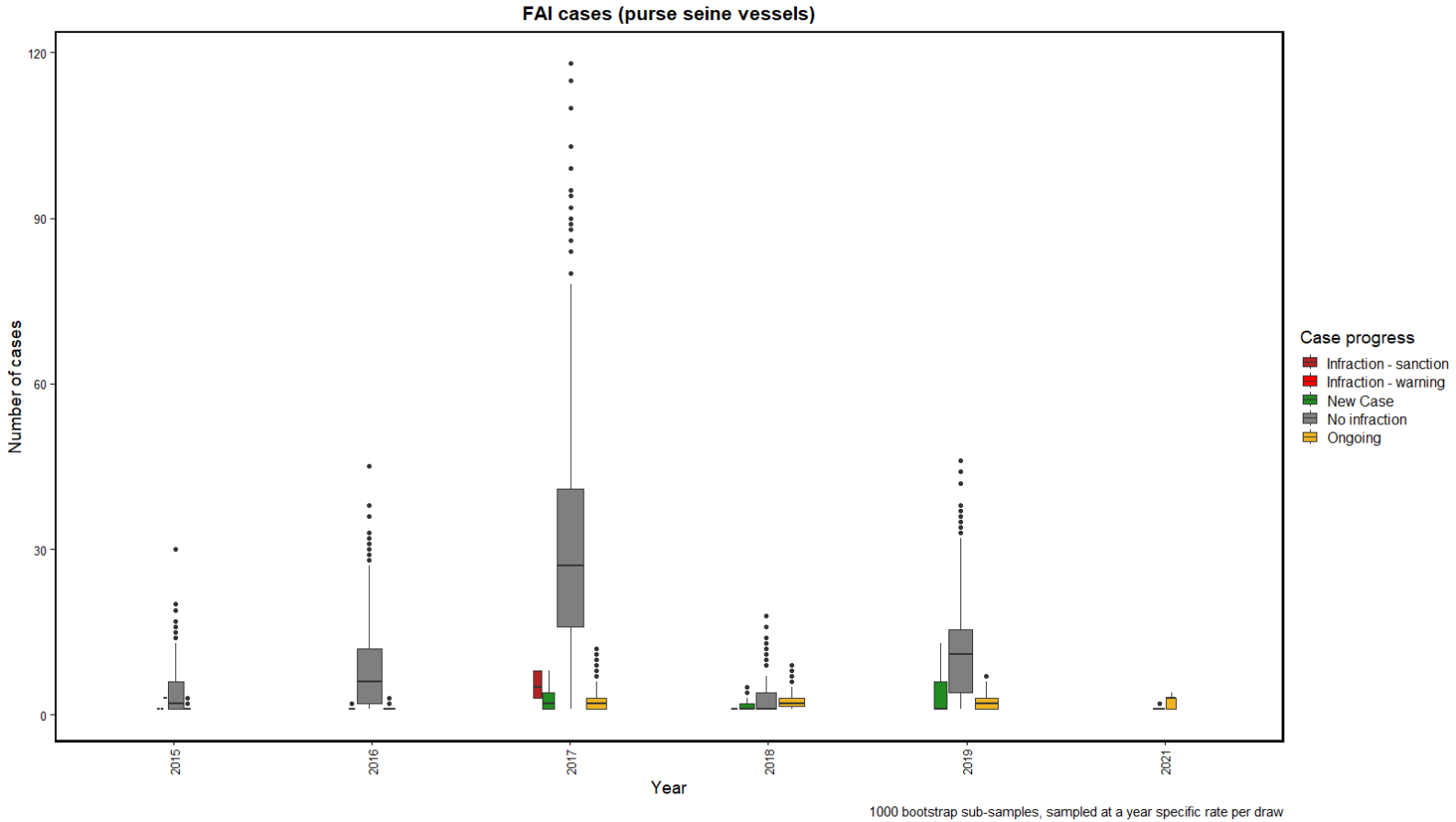

Figure 16: Box plot showing FAD set management case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a year specific rate for each year.

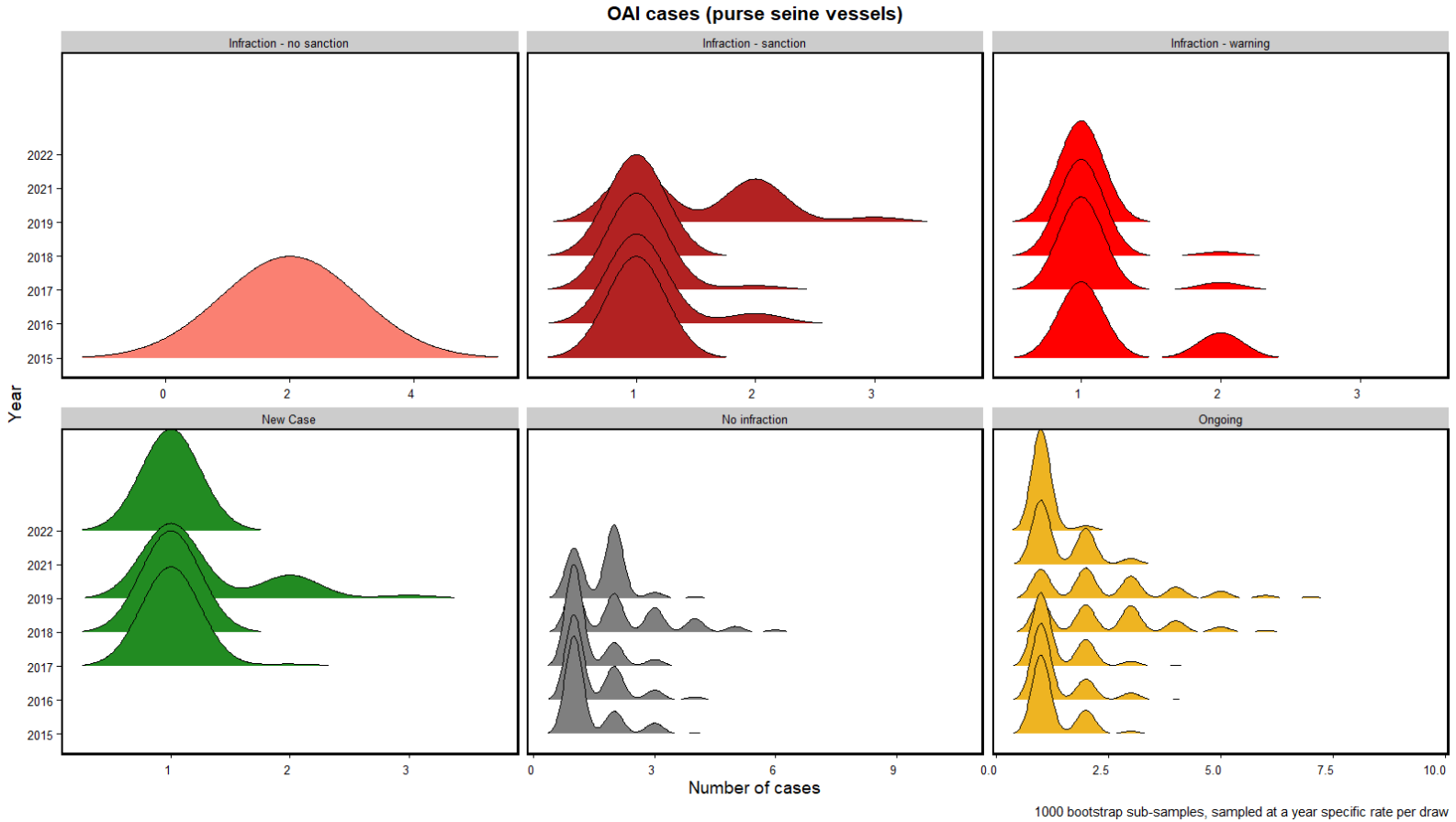

Figure 17: Ridgeline plot of observer welfare and safety case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a year specific rate for each year.

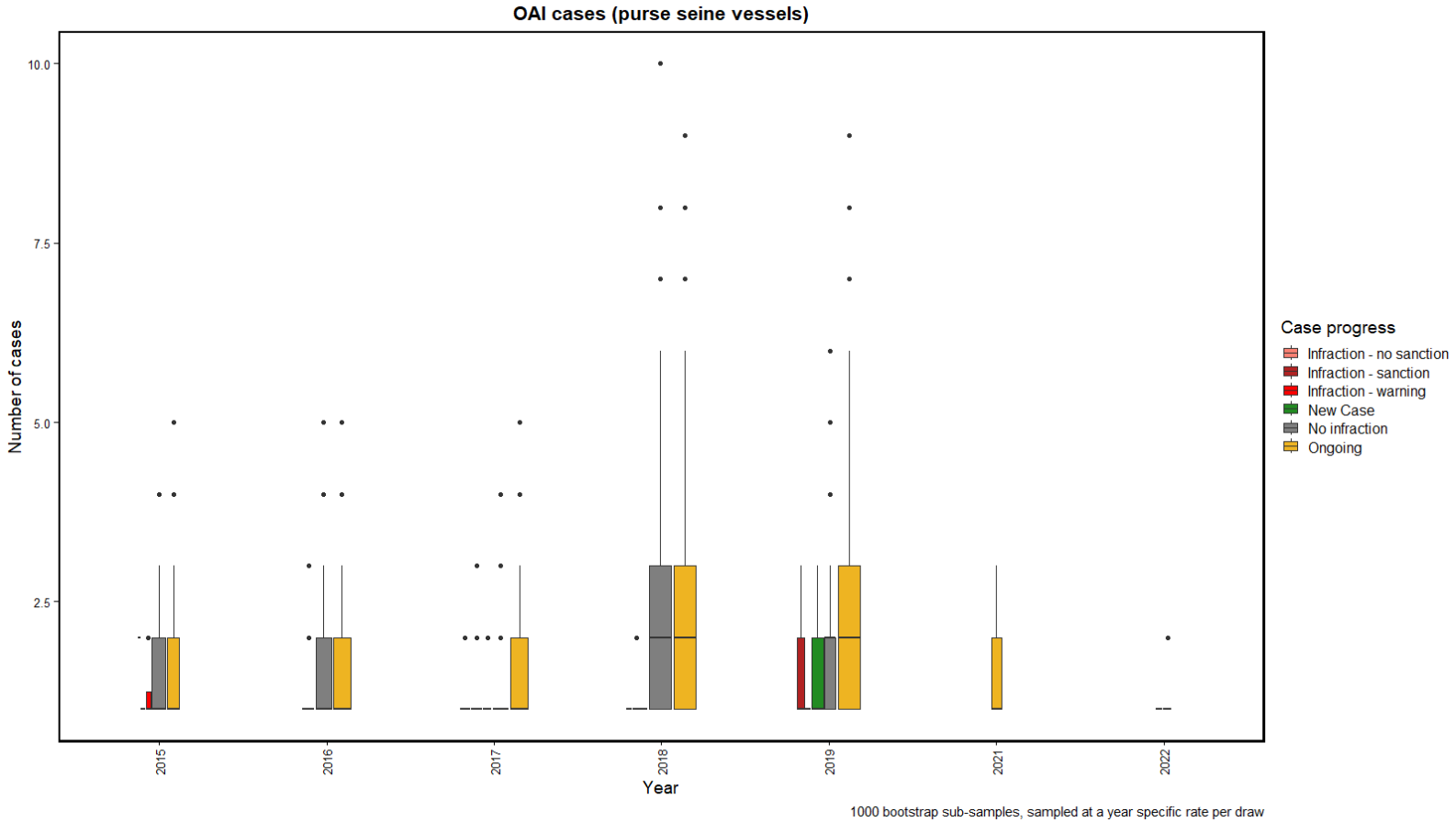

Figure 18: Box plot showing observer welfare and safety case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a year specific rate for each year.

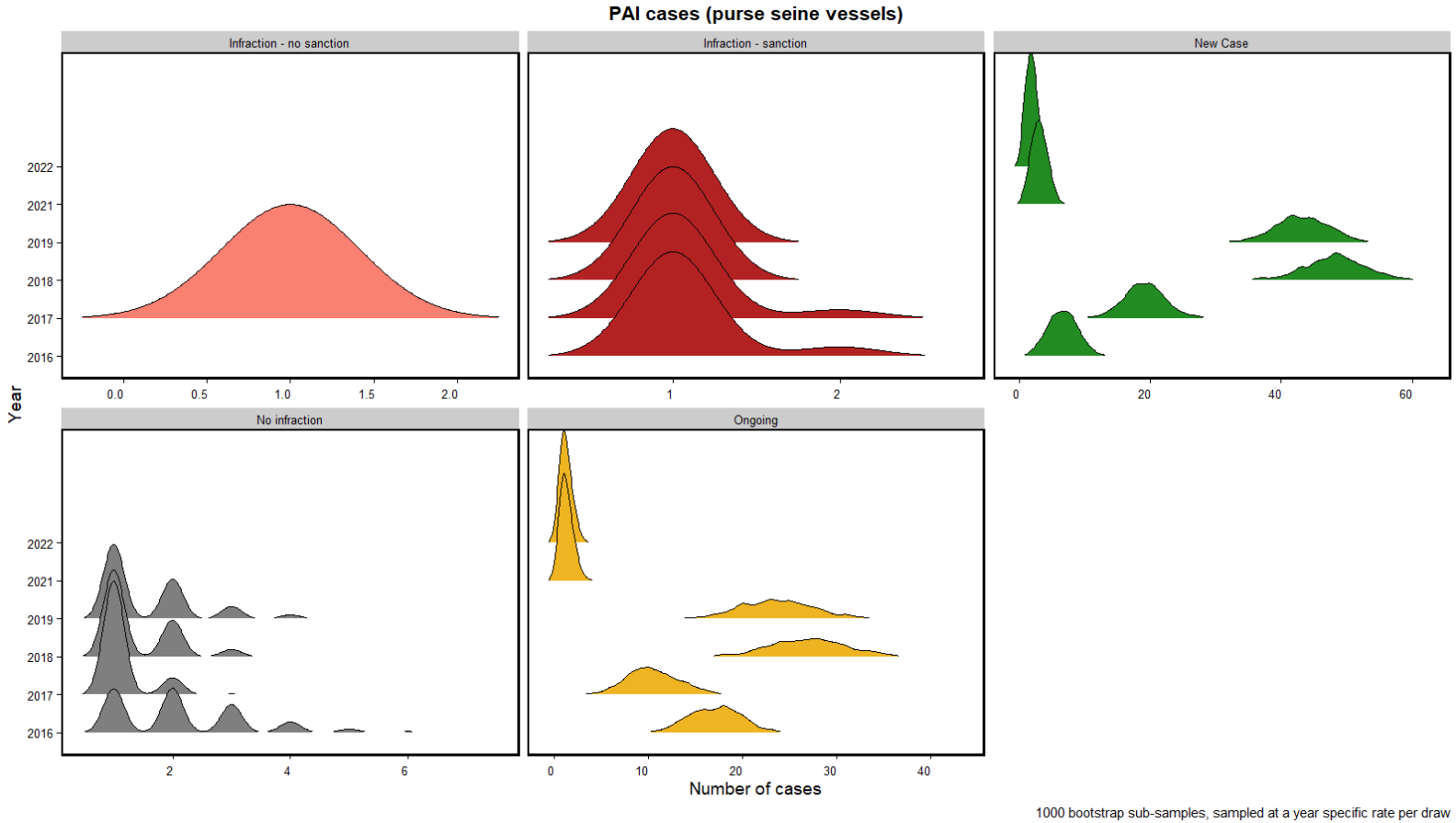

Figure 19: Ridgeline plot of ROP pre-notification case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at year specific rate for each year.

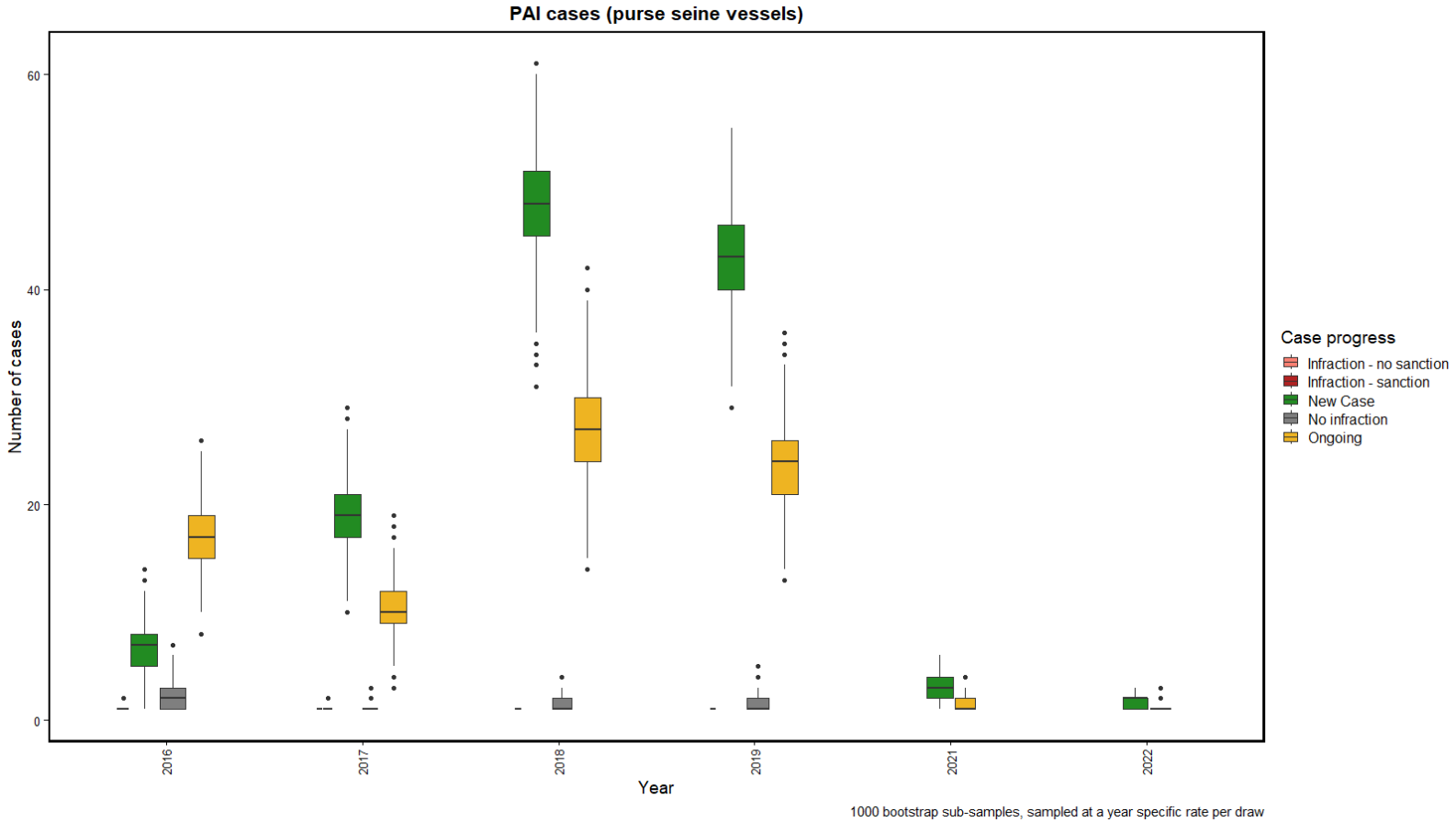

Figure 20: Box plot showing ROP pre-notification case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a year specific rate for each year.

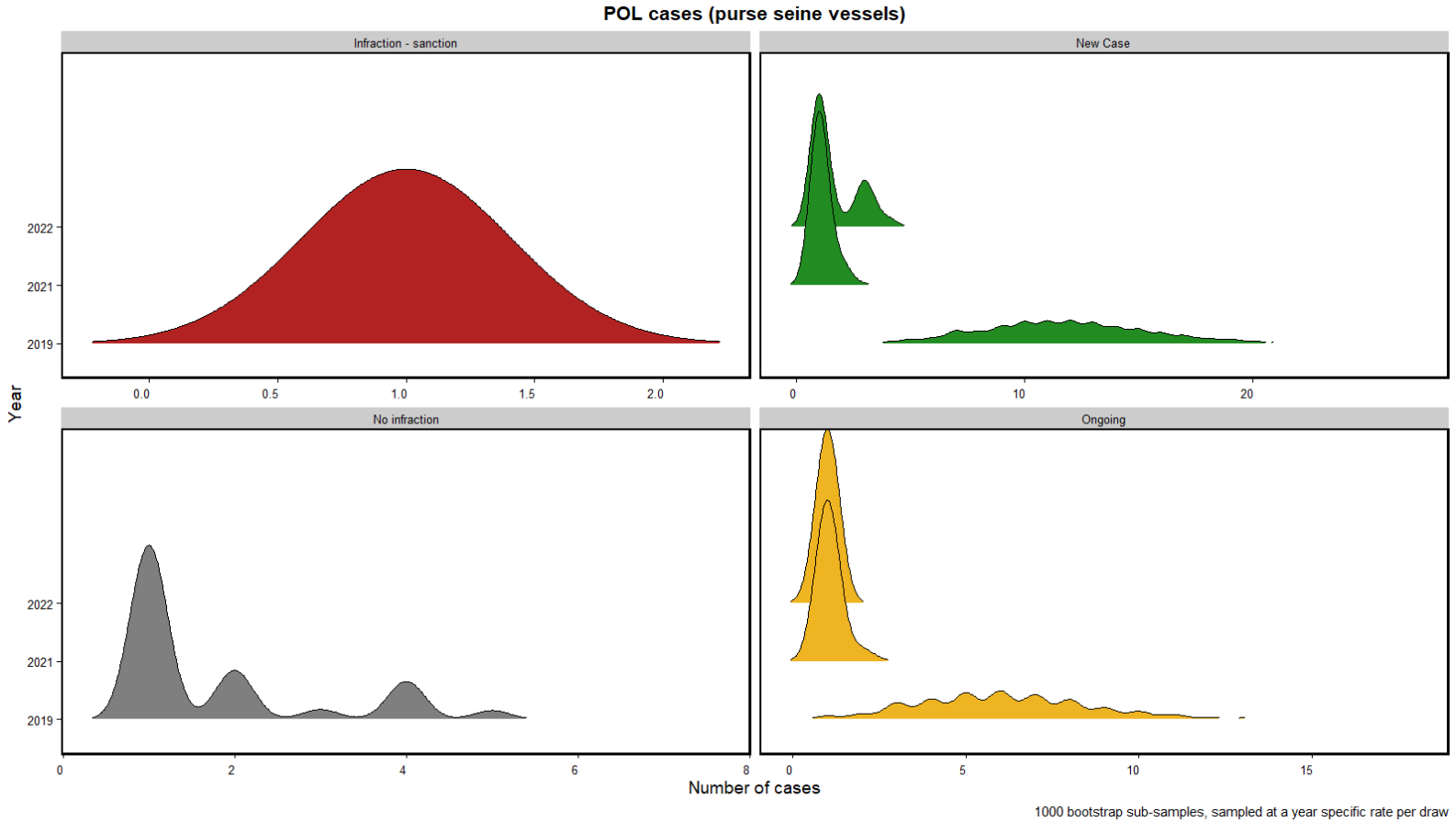

Figure 21: Ridgeline plot of marine pollution case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a year specific rate for each year.

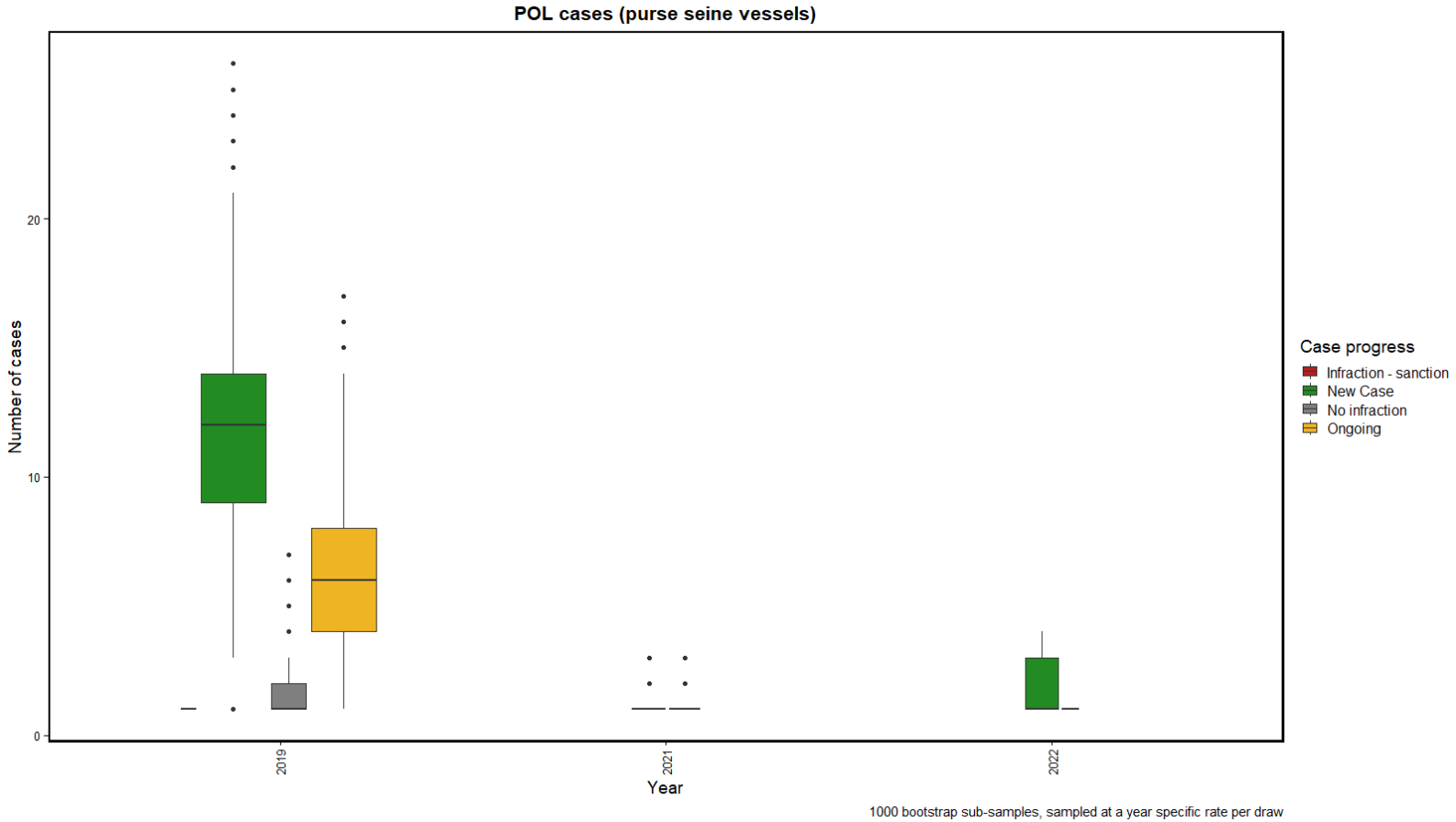

Figure 22: Box plot showing marine pollution case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at year specific rate for each year.

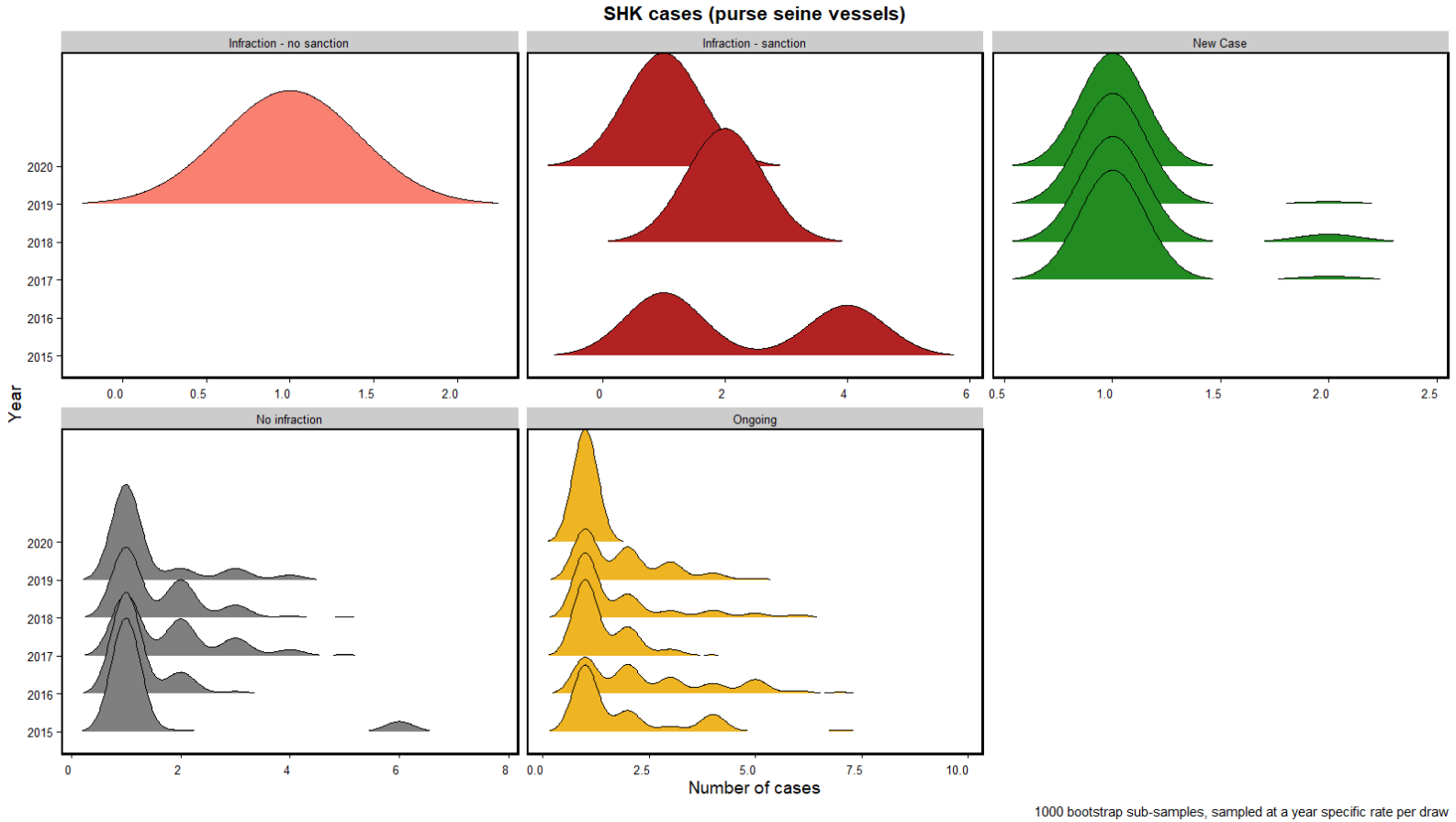

Figure 23: Ridgeline plot of shark mitigation case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a year specific rate for each year.

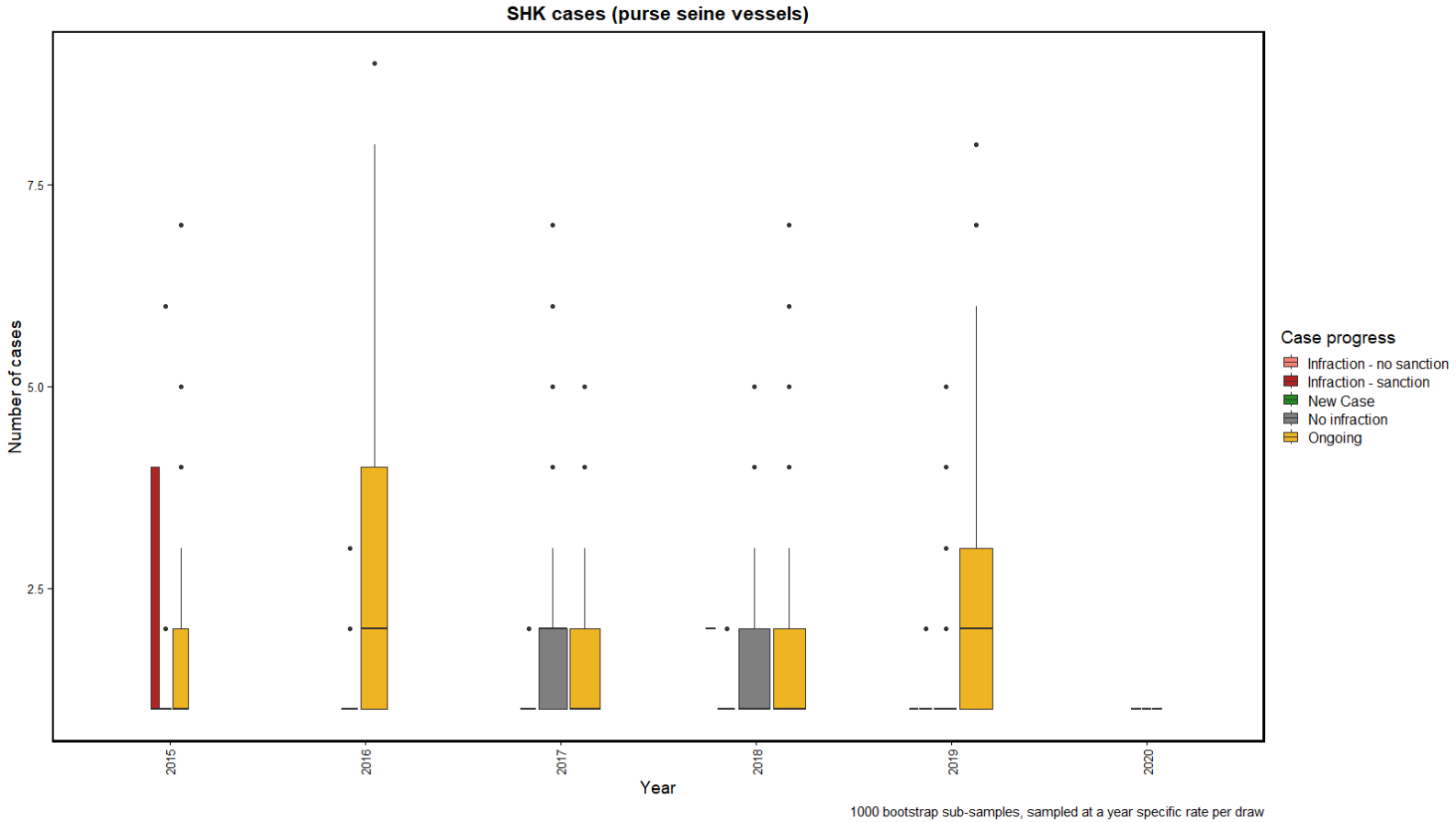

Figure 24: Box plot showing shark mitigation case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a year specific rate for each year.

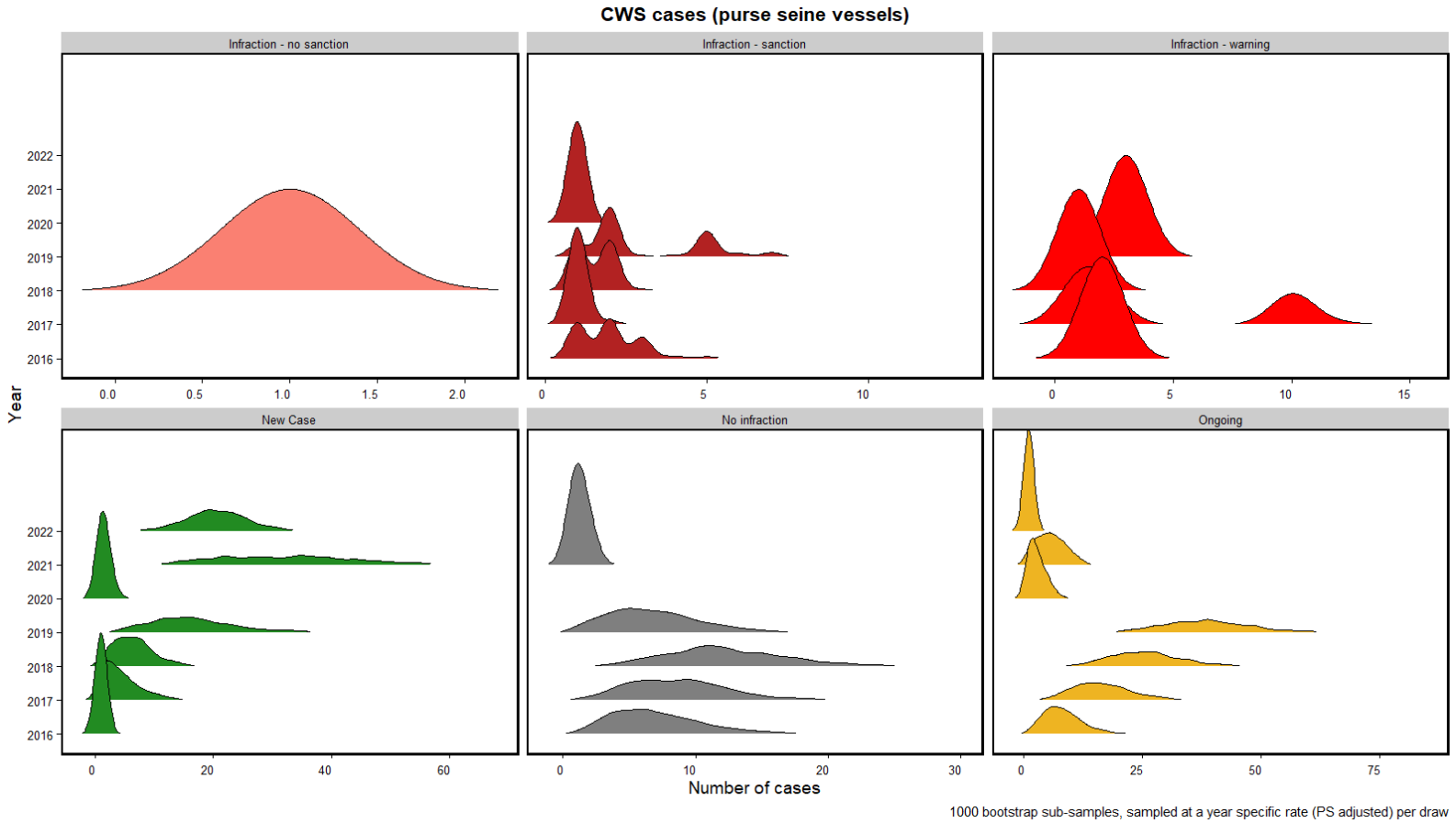

Figure 25: Ridgeline plot of cetacean protection in the purse seine fishery case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a year specific rate (adjusted for the purse seine observer coverage rate) for each year.

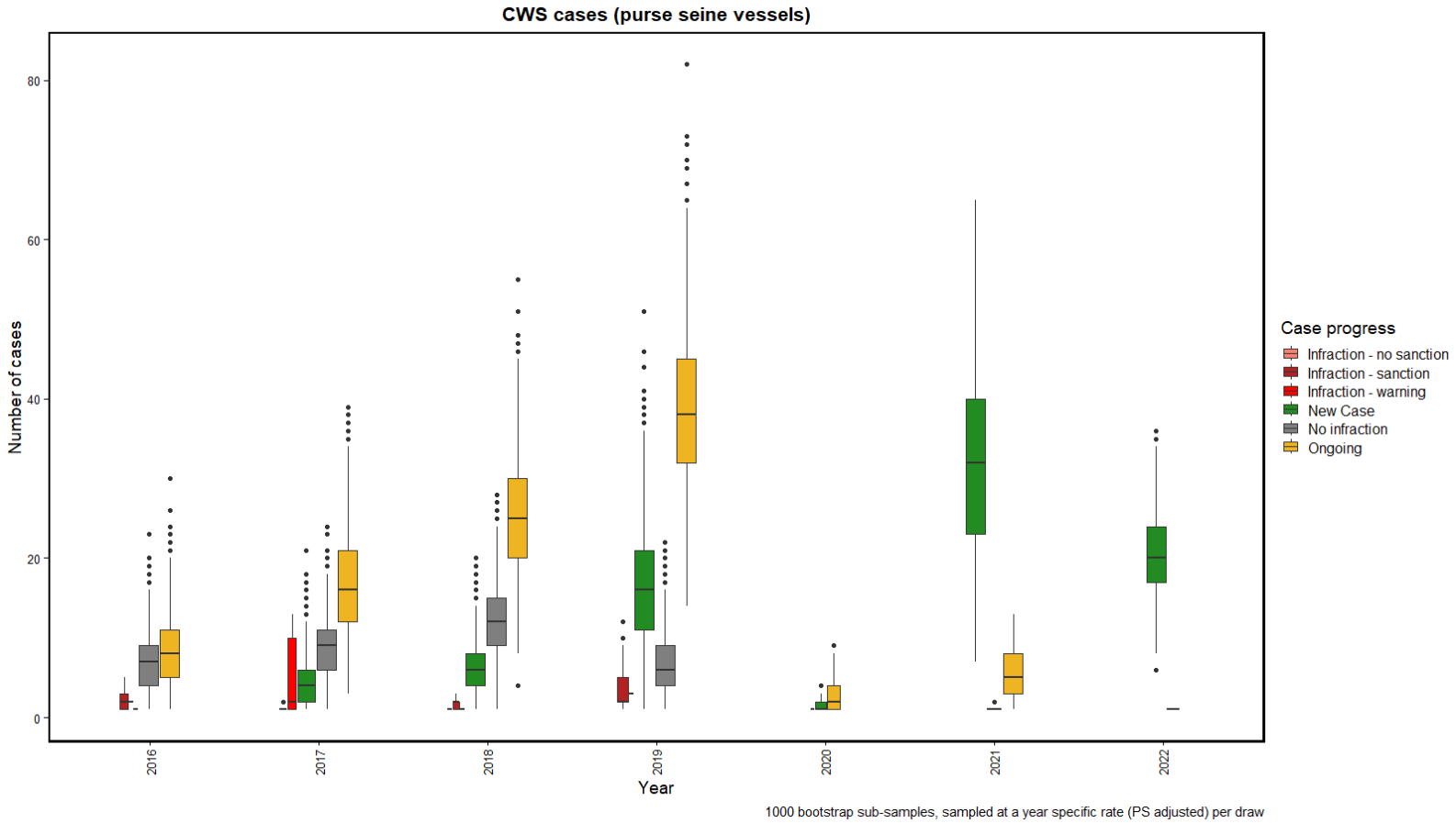

Figure 26: Box plot showing cetacean protection in the purse seine fishery case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a year specific rate (adjusted for the purse seine observer coverage rate) for each year.

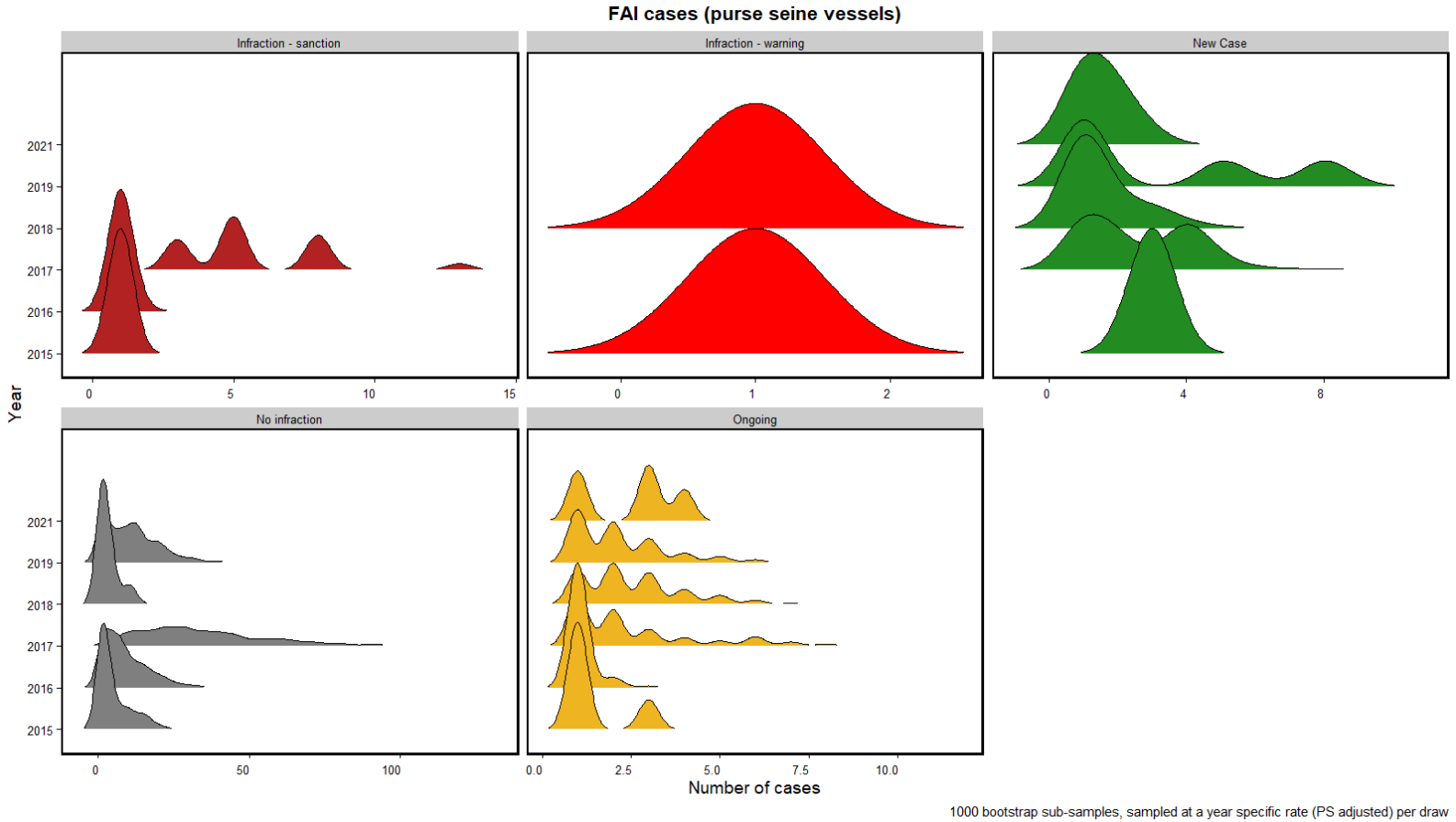

Figure 27: Ridgeline plot of FAD set management case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a year specific rate (adjusted for the purse seine observer coverage rate) for each year.

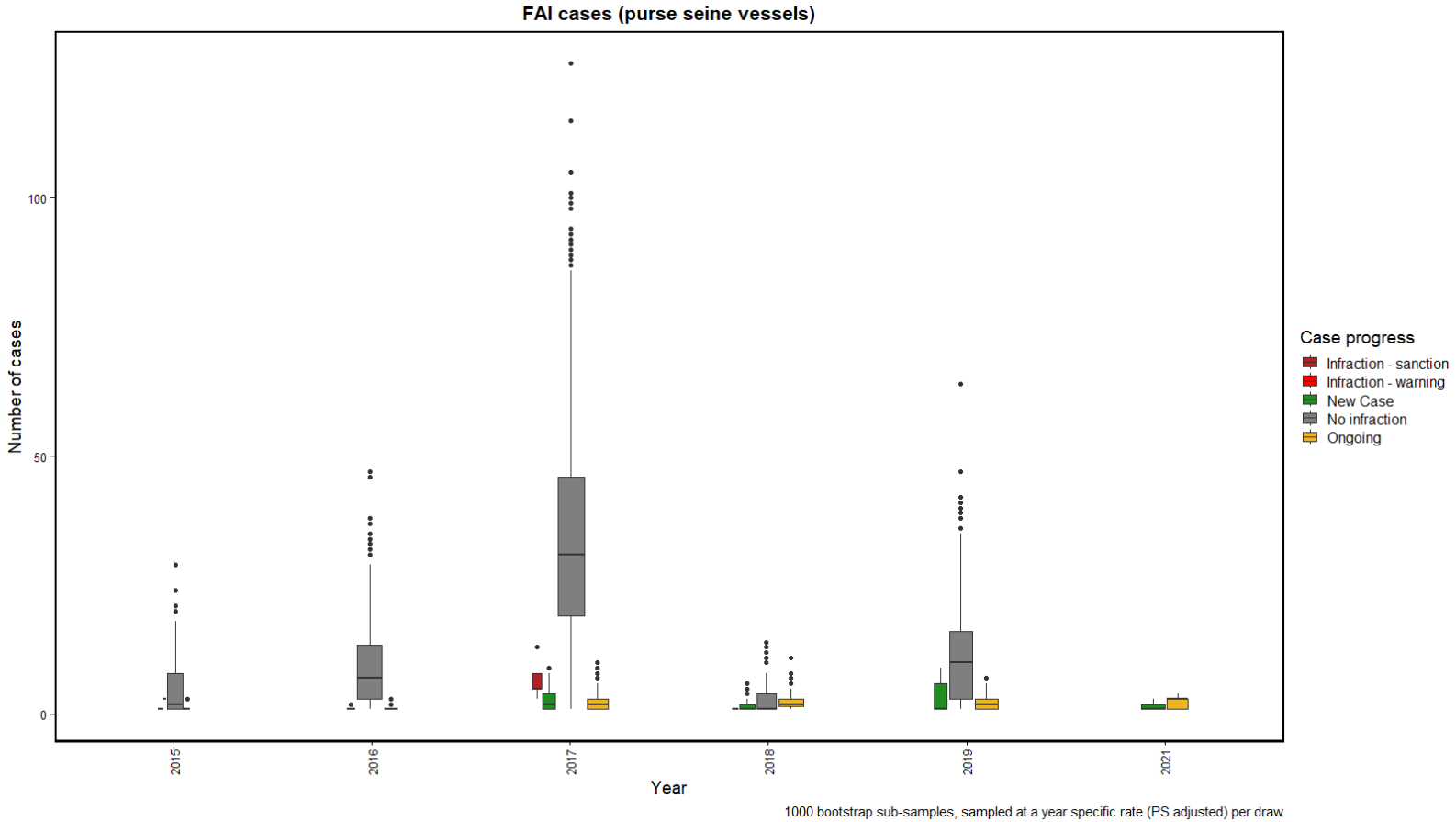

Figure 28: Box plot showing FAD set management case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a year specific rate (adjusted for the purse seine observer coverage rate) for each year.

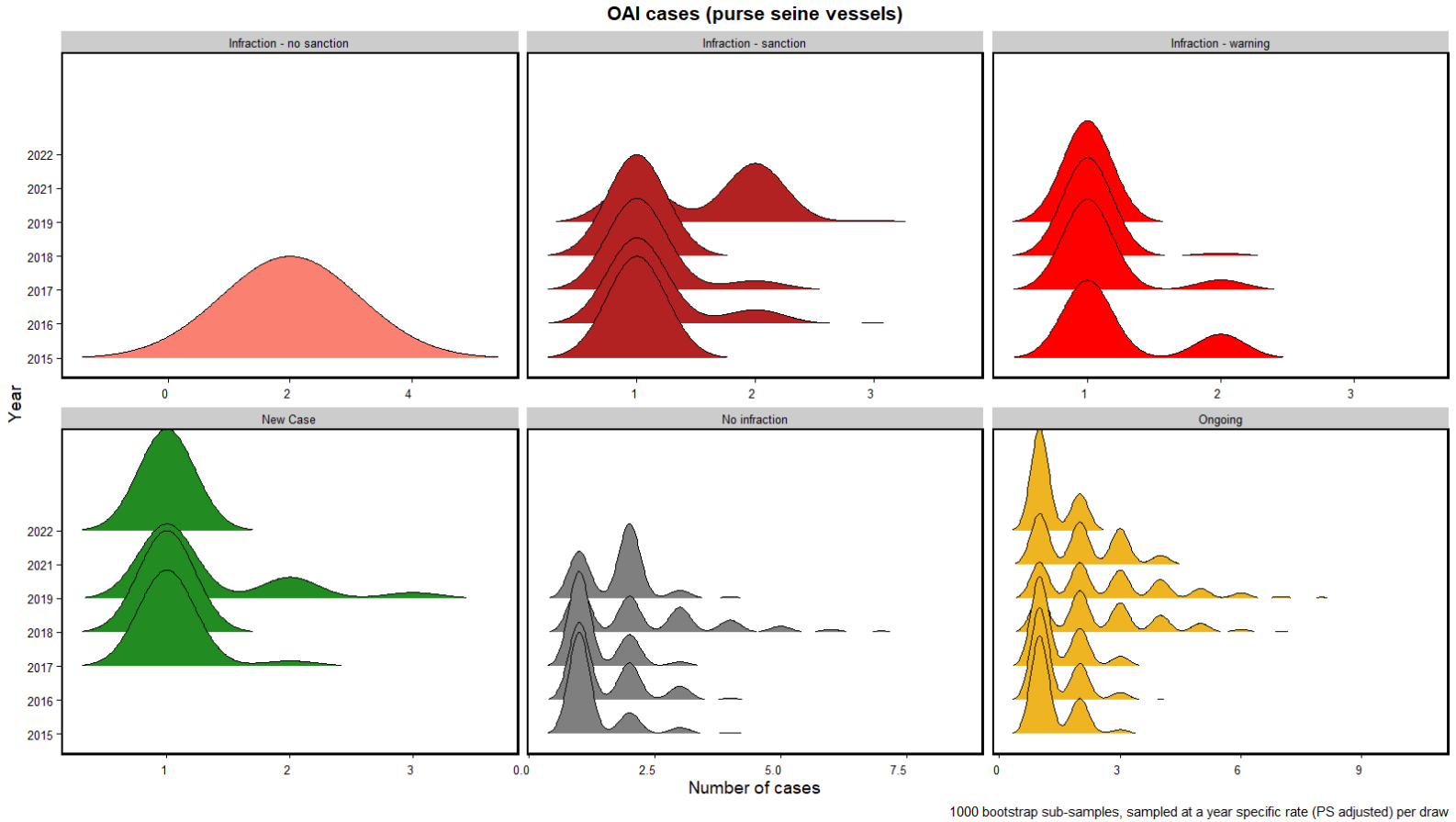

Figure 29: Ridgeline plot of observer welfare and safety case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a year specific rate (adjusted for the purse seine observer coverage rate) for each year.

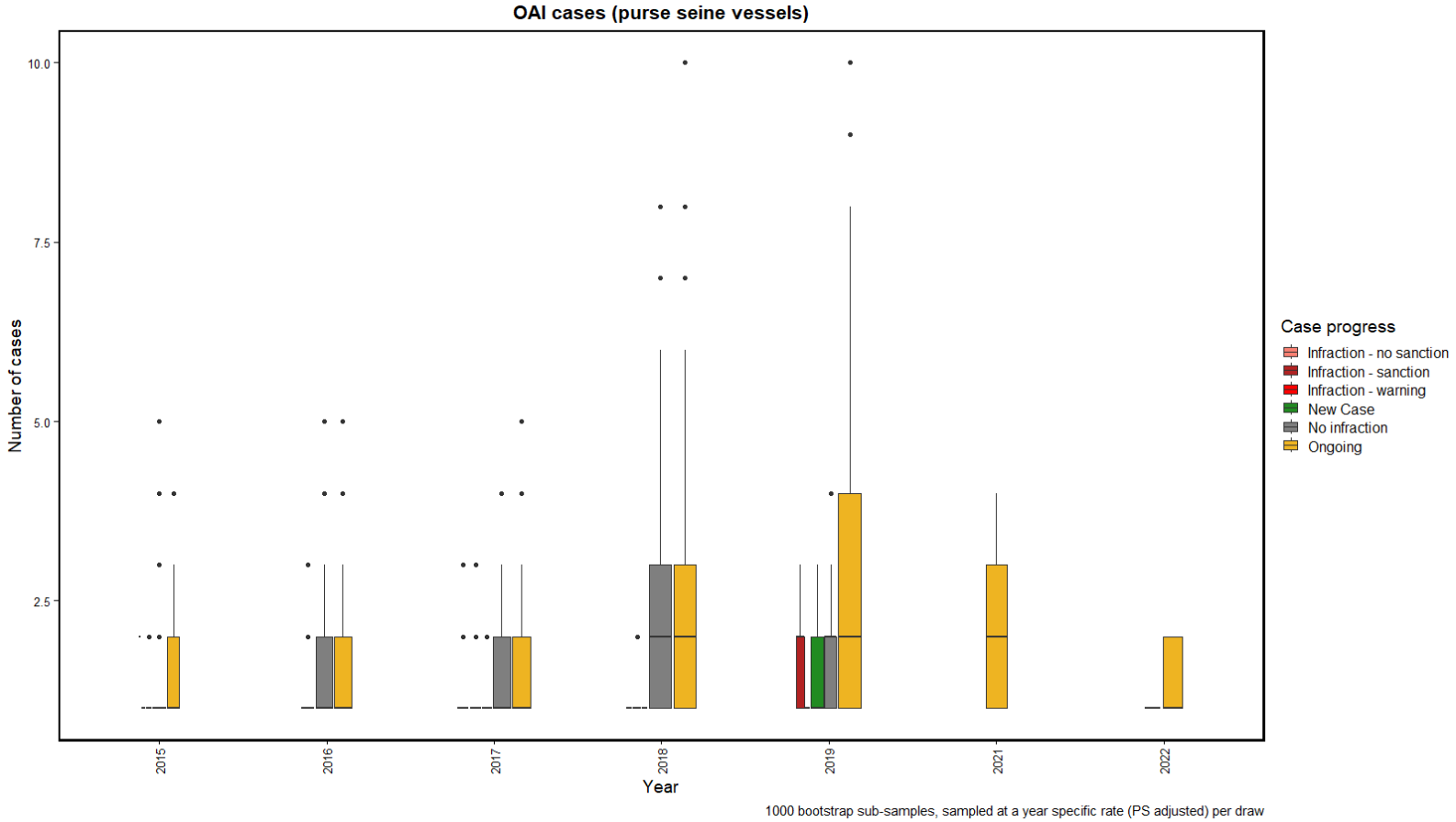

Figure 30: Box plot showing observer welfare and safety case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a year specific rate (adjusted for the purse seine observer coverage rate) for each year.

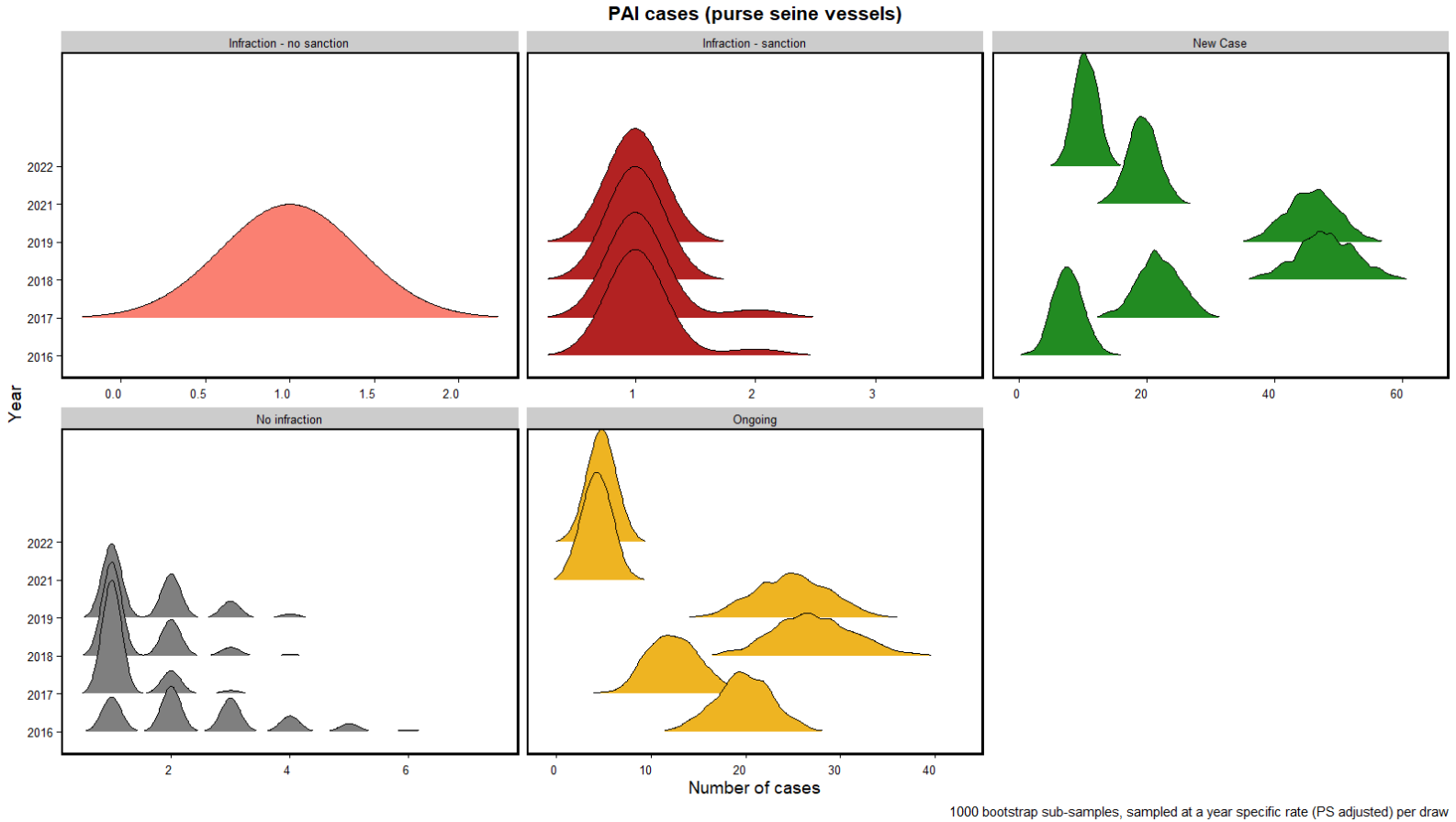

Figure 31: Ridgeline plot of ROP pre-notification case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at year specific rate (adjusted for the purse seine observer coverage rate) for each year.

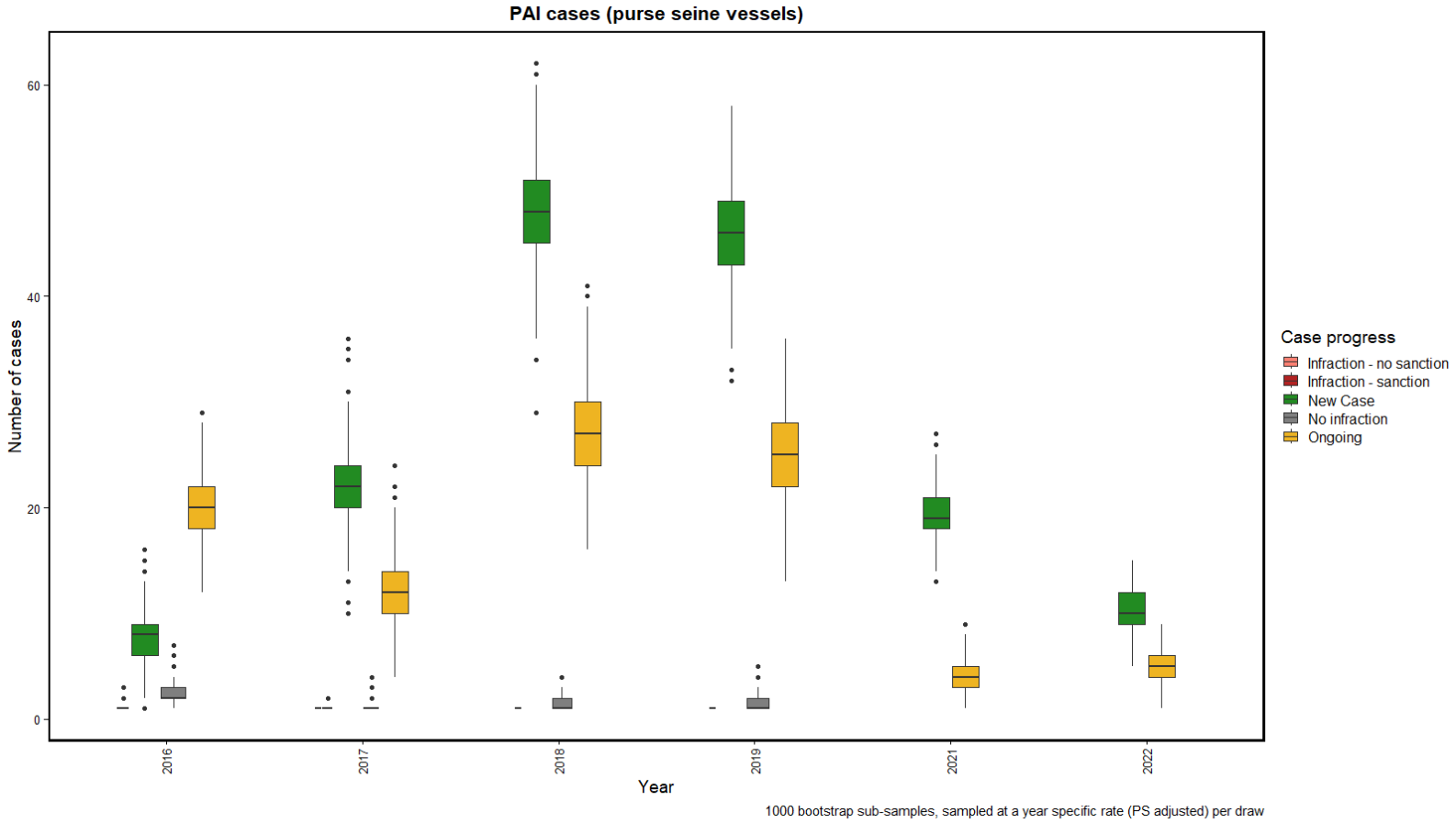

Figure 32: Box plot showing ROP pre-notification case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a year specific rate (adjusted for the purse seine observer coverage rate) for each year.

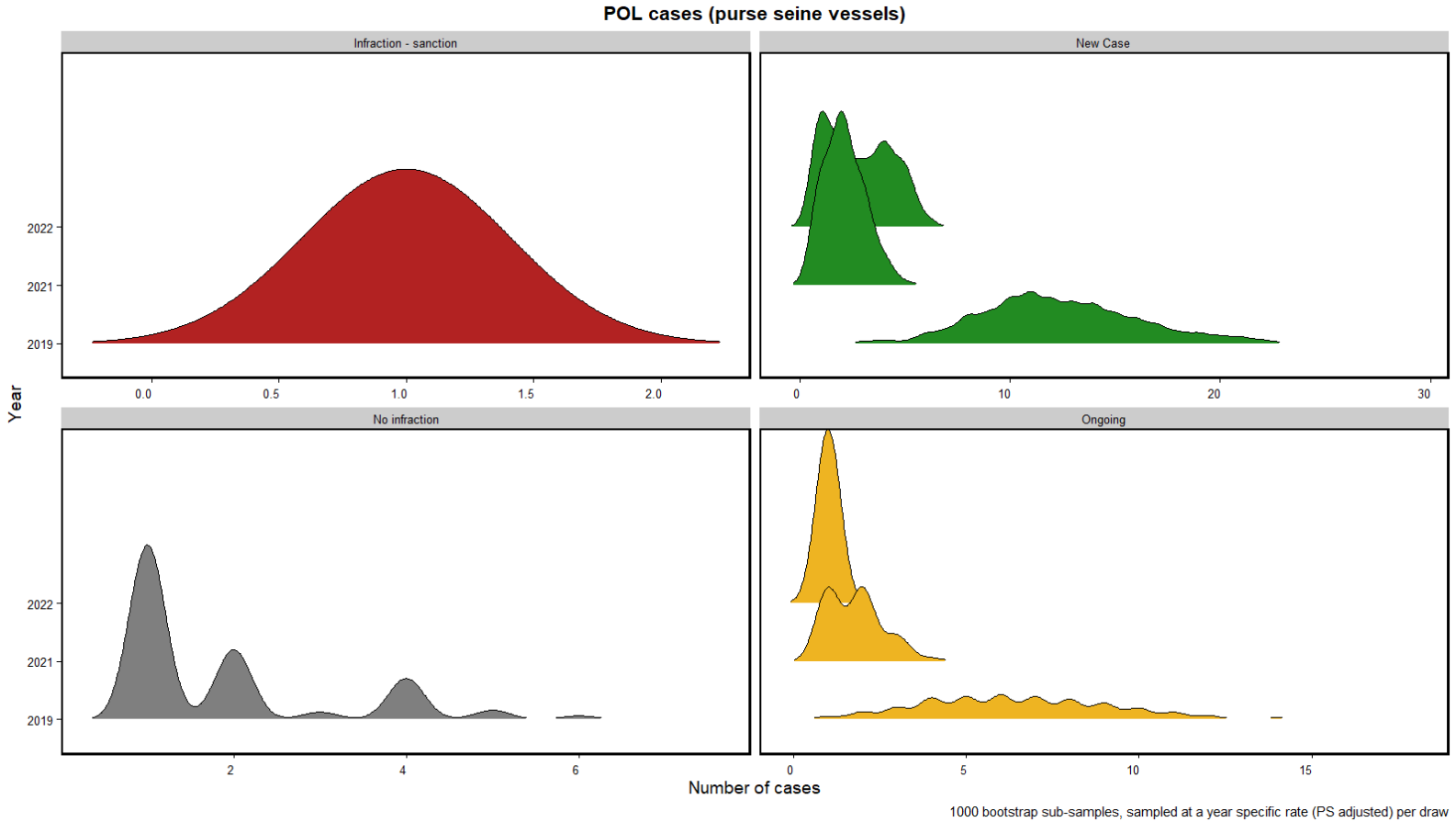

Figure 33: Ridgeline plot of marine pollution case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a year specific rate (adjusted for the purse seine observer coverage rate) for each year.

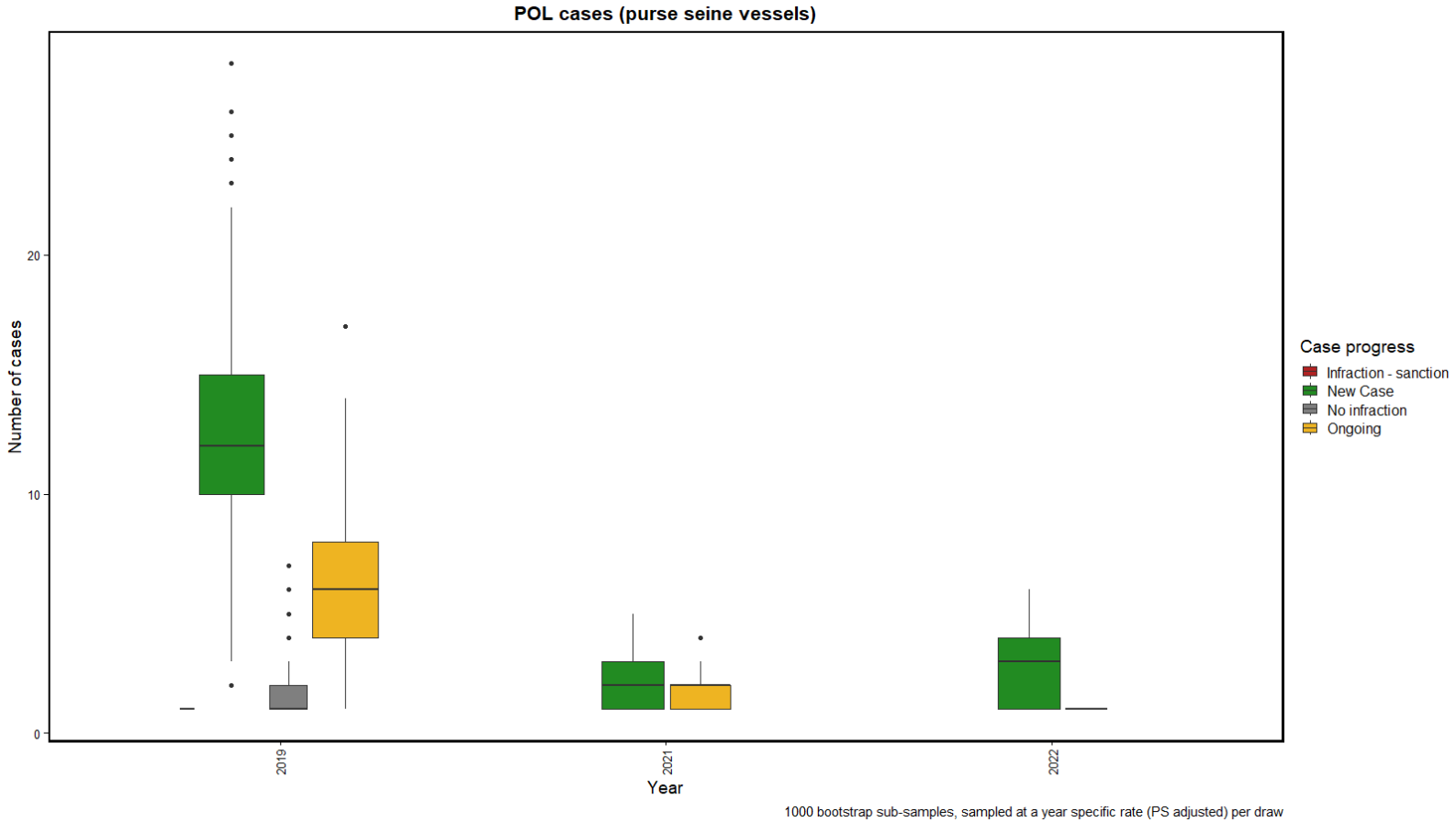

Figure 34: Box plot showing marine pollution case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at year specific rate (adjusted for the purse seine observer coverage rate) for each year.

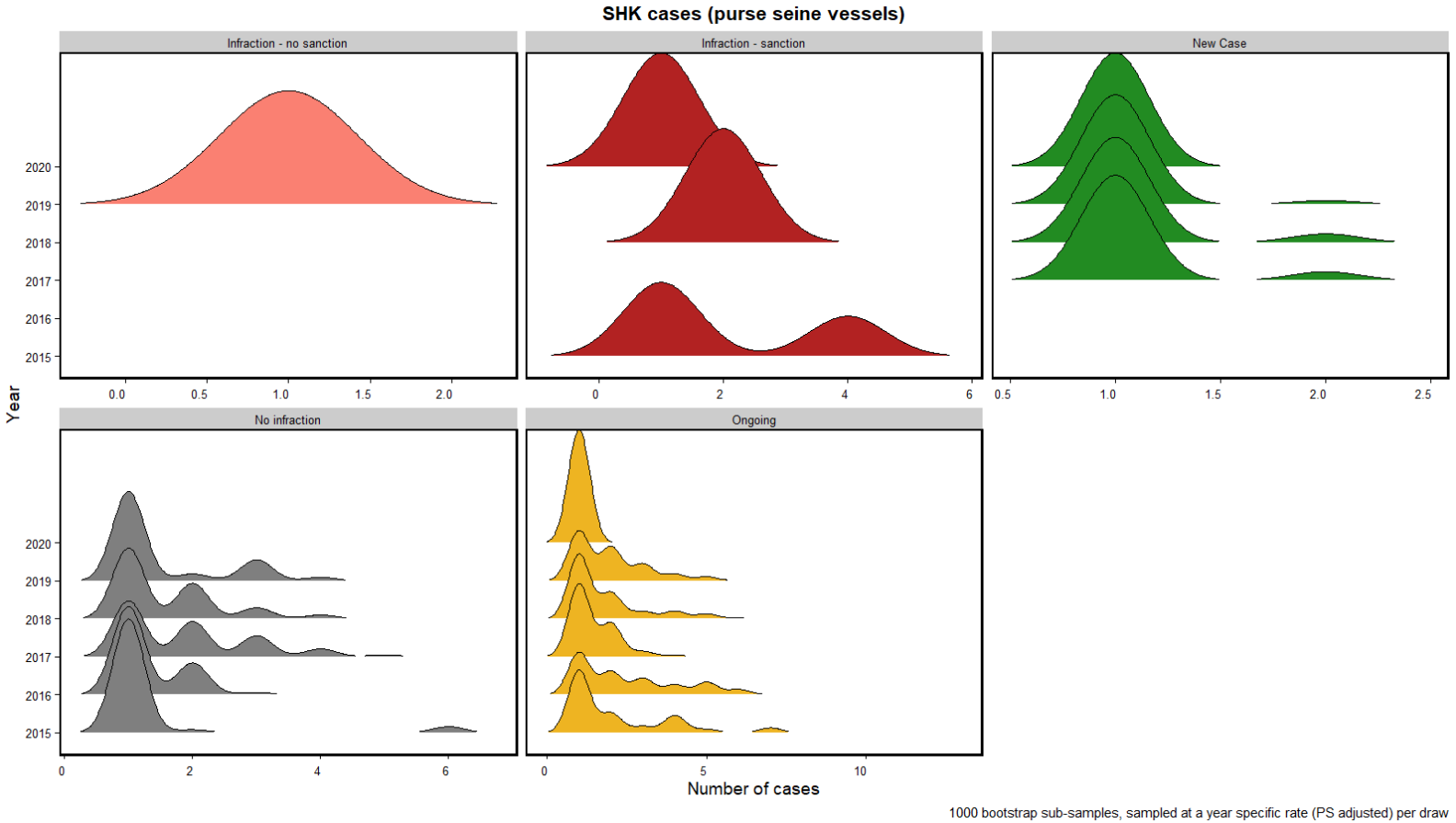

Figure 35: Ridgeline plot of shark mitigation case numbers from individual bootstrapped draws of the purse seine compliance cases. Draws were selected at a year specific rate (adjusted for the purse seine observer coverage rate) for each year.

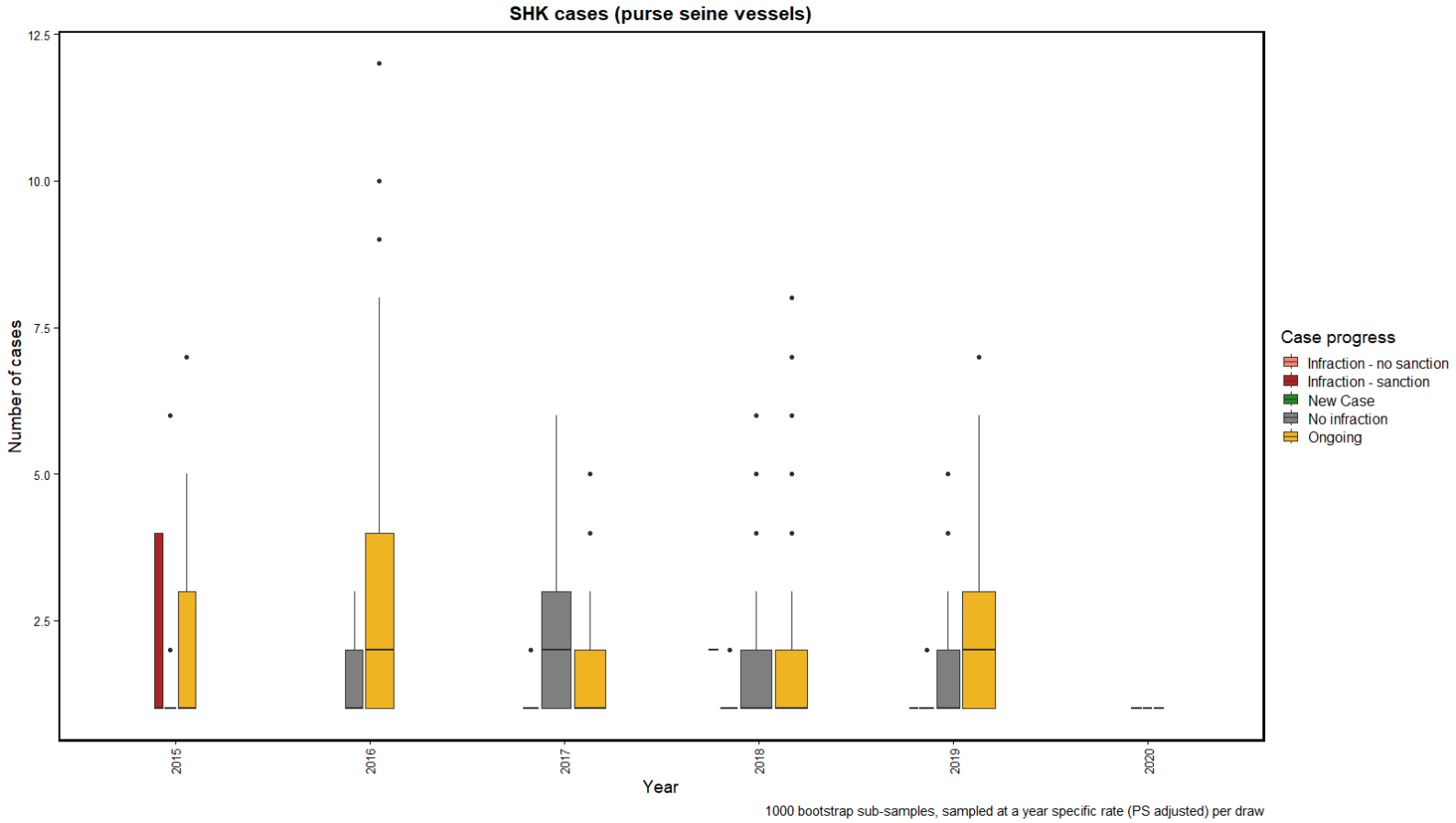

Figure 36: Box plot showing shark mitigation case numbers from individual bootstrapped draws of the purse seine compliance cases by year. Draws were selected at a year specific rate (adjusted for the purse seine observer coverage rate) for each year.