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Analysis of the small-scale fleet's coverage under two sampling strategies: from the DCR stock-based to the DCF concurrent sampling in the Northern Spanish coastal gillnets fleet

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ABSTRACT

The Northern Spanish coastal small scale fleet represents a major challenge for sampling due to the multi-species and multi-gear character and the complexity of the fleets' dynamics. Particularly, the small-scale gillnets called "beta" (GNS_DEF_60-79_0_0) represents a complex Spanish métiers in terms of catches, effort, geographical distribution and the number of exploited species. Comparison of data obtained in 2008, under a stock-based approach, versus concurrent sampling realized in 2014 resulted in the increase of the information obtained and provided to ICES without detected failures in data quality. Concurrent sampling could represent a source of information for small-scale fisheries which often target a set of coastal species some of which are presently unassesed.

Keywords: onshore sampling, small-scale, concurrent sampling

The Northern Spanish coastal gillnets fleet

Small-scale fisheries present a major challenge for sampling programmes due to the number of boats, the large number of fishing operations, the diversity and variability of gears and the number of species caught.

The small-scale gillnets called "beta" (GNS_DEF_60-79_0_0) which operates along the ICES Divisions VIIIc and the north component of the IXa represents a complex Spanish métiers in terms of catches (1850 t in 2014; Figure 1), effort (23341 trips), geographical distribution (Fig. 2 and 3) and the number of exploited species. This net has a general mesh size of 60 mm, extended to 80 mm when targeting sole and hake (Spanish Royal Decree RD 410/2001). Each piece of netting can reach a maximum length of 50 meters and a maximum height of 3 meters, while the maximum total length of the gear is 4,500 meters. It is set at depths shallower than

150 m therefore is mainly used to catch coastal species, targeting hake, red mullet and other species from the families Labridae, Triglidae or Scorpaenidae. There is a multitude of variations of this gear, which adapts well to both topographical and oceanic conditions (Abad et al.).

Changes in the sampling strategy

Implementation of new data collection procedures in the market sampling following EU Data Collection Framework (DCF) provisions in 2009 led to significant changes in the sampling programmes. From a stock-based approach, sampling design moved to a métier-based scheme where species had to be sampled "concurrently", i.e., all species measured in every sampling event. Concurrent sampling strategy was conceived to facilitate the existing data demands as well as serving the needs for future fishery based management and ecosystem approach. New benefits, as an increase in the information collected (mostly number of species) and the sampling coverage for those sampled, were expected from the new procedures. However, after some years of implementation, the concurrent sampling has proven to be not well-known by end-users (ICES 2015a), generating some controversial points of view regarding the new information provided, including quality, utility and the associated costs.

The approach adopted here is to compare, under statistical and logistical perspectives, the length data compiled for the Northern Spanish small-scale gillnet fleet before and after the concurrent sampling implementation. Concurrent sampling could represent a valuable source of information for small-scale fisheries which often target a set of coastal species some of them presently unassesed. The current implementation of the concurrent strategy is also discussed to consider changes needed.

Sampling coverage for "betas"

Analysis are based on market sampling length information from the Northern Spanish small-scale gillnets ("betas") collected by IEO during 2008 and 2014. Dataset from 2008 includes information from two Galician ports (Finisterre and Muros) where a stock-based sampling was carried out for hake (*Merluccius merluccius*). The 2014 "betas" data derive from the full concurrent sampling carried out in the same Galician ports, as well as Cantabrian ports (Aviles/Gijón). The sampling frame was stratified by quarter with a systematic monthly allocation of effort. Overall dataset contains sampling information from 195 trips (74 trips from 2008 and 121 from 2014).

Results and Discussion

Results showed a high increase in the number of species measured, from 1 species in 2008 to 48 species in 2014 (Figure 4). However, the 2014 length data are concentrated in a set of 6 species surpassing 500 individuals measured and accounting for the 90% of the total individuals: hake, pouting *(Trisopterus luscus),* Atlantic horse mackerel *(Trachurus trachurus),* striped red mullet *(Mullus surmuletus),* axillary seabream *(Pagellus acarne)* and Atlantic mackerel *(Scomber scombrus*). Total number of lengths rose 176% due to an increase in the number of trips sampled and an overall increase in the number of lengths by trip (Figure 5). Considering hake, the average number of lengths by trip decreased in 2014 while the median is

similar. Both, the third and specially the first quartile, are smaller in 2014 (Figure 6) as a result of not carrying a species-driven selection of trips. Random selection of trips within the betas fishing activity implies hake landings may occur to be low. No failures where reported concerning this in 2014.

Qualitative analysis was carried using the open-source software developed in R COST (Anon., 2008). This software allows the detection of outliers in length frequencies in the most disaggregated level through the *Delta* measure and the estimation of precision estimates (coefficient of variation: CV) for length structures according to the DCF. The qualitative analysis of hake length frequencies provided similar *Delta* values for both years (Figure 7). Same analysis on the rest of species in 2014 provided results equally robust (Figure 8). Precision estimates for hake length structures revealed better CV in 2014 while CV of the rest of species show similar levels to hake (Table 1).

As a conclusion, concurrent sampling on *betas* resulted in an important increase in the number of species and lengths measured, while the quality indicators improved slightly. The importance of the sample size (number of individuals) for trips sampled in 2008 was overestimated in the past. The number of trips (primary sampling unit) sampled and the direct estimation of CVs are seen as better quality indicators (ICES, 2014a). Besides not affecting the quality of the information collected, the concurrent sampling approach allows extending the provision of scientific fishery data to ICES for more stocks. Particularly related to the Northern Spanish coastal gillnet fleet, the respective length frequency distributions are currently provided to ICES for hake, striped red mullet, Atlantic horse mackerel and Atlantic mackerel (ICES, 2014b,c,d; ICES, 2015b). Other species with significant biometric data from Spanish "betas", as axillary seabream or pouting, are not yet assessed by ICES.

Results suggest concurrent market sampling could be optimized through a prioritization of species –not limitation by species list— by métier based on the analysis of data obtained from current implementation. This operational concurrent sampling strategy would ensure the collection of statistically robust information for key species –as required for assessment– without compromising other benefits and uses of concurrent data.

REFERENCES

Anon. 2009. Common tool for raising and estimating properties of statistical estimates derived from the Data Collection Regulation. EC service contract FISH/2006/15 lot 2. Final report COST project.

Abad, E; I. Artetxe; F. Cardador; J.Castro (coordinator); D. García; M. Marín; A. Murta; A. Punzón; I. Quincoces; M. Santurtún; C. Silva; L. Silva. 2007. Identification and segmentation of mixed -species fisheries operating in the atlantic Iberian peninsula waters. IBERMIX project (Contract Ref.: FISH/2004/03-33).

ICES. 2014a. Report of the third Workshop on Practical Implementation of Statistical Sound Catch Sampling Programmes, 19-22 November 2013, ICES HQ, Copenhagen, Denmark. ICES CM2013/ACOM:54. 109 pp.

ICES. 2014b. Report of the Working Group on Assessment of New MoU Species (WGNEW), 24–28 March 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:21. 162 pp.

ICES. 2014c. Report of the Working Group on Southern Horse Mackerel, Anchovy and Sardine (WGHANSA), 20-25 June 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:16. 599 pp.

ICES. 2014d. Report of the Report of the Working Group on Widely Distributed Stocks (WGWIDE), 26 August - 1 September 2014, ICES HQ, Copenhagen, Denmark. ICES CM 2014/ACOM:15. 938 pp.

ICES. 2015a. Report of the ICES Workshop on evaluating the implementation and statistical aspects of concurrent length sampling (WKISCON2), 16 - 19 July 2015, Sukarrieta, Spain.

ICES. 2015b. Report of the Working Group for the Bay of Biscay and the Iberian waters Ecoregion (WGBIE), 04-10 May 2015, ICES HQ, Copenhagen, Denmark.

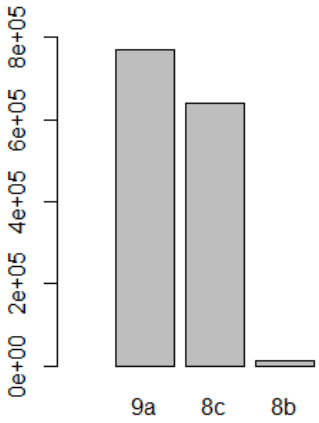


Figure 1. Total landings of "beta" by ICES Divison, 2014.

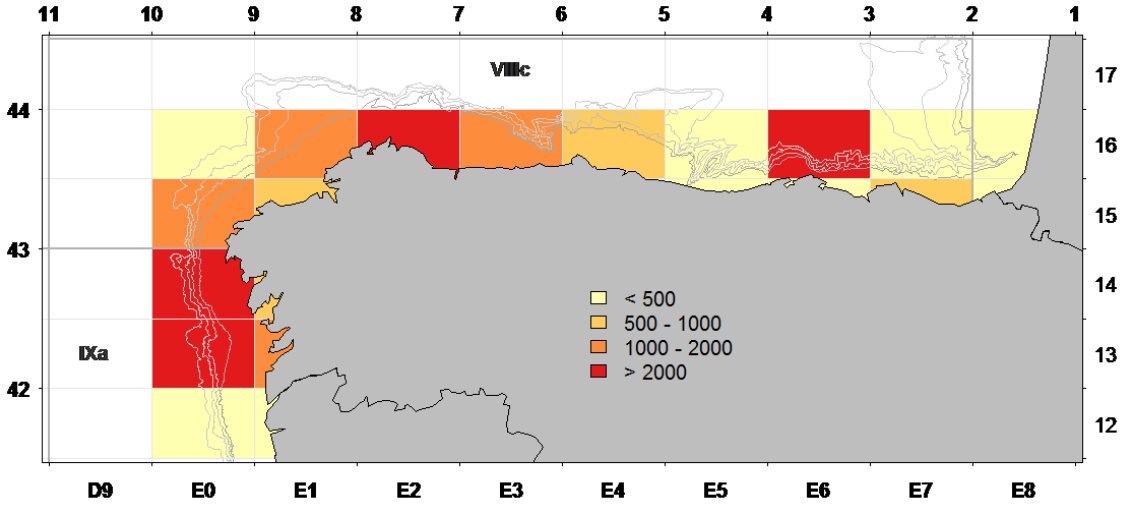


Figure 2. Distribution of landings of "beta" by statistical rectangle, 2014.

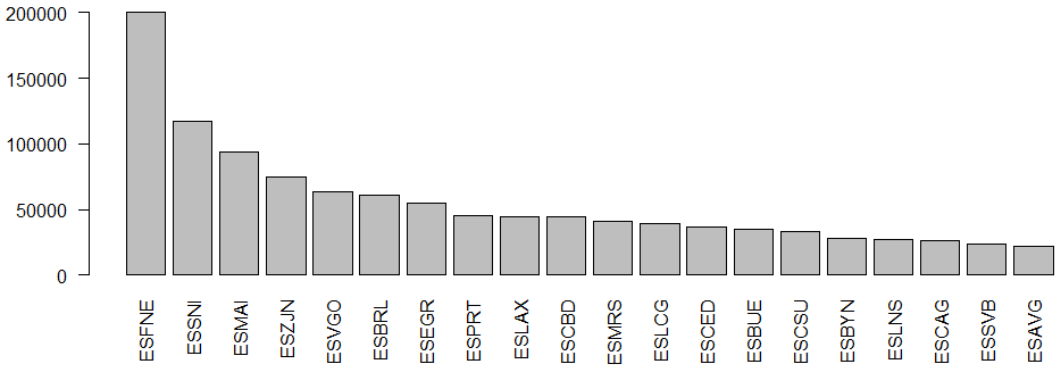
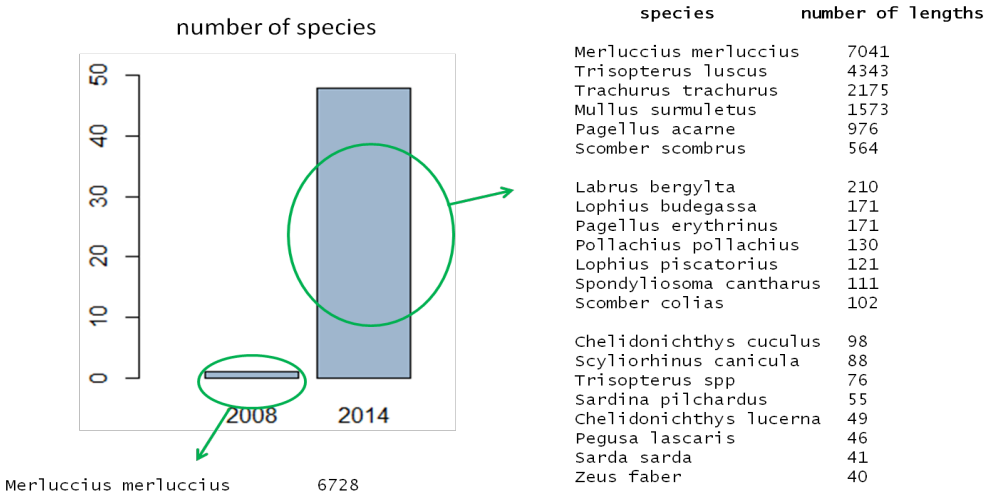


Figure 3. Distribution of landings of "beta" by port, 2014.



species	number of lengths
Merluccius merluccius	7041
Trisopterus luscus	4343
Trachurus trachurus	2175
Mullus surmuletus	1573
Pagellus acarne	976
Scomber scombrus	564
Labrus bergylta	210
Lophius budegassa	171
Pagellus erythrinus	171
Pollachius pollachius	130
Lophius piscatorius	121
Spondyliosoma cantharus	111
Scomber colias	102
Chelidonichthys cuculus	98
Scyliorhinus canicula	88
Trisopterus spp	76
Sardina pilchardus	55
Chelidonichthys lucerna	49
Pegusa lascaris	46
Sarda sarda	41
Zeus faber	40

Figure 4. Number of species and individuals sampled.

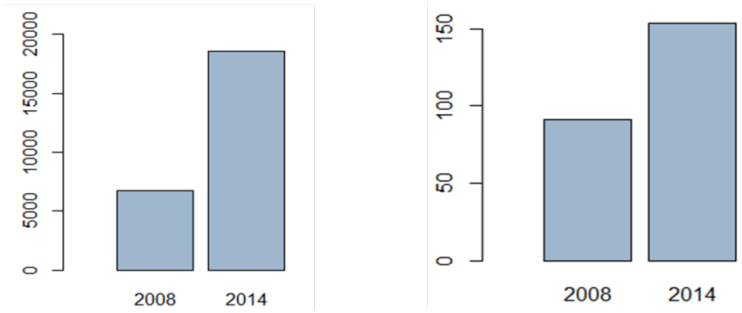


Figure 5. Total number of lengths (left) and average number of lengths by trip (right).

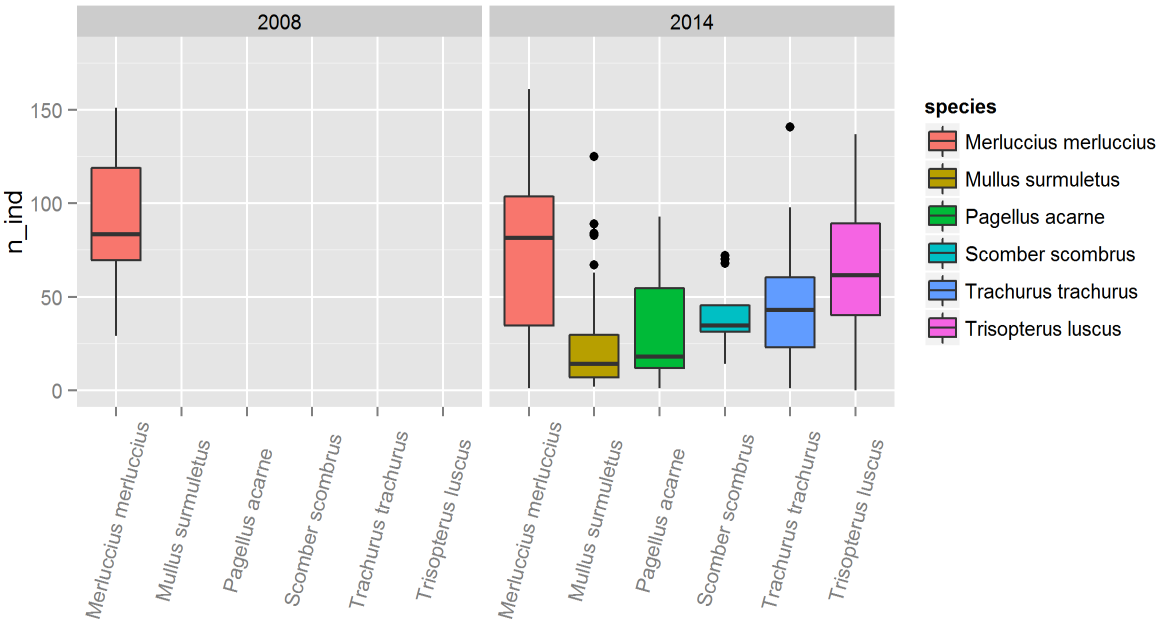


Figure 6. Number of lengths by trip.

Table 1. Cv calculation (COST) for main species.

Species	CV	
	2008	2014
Merluccius merluccius	0,276	0,219
Trachurus trachurus	-	0,331
Trisopterus luscus	-	0,185
Mullus surmuletus	-	0,153
Pagellus acarne	-	0,222
Scomber scombrus	-	0,378

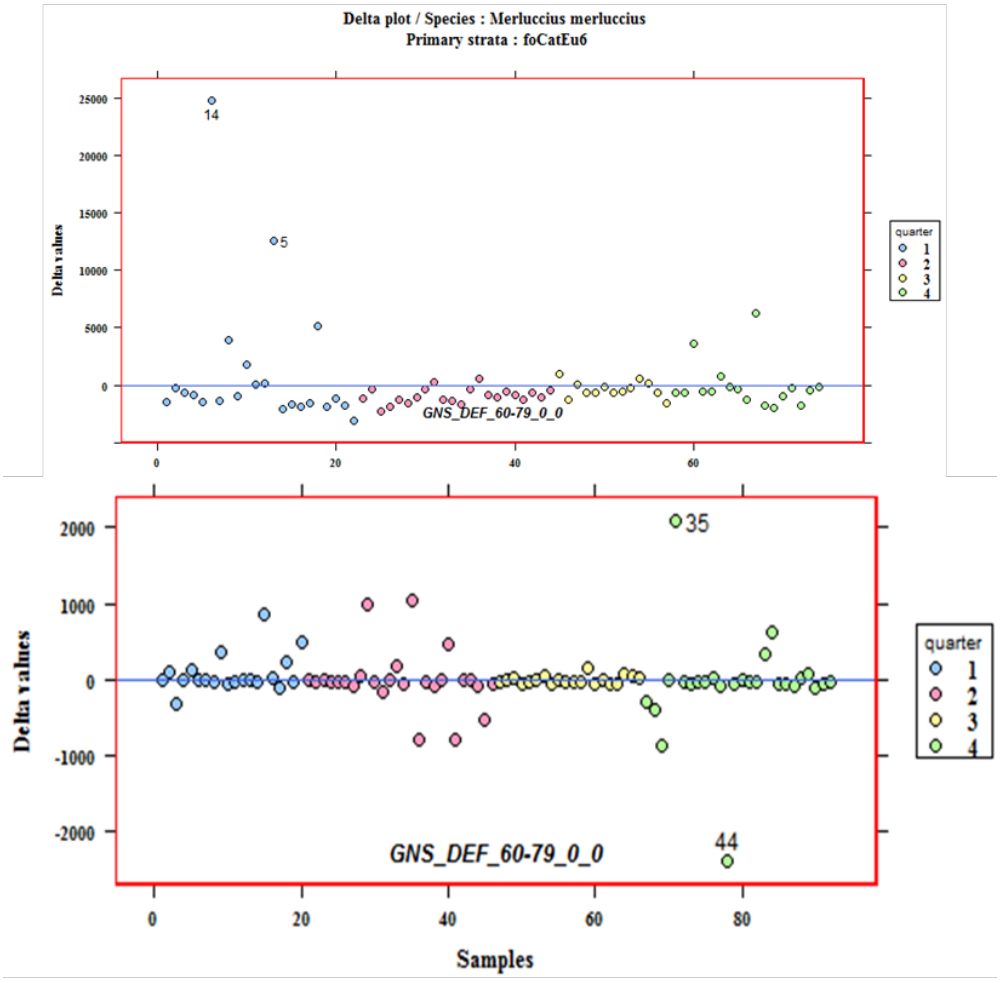


Figure 7. Graphical display of delta values for hake in 2008 (above) and 2014 (below).

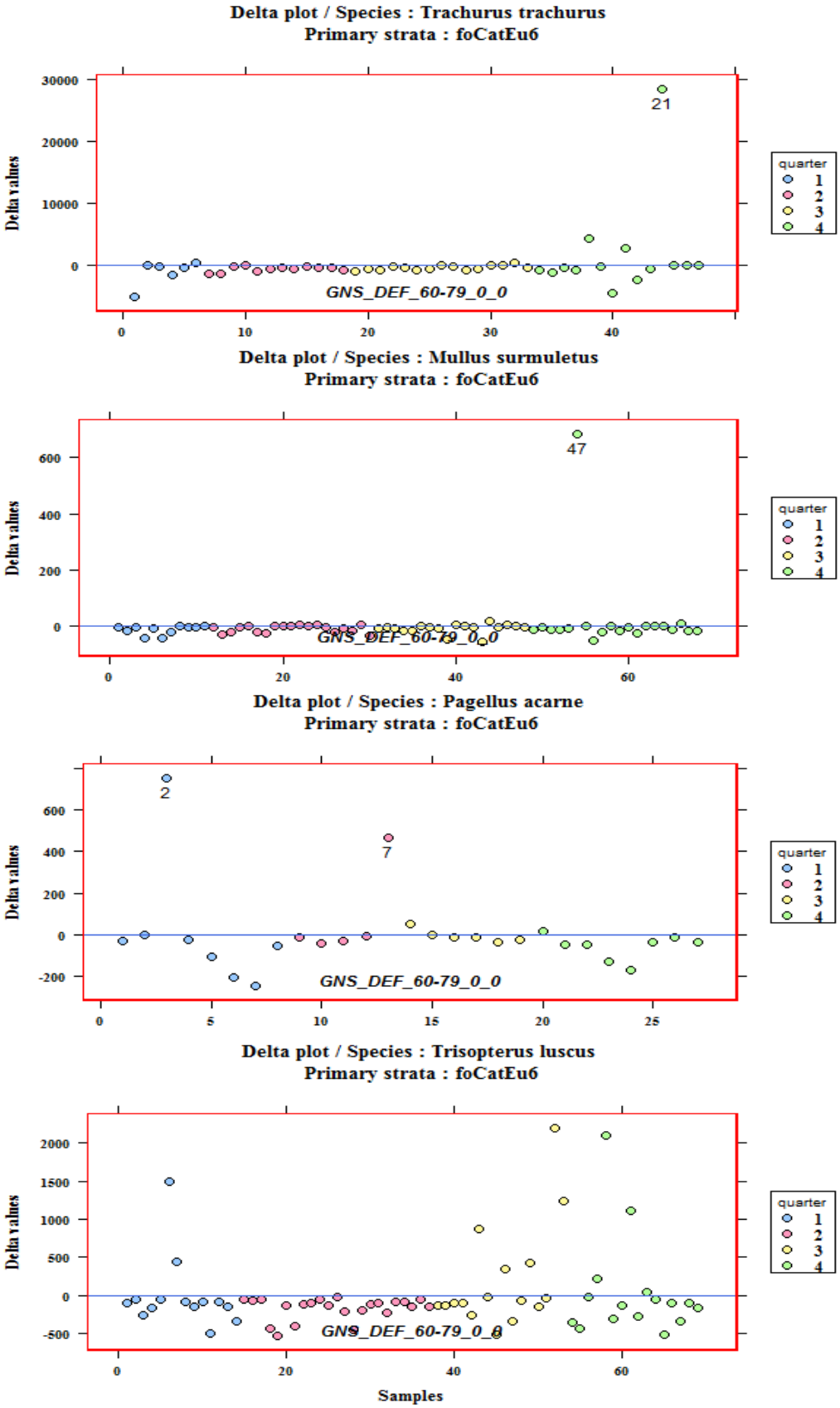


Figure 8. Delta values for horse mackerel, red mullet, axillary seabrem and pouting in 2014.