



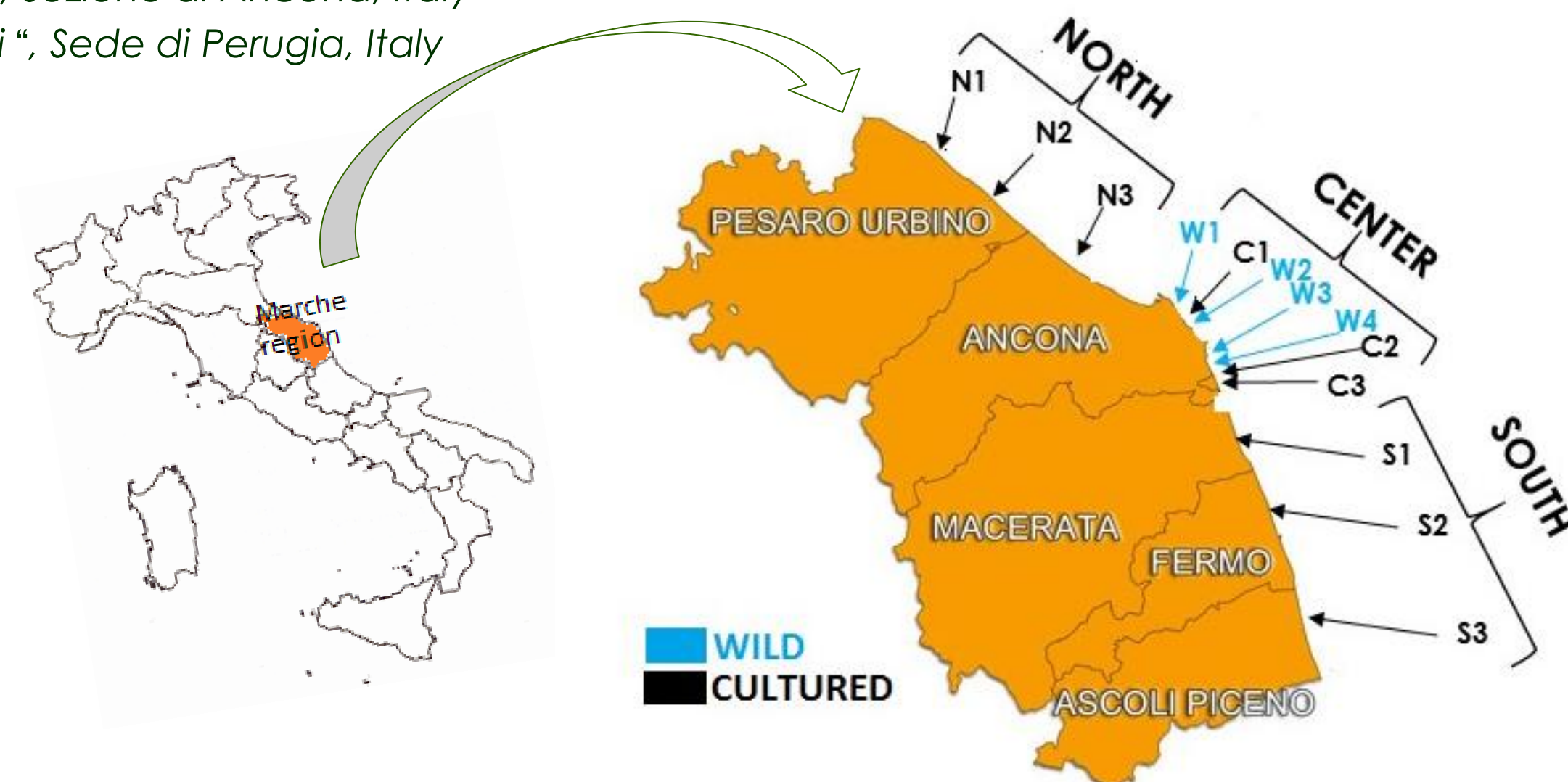
## NDL-PCBs, PBDEs, HBCDs LEVELS AND TEMPORAL TRENDS IN MUSSELS (*Mytilus galloprovincialis*) FROM MIDDLE ADRIATIC SEA

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### Introduction

Mussels harvesting is a relevant commercial activity along the Adriatic Sea. Mussels are worldwide used as sentinels for pollution monitoring. The aim of this study was to study temporal trends of "old" contaminants like PCBs and of contaminants not yet included in monitoring programs (PBDEs and HBCDs), in *Mytilus galloprovincialis* collected along the Marche Coast in 2001-2011-2017 (May-September).



### Method

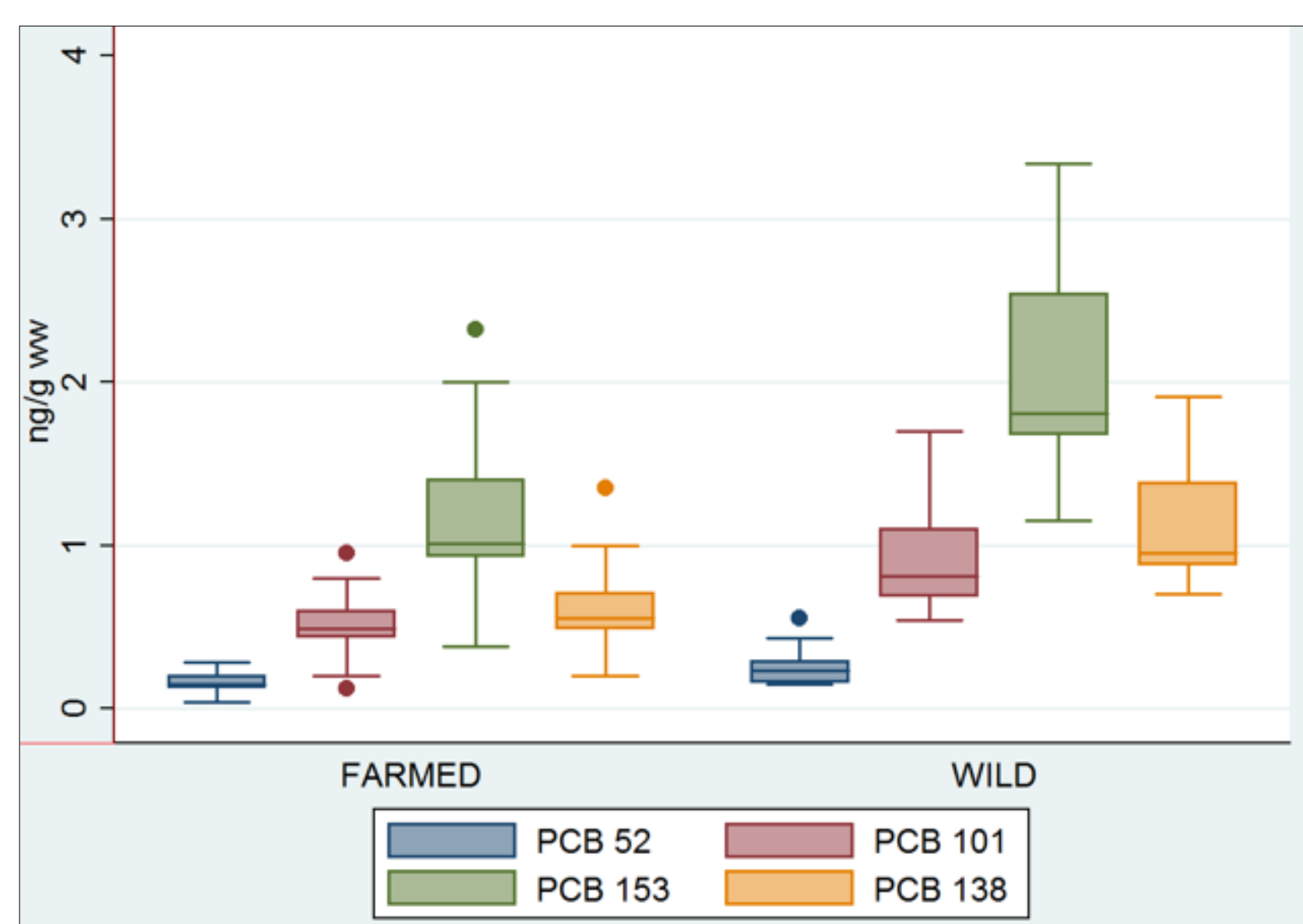
Thirteen sampling stations (9 breeding and 4 wild) along the Marche Coast (Italy) were included in this study. Breeding were distributed from North to South, while the wild areas were around Ancona. Thirty-three mussel samples were analyzed to assess environmental pollutants: 6 NDL-PCBs, 15 PBDEs congeners (GC-MS/MS) [1,2] and  $\alpha$ -,  $\beta$ - and  $\gamma$ -HBCD (LC-MS/MS). All the data were processed using STATA software.



### Results

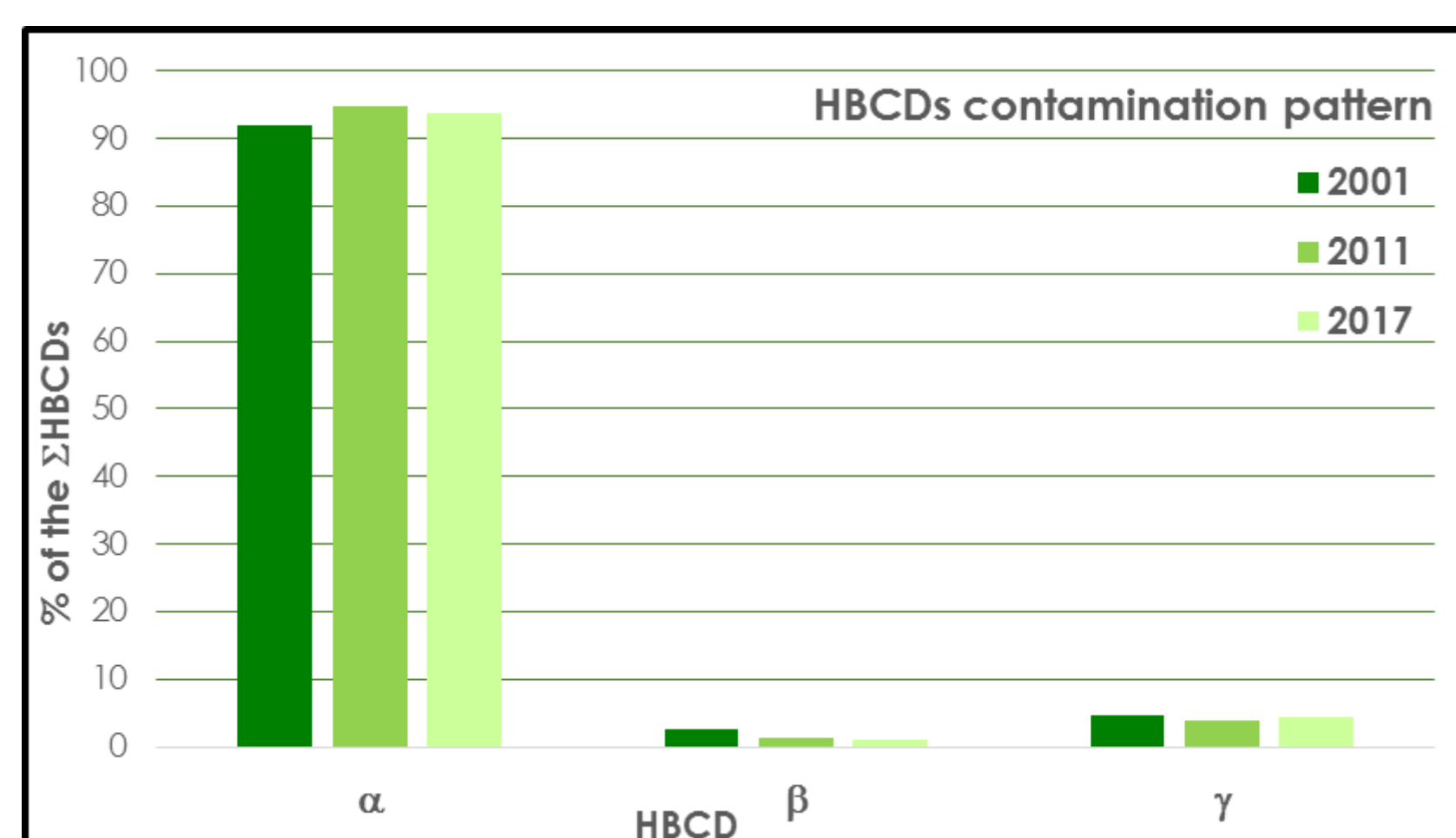
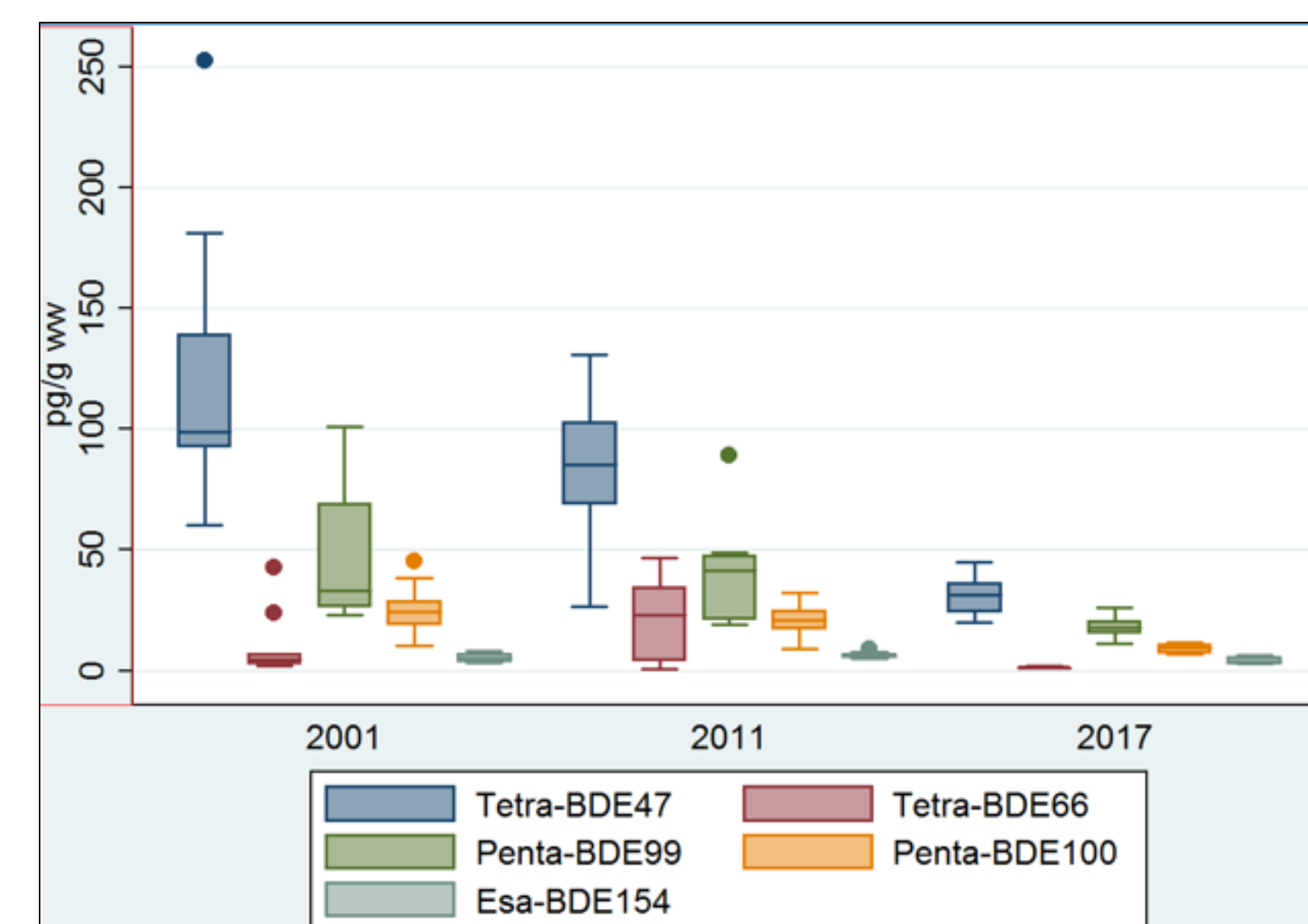
	NORTH			CENTER				SOUTH					
	N1	N2	N3	W1	W2	W3	W4	C1	C2	C3	S1	S2	S3
$\Sigma 6$ PCBs pg/g u.b.	0	0	0	0	0	0	0				0	0	0
$\Sigma 15$ PBDEs pg/g m.b. 2001	388	347	376	394	412	485	496				559	660	660
$\Sigma 3$ HBCDs pg/g m.b.	58	56	257								401	461	461
$\Sigma 6$ PCBs pg/g u.b.	0	0	0	0	0	0	0	0	0	0	0	0	0
$\Sigma 15$ PBDEs pg/g m.b. 2011	410	404	474	505	474	425	370	391	409	359	462	506	459
$\Sigma 3$ HBCDs pg/g m.b.	483	419	372					562	423	429	463	512	367
$\Sigma 6$ PCBs pg/g u.b.	0	0	0	0	0			0	0	0	0	0	
$\Sigma 15$ PBDEs pg/g m.b. 2017	302	306	311	312	327			291	312	287	302	305	
$\Sigma 3$ HBCDs pg/g m.b.	143	98	141					222	242	209	289	342	

The average concentrations of  $\Sigma 6$ PCBs were 3.75, 3.42 and 2.75 ng/g for the mussels collected in 2001, 2011 and 2017, respectively. No significant differences were highlighted among the years. The  $\Sigma 15$ PBDE medium bound decreases from 458 pg/g in 2001 to 432 and 306 pg/g, respectively, in 2011 and 2017. The results were comparable with those reported in literature for European mussels [3,4]. No significant differences were observed for HBCDs among the three sampling periods. The  $\Sigma$ HBCDs were 273, 448 and 227 pg/g in 2001, 2011 and 2017, respectively.

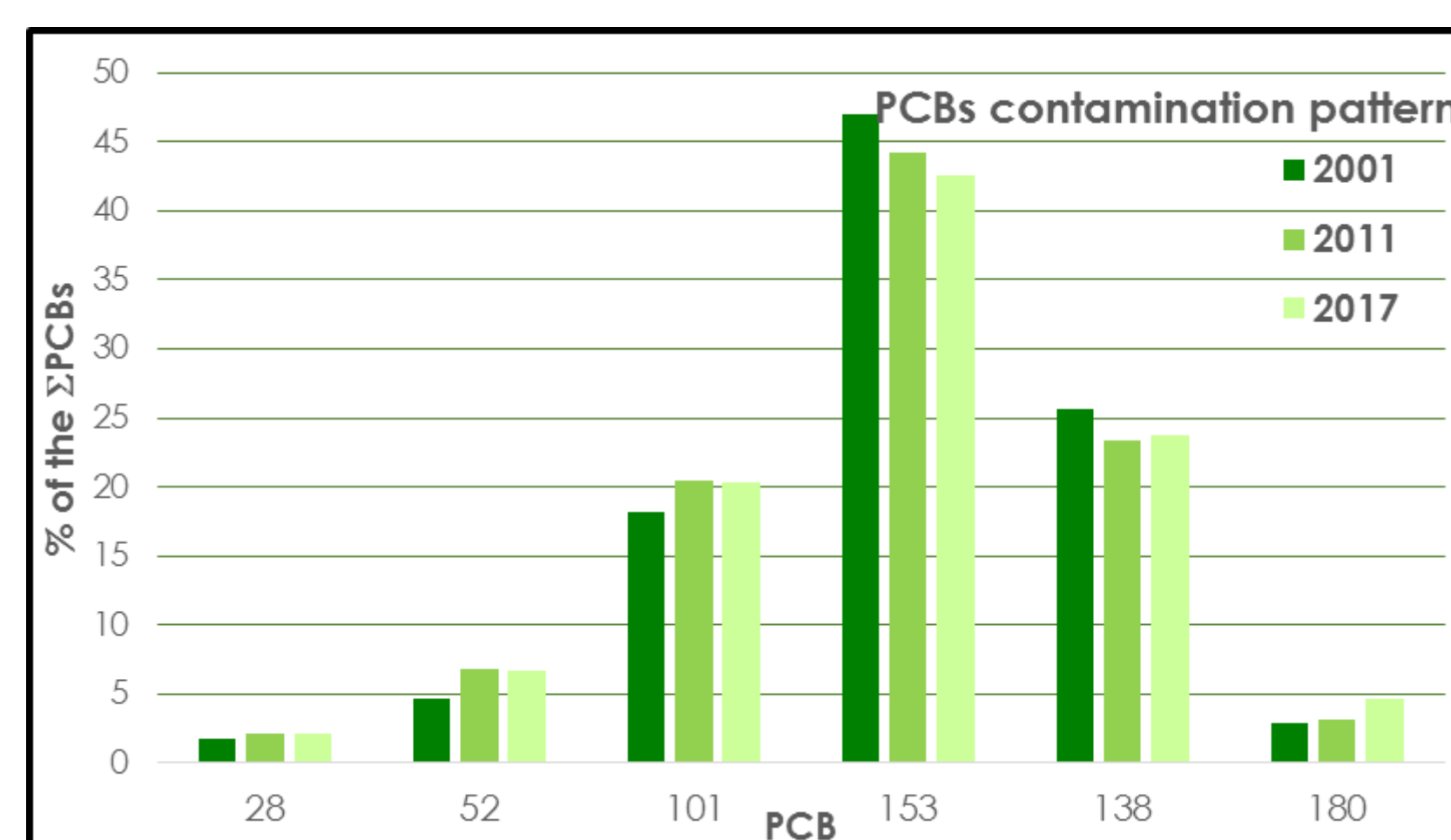


Mussels collected in the wild sites showed PCB levels significantly higher respect to the bred ones ( $p < 0.001$ ) irrespective of the sampling period. The wild sites are closer to the coast (<1 km) and therefore subjected to higher anthropic impact.

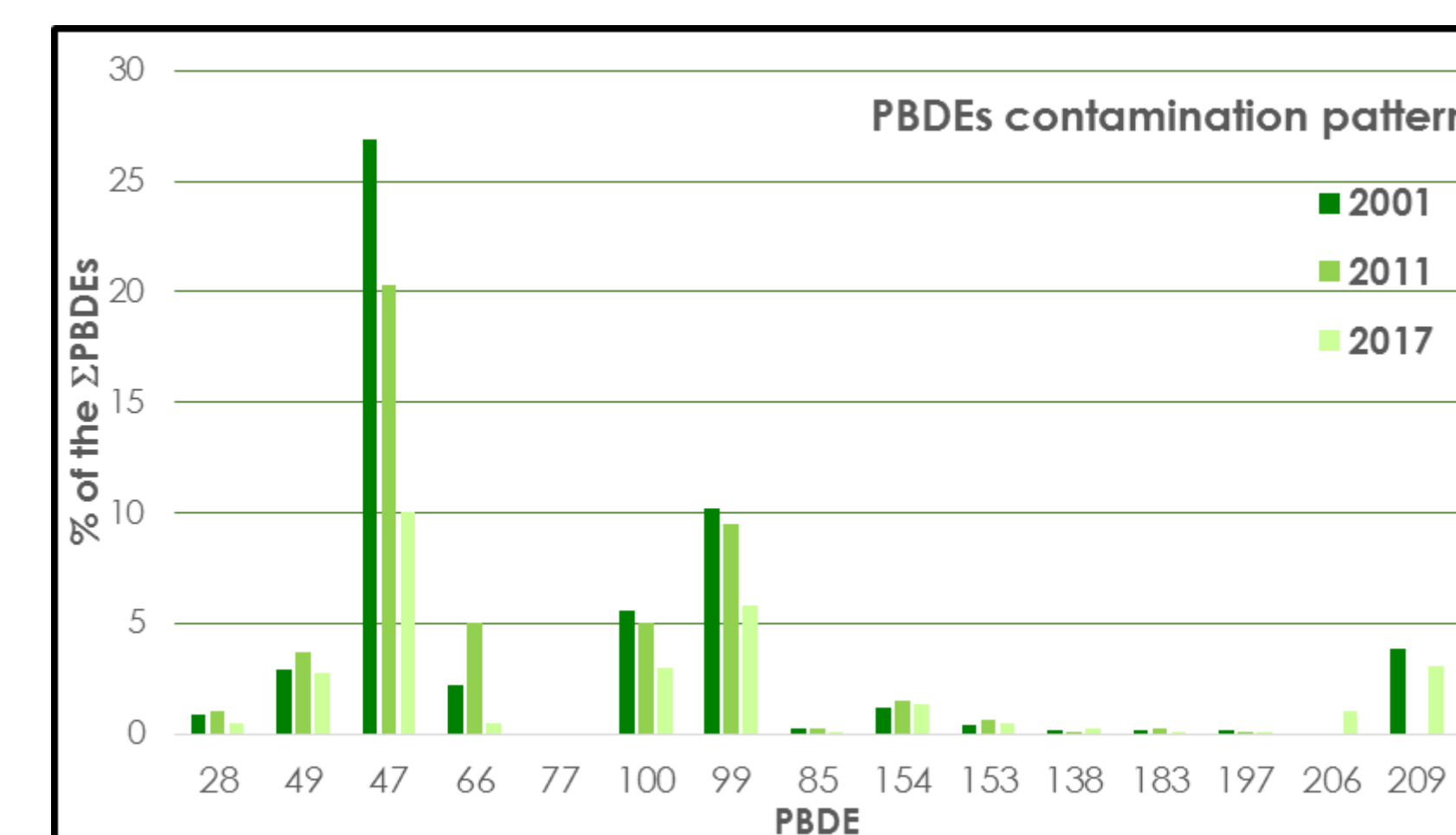
The PBDEs levels significantly decrease going from 2001, 2011 to 2017 ( $p < 0.001$ ) [5].



$\alpha$ -HBCD was measured in all the mussel samples, accounting for roughly 90% of the HBCD contamination. In 20 out of 33 mussel samples, also  $\gamma$ -HBCD was detected [4].



The predominant congeners were PCB-153>138>101 in all the samples analyzed.



PBDEs contamination pattern was dominated by tetra- and penta-BDE: 47, 99 and 100 were measured in all the samples and PBDE-47 was the highest, accounting for 60% of the quantified congeners.

### Conclusions

NDL-PCB, BDE-47 and  $\alpha$ -HBCD were detected in 100% of the analyzed samples. PCBs did not reduce significantly in mussels with time, but the wild sites seems more contaminated than the breeding ones. The results obtained show a PBDE decrease in the years. The BDE-47 levels were generally lower than  $\alpha$ -HBCD's. This study reports, for the first time, the concentrations of HBCDs in Adriatic mussels, confirming the predominance of the  $\alpha$ -HBCD isomer.

### References

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