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Title: The new Italian official list of seafood trade names (Annex I of Ministerial Decree n. 19105 of September the 22th, 2017): strengths and weaknesses in the framework of the current complex seafood scenario

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Corresponding Author: Dr. Andrea Armani,

Corresponding Author's Institution: University of Pisa

First Author: Lara Tinacci

Order of Authors: Lara Tinacci; Alice Giusti; Lisa Guardone; Elena Luisi; Andrea Armani

Abstract: Species substitution, favoured by the high supply chain complexity and the huge number of marketable species, poses economic and health issues and contribute to stocks exploitation. To face this issue, the current EU Regulation no. 1379/2013 imposes to the Member States to publish a list reporting the official designations, corresponding to species scientific names, accepted within the national territories. In the present study the new Italian list of official seafood commercial designations issued by Ministerial Decree no. 19105 of September the 22th, 2017 (Annex I) was analysed to verify the document's compliance to the EU Commission requirements and to check the correctness and validity of the listed items. Moreover, through a comparison with previous national lists from 2002 to date, the list evolution and accuracy were assessed. Finally, the list's correspondence to the Italian market's trend and the species conservation status were evaluated. The analysis highlighted a renewal of the official list, which currently accounts for a total of 1003 records, with a meticulous revision of the taxonomical nomenclature for the scientific name attribution, although editing errors and invalid terms are still present in 8.1% and 13.3% of the records. The Annex I represents a valuable tool for a fair seafood labelling and the recorded items well describe the current consumers' expenditure trend. Nevertheless, the results also highlighted a decrease, by the years, of the list's accuracy in favour of a progressive generalization of trade names. Despite the considerable effort of the Italian legislator for the identification of effective standardization criteria in the attribution of the trade names, the numericity reduction of official commercial designation distances the Italian list from the one name-one fish conception, proposed at international level as a resolute approach for the traceability in the seafood trade.

1        **The new Italian official list of seafood trade names (Annex I of Ministerial Decree n. 19105**  
2 **of September the 22<sup>th</sup>, 2017): strengths and weaknesses in the framework of the current**  
3 **complex seafood scenario**

4

5        Lara Tinacci<sup>1</sup>, Alice Giusti<sup>1</sup>, Lisa Guardone<sup>1</sup>, Elena Luisi<sup>2</sup>, Andrea Armani<sup>1\*</sup>

6        <sup>1</sup>*FishLab, Department of Veterinary Sciences, University of Pisa, Via delle Piagge 2, 56124,*  
7 *Pisa (Italy);*

8        <sup>2</sup>*Freelance Veterinary, Specialist in Food Inspection*

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19        **Corresponding author**

20        Andrea Armani

21        Postal address: *FishLab, (<http://fishlab.vet.unipi.it/it/home/>). Department of Veterinary Sciences,*  
22 *University of Pisa, Via delle Piagge 2, 56124, Pisa (Italy).*

23        Tel: +390502210204; Fax: +390502210213

24        Email: [andrea.armani@unipi.it](mailto:andrea.armani@unipi.it)

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## 50      **Introduction**

51      The fishery supply chain is a dominant sector in the global food industry and seafood is among  
52 the most widely traded commodity worldwide. Over the last decades, the continuous expansion of  
53 the sector has been promoted by the significant improvement of transportation and global trade, the  
54 rapid fishery and aquaculture industrialisation and the rise of Asian countries, especially China,  
55 which are currently the leading mass seafood producers (FAO, 2016).

56      According to the data provided by the *Food and Agriculture Organization of the United Nations*  
57 (FAO), world per capita apparent fish consumption increased from an average of 9.9 kg in the  
58 1960s to 14.4 kg in the 1990s and to 19.7 kg in 2013, with preliminary estimates pointing towards  
59 further growth beyond 20.2 kg (FAO, 2018). The EU is currently the second largest market in terms  
60 of value in the international trade of fisheries and aquaculture products, be expected to absorb  
61 about 26% of the total global imports according to the sector projection up to 2030, as testified by  
62 the current high average per capita consumption (22.5 kg) already exceeding the global estimate  
63 consumptions' threshold (FAO, 2018; EUMOFA, 2017). According to the expenditure data  
64 provided by the *Statistical Office of the European Communities* (EUROSTAT), imports cover 68%  
65 of the EU domestic consumption; the high dependency on extra-EU imports is mainly related to the  
66 progressive decrease of EU self-sufficiency. Within the EU Member States, Italy, together with  
67 Spain and France, maintains a lead position in seafood demand for fishery and aquaculture products  
68 (EUMOFA, 2017).

69      The complexity of the fishery supply chain and the high number and heterogeneity of marketable  
70 seafood species particularly exposes the sector to illegal practices. Seafood falsification concerning  
71 the product's origin, composition and identity misdescription, are the illegal incidents most  
72 frequently reported at International and European level with a direct impact both on the supply  
73 chain economy and consumers' health (Upton, 2015; Pardo, Jiménez, & Pérez-Villarreal, 2016;  
74 Stawitz, Siple, Munsch, Lee, & Derby, 2017; Giusti et al., 2018). Identity misdescription  
75 incidents are generally elicited by inaccurate labelling and favoured by the designation of inaccurate

76 trade names and the lack of international encoded rules for the harmonization of seafood labelling  
77 (Sterling et al., 2015; Xiong et al., 2016a). In addition, the exponential expansion of marine fishing  
78 technology has sometimes led to unsustainable rates of fishing activities and has affected the global  
79 fish stocks through the overexploitation of several long-lived species (FAO, 2018). Furthermore,  
80 Illegal, Unreported and Unregulated (IUU) fishing, consisting of activities that do not comply with  
81 national and international legislative fisheries conservation or management measures, exerts  
82 additional pressure on seafood stocks (Pramod, Nakamura, Pitcher, & Delagran, 2014; Xiong et al.,  
83 2016b; Stawitz et al., 2017).

84 Seafood traceability, sustainability and consumers' right to an informed purchase, represent three  
85 of the main inspiring principles for the institution of the European Common Fishery Policy (CFP),  
86 originally formed in 1970 and last reformed in 2013 in concurrence with the publication of the EU  
87 Reg. EU No. 1379/2013 entered into force on the 1<sup>st</sup> January 2014 (D'Amico, Armani, Gianfaldoni,  
88 & Guidi, 2016,). This Regulation represents the end point of a seventeen-year European legislative  
89 course started with the enactment of the Council Regulation EC n. 104/2000 *on the common*  
90 *organisation of the markets in fishery and aquaculture products*. Without prejudice to the general  
91 rules on food labelling according to the EU Reg. No.1169/2011, the EU Reg. No. 1379/2013  
92 integrates and completes the previous regulations on the mandatory information to be declared on  
93 seafood at retail or at the mass caterer, which are: the commercial designation of the species and the  
94 associated scientific name; the production method and the corresponding catching or farming area,  
95 the category of fishing gear used in capture of fisheries, the possibly applied freezing process and  
96 the date of minimum durability (Article 35).

97 About the commercial designation, each EU Member State is delegated to the drafting and  
98 updating of official lists reporting the trade names (including local or regional names) accepted  
99 throughout the country for the product name declaration.  
100 ([https://ec.europa.eu/fisheries/cfp/market/consumer-information/names\\_en](https://ec.europa.eu/fisheries/cfp/market/consumer-information/names_en)). The scientific  
101 denominations, in accordance with the Regulation provisions (Article 37, paragraph 1, letter a),

102 refer to the scientific names reported in the FishBase information system and in the ASFIS database  
103 and, exclusively for crustaceans, molluscs, echinoderms and tunicates, Sealifebase and Worms  
104 databases.

105 The first Italian official list of fish and seafood trade designations was originally released by the  
106 Ministry of Agricultural and Forestry Politics in 2002 (Ministerial Decree of March 27<sup>th</sup>, 2002)  
107 subsequently amended on 2003 and 2005. A revised list was then published by Ministerial Decree  
108 of January 31, 2008 -which remained in force, as amended by the ministerial decree March 5, 2010  
109 and Ministerial Decree of December 23, 2010, until 2017. The renewed list was finally published as  
110 separate annex (Annex I) of the Ministerial Decree n. 19105 of September the 22<sup>th</sup>, 2017, -which is  
111 in application on the Italian market -since September 2018-.

112 The present study aimed to analyse the Annex I compliance to the EU Commission  
113 requirements, verify the correctness and validity of the listed items and delineate the temporal  
114 evolution of its accuracy, through a comparison with previous national lists of official denomination  
115 (from 2002 to date). Finally, the list's correspondence to the Italian market's trend and the species  
116 conservation status were evaluated. Strengths and weakness were then delineated also in the  
117 framework of the current complex seafood scenario.

## 118 **2. Materials and Methods**

### 119 *2.1 Descriptive analysis of the Annex I of the Ministerial Decree No 19105 of September the* 120 *22<sup>th</sup>, 2017*

121 The Annex I was analysed to describe the document's ~~layout~~ ~~lay-out~~, structure and correctness.  
122 The records listed, consisting of one species or genus SN, for which both Family and Order ranking  
123 are also reported, associated with one or more accepted CD in Italian language and with the  
124 corresponding international FAO three letter code univocally identifying the species, were firstly  
125 grouped in 6 taxonomical macro-categories: 1) Fish (Chondrichthyes; Osteichthyes) (F), 2)  
126 Crustaceans (C), 3) Mollusc bivalves (MB), 4) Cephalopods (CEP), 5) Gastropods (G), 6) Other  
127 Invertebrates (OI) (Echinoderms, tunicates animals, Cnidaria). Then, the Scientific Name (SN) and

128 the associated Commercial Designation (CD) were counted. Subsequently, the SNs records were  
129 checked against FAO's reference official information systems (Fishbase: fishbase.org, Sealifebase:  
130 sealifebase.org) and against the World Register of Marine Species (WorMS) accessible at  
131 <http://www.marinespecies.org/> to verify both the formal correctness (absence of spelling errors) and  
132 the taxonomical validity of the terms regarding the Order, Family and Genus or Species' binomial  
133 nomenclatures. Finally, the alpha-3 codes associated to the designation records were assessed by the  
134 comparison to the accepted codes reported on the Aquatic Sciences and Fisheries Information  
135 System (ASFIS) list updated on February 2018 (<http://www.fao.org/fishery/collection/asfis/en>).

## 136 *2.2 Evaluation of the list's evolution and accuracy*

137 The current list was compared to the previous lists of official denominations which, for this  
138 purpose, were preliminary clustered in two distinct groups. The first group included the lists  
139 published as an annex to the Ministerial Decree of the 27<sup>th</sup> March 2002 and the list annexed to the  
140 Ministerial Decree of January the 14<sup>th</sup> 2005 as further modified by the Ministerial Decree of July  
141 the 25<sup>th</sup> 2005. The second group included the lists published on the 31<sup>st</sup> January 2008 as further  
142 updated by the Ministerial Decrees published on 5<sup>th</sup> March 2010, on 23<sup>rd</sup> December 2010 and,  
143 lately, on the 12<sup>th</sup> August 2011 and 19<sup>th</sup> November 2012. The Ministerial Decrees of the 27<sup>th</sup> March  
144 2002 and 31<sup>st</sup> January 2008 represent in fact the main legislative texts before the entrance in force  
145 of the Ministerial Decree of September 2017. To compare the lists (overall and within each macro-  
146 category) the designation records included were counted by grouping the listed terms according to  
147 the 6 macro-categories previously defined (section 2.1), ~~in order~~ to assess the overall and within  
148 each macro-category evolution trend in terms of numbers. Then, the official designations' accuracy  
149 by the years was assessed by calculating a Species Index (SI), reported as the ratio among the total  
150 CDs number and the corresponding number of SNs (Xiong et al. 2016a). Since the SNs were  
151 provided either as species or genus name, a second index, further defined "cumulative Species  
152 Index" (c-SI), was calculated by dividing the total CDs number against the total number of listed  
153 species-specific SNs added with the total number of species reported in the FAO catalogues for

154 each of the SN listed as genus name. Both the SI and c-SI were calculated within each macro-  
155 category group and on the total number of CDs (overall SI and c-SI).

### 156 ***2.3 List comparison with market trends, geographical distribution and conservation status***

157 Within each macro-category, each Family was compared to annual statistical data on seafood  
158 market preferences and expenditure, at the Italian level, provided by the European Market  
159 Observatory for Fisheries and Aquaculture Products (EUMOFA, 2017), to verify if the list reflects  
160 the consumption trend. Moreover, information about the native geographical distribution of the  
161 newly introduced products was recorded to map the new potential source of the seafood products  
162 supply for the Italian Market. The conservation status of the species according to the International  
163 Union of Conservation of Nature (IUCN) was also assessed. Each record was included in one of the  
164 9 categories defined by the IUCN to describe the species conservation status (Meynell, 2005): Not  
165 Evaluated (NE), Data deficient (DD), Least Concern (LC); Near threatened (NT), Vulnerable (VU);  
166 Endangered (EN) Critically Endangered (CR); Extinct in the Wild (EW); Extinct (EX). Finally, the  
167 variety of the CDs associated to each SN was evaluated with respect to the correctness and the  
168 degree of informativeness provided by different designations to facilitate the recognition of  
169 different species by the consumer in favour of a conscious purchase choice.

## 170 **3. Results and discussion**

### 171 ***3.1 Descriptive analysis of the Annex I of the Ministerial Decree No 19105 of September the*** 172 ***22<sup>th</sup>, 2017: official designations' correctness and validity***

#### 173 ***3.1.1. List framework, overall SN and CD number and distribution among the macro-categories.***

174 The records tabled in the Annex I are provided in a unique list, alphabetically ordered on the  
175 basis of the genus and the species SNs unlike the previously published ministerial decrees in which  
176 the different SNs were grouped according to conventional market macro-categories and published  
177 in separate lists (MD of March 27<sup>th</sup> 2002; MD of February the 17<sup>th</sup> and July the 25<sup>th</sup> 2005, MD of  
178 January the 31<sup>st</sup> 2008 and further amendments). The current type of drafting inevitably results in the  
179 mixture of different seafood categories, representing a potential obstacle for the sector operators to



180 the usability of the list. For this reason, to proceed to a systematic analysis of the list, the records  
181 were preliminary grouped as described below.

182 Pursuant to Article 37 of Regulation EU No. 1379/2013, each CD reported in the list should  
183 correspond to the current name accepted in the Member State language or a current denomination  
184 accepted at regional or local level and equally effective, once associated to the scientific name  
185 listed, for the immediate seafood or fish product recognition by the final consumer. However,  
186 although emphasizing the need of informative CDs, the European legislator doesn't impose any  
187 restriction on the number of CDs to be possibly associated with one scientific name. It follows that  
188 each listed record may ~~be~~ alternatively consist of: 1) one CD corresponding to one genus or species  
189 SN, 2) one CD corresponding to more than one genus or species SN; 3) two or more CDs related to  
190 one SN.

191 Annex I currently includes a total of 1007 records. However, 2 SN records, (*Strongylocentrotus*  
192 *droebachiensis* and *Anadara antiquata*) are repeated throughout the list and other 2 SNs (*Pegusa*  
193 *macrophthalma* and *Murex trunculus*) can't be recollected either to an obsolete classification or a  
194 misspelled species. Thus, ~~actually~~ 1003 different SNs associated with 737 different CDs are present  
195 in the list. The 1003 records include 860 marine, 22 anadromous/catadromous and 121 fresh water  
196 and brackish species or genus. The CD numericity within the 6 categories is detailed in Table 1.  
197 The majority of the listed records within all the categories consist of one CD attributed to a single  
198 SN or one CD valid for multiple Species or entire Genus SN. However, SN records for which up to  
199 three separate CDs are allowed are also present within all the categories. A relevant number of CDs  
200 are constituted by a descriptive common name and an adjective referring to the geographic origin of  
201 the species identified by the associated scientific name or to some peculiar morphological  
202 characters.

203 The F category contributes to the 68.9% (SN=691) of the total records followed by C (13.3%;  
204 SN=134), MB (8.1%, SN=81), CEP (6.0%; SN=61), G (2.5%; SN=24) and OI (1.2% SN=12).

205 Among the 152 families included in the F category, 7 are the most represented, each accounting  
206 for a range of 29 to 38 SNs and belonging to Perciformes (Carangidae, Sciaenidae, Scombridae,  
207 Serranidae, Sparidae), Salmoniformes (Salmonidae) and Cypriniformes (Cyprinidae) orders. ~~They  
208 are immediately followed by Clupeidae (SN=19), Pleuronectidae (SN=18) and Soleidae (SN=14),  
209 Gadidae (SN=18) and Merlucciidae (SN=14), families respectively belonging to Clupeiformes,  
210 Pleuronectiformes and Gadiformes orders.~~

211 C category is led by Penaeidae (N=35) and Palinuridae (N=14) families representing together  
212 almost one third of the total records (N=134).

213 Veneridae (SN=27) and Pectinidae (SN=16) are the two most represented families of the MB  
214 macro-category, accounting together for the 53% of the listed SNs.

215 Within CEP, squid (Loliginidae N=16 and Ommastrephidae N=9) is the most numerous  
216 commercial category followed by octopus (Octopodidae N=18; Eledonidae N=1) and cuttlefish,  
217 which closes the triad with 17 records (Sepiidae N=15; Sepiolidae N=2).

218 All the above described data [and further details regarding all the families included in the new](#)  
219 [official list](#) are collected in Table 1SM.

220 *3.1.2 Formal correctness and validity of SNs and alpha 3-code.* The assessment of the  
221 correctness and validity of the species SN against the FAO reference databases (Fishbase:  
222 [www.fishbase.org](http://www.fishbase.org); Sealifebase: [www.sealifebase.org](http://www.sealifebase.org)) and the WorMS database  
223 (<http://www.marinespecies.org/>), highlighted the presence of a total of 133 records (13.3%)  
224 wrongly classified and 81 SN records (8.1%) containing spelling or typing errors plausibly occurred  
225 both during the list drafting and editing (Table 2SM).

226 As regard as the taxonomical validity, each of the misclassified records (N=133) contains from 1  
227 to 3 invalid terms concerning the species binomial classification, the Family and/or the Order  
228 ranking. Particularly, 68.4% (91/133) of the misclassified records was associated to the wrong  
229 Order, 21% (28/133) of the SNs was associated to the wrong Family and 19.5% (26/133) was found  
230 to be listed according to an obsolete species binomial classification (Table 2SM). Most of Order and

231 Family misclassifications were highlighted within CEP and MB category with a percentage of  
232 wrong ranking of 39.3% (24/61) and 32% (26/81), respectively. Although the majority of  
233 misclassification and misspelling issues involve Order and Family terms without directly affecting  
234 the reliability of the official designations, an accurate proof reading of the document ~~and the~~  
235 ~~replacement at least of all the invalid terms at species level~~ would be desirable. However,  
236 considering the continuous advances in fish and seafood phylogeny research, ~~also thanks to the use~~  
237 ~~of new generation molecular tools~~, the maintenance of a correct and updated list is difficult and  
238 requires and increasingly frequent publishing of amendments. ~~An officially recognised online~~  
239 ~~database platform for the real-time update of the SNs in accordance with the most updated scientific~~  
240 ~~data would improve the efficiency of the labelling system. In this respect, the informatic platform~~  
241 ~~proposed by the Experimental Institute of Zooprophyllaxis Piedmont, Liguria and Aosta Valley,~~  
242 ~~Turin section (<http://90.147.123.23/ittiobase/>) could represent a useful informative instrument for~~  
243 ~~both Food Business Operator and consumers.~~

244 The presence of the international alpha-3 code on the list represent a novelty as it is reported for  
245 the first time on the Decree, even though the identification of each species lot by this code was  
246 already imposed by the EU Reg. No 1224/2009 (Art. 58, c) and the Commission Implementing Reg.  
247 No. 404/2011 (Artt. 67, 68) to monitor and trace the species catches. This code represents one of the  
248 labelling requirements to be provided within 24 hours after completion of the catches transshipment  
249 and landing together with the compulsory minimum information requirements for all lots of  
250 fisheries and aquaculture products provided under the two regulations. ~~(identification number of~~  
251 ~~each lot, the external identification number and name of the fishing vessel or the name of the~~  
252 ~~aquaculture production unit, the date of catches or the date of production, the quantities of each~~  
253 ~~species and the number of individuals when applicable, the type of gear, mesh size and dimension).~~  
254 This considered, although the FAO 3-letter code for each species can be directly acceded by the  
255 FAO database at <http://termportal.fao.org/faoas/main/start.do>, the availability of these codes ~~on the~~  
256 ~~list~~ constitutes an additional informative element in support of both the sector FBOs and the

257 competent authorities responsible for monitoring the traceability of the products. The analysis of the  
258 list confirmed the correct association of all the SN records to the corresponding the alpha-3 codes  
259 provided in the latest updated version of the ASFIS catalogue excepted for the SN *Cerastoderma*  
260 sp. wrongly associated to the alpha-3 code identifying *Acanthocardia* sp. and for which no alpha-3  
261 code has been assigned yet.

### 262 3.2 Assessment of the list's evolution and accuracy

263 The first sensitive data emerging from the analysis is represented by the constant increase in the  
264 number of records included from 2002 (SN=603) to 2017 (SN=1003), -with a relative high increase  
265 rate within each category: F (+39,6%), MB (+32%), C (+43%), CEP (+37%), G (+45%), OI (+83%)  
266 as the result of the constant rising of fishery products' import into EU and of species diversification  
267 in the international fishery supply chain offer (Guardone et al., 2017). Table 1 shows the results of  
268 the analysis of the lists' evolution over the years, as described in section 2.2.

269 According to Lowell, Mustain, Ortenzi, & Warner (2015) and Xiong et al., (2016a), SI = 1  
270 defines the ideal situation, indicating the univocal correspondence between the SN and the CD. On  
271 the contrary, SI near to 0 indicates the maximum concentration of CDs and a poor representation of  
272 diversity of fish species on the market through the attribution of identical commercial names for  
273 species even morphologically distant. Finally, by admitting the use of more than 1 CD for each SN  
274 record SI >1 may be potentially obtained.

275 An interesting result in the assessment of the list accuracy evolution is represented by the  
276 decrease of both SI and the c-SI and the widening of the gap between the two indices values  
277 calculated on the overall records and within each category mainly consequently to the increased use  
278 of Genus SNs as new or substitute records of species SN considered in the lists of previous years. In  
279 particular, 73 out of the 78 deleted records (F=64; C=5; MB=2; CEP=2) consist of species SN  
280 replaced by the corresponding Genus SN (Table 3SM). ~~Among the remaining SN, two genus SN~~  
281 ~~(*Lutianus* sp.; *Lephrinus* sp.) including species of medium high commercial value on the~~  
282 ~~international market (FAO data) and three species SN (*Clarias fuscus*, *Ensis minor*, *Anemonia*~~

283 ~~sulcata) were removed, possibly due to a drafting error or due to the limited or no commercial~~  
284 ~~interest of the products on the national market.~~ Moreover, the decrease of the SI indices was  
285 partially due to the association of CDs already present in the previous list to SN newly introduced.  
286 The maximum expression of this phenomenon is highlighted within the CEP category for which,  
287 despite the introduction of 23 new SN records since the 2002, only three new CD records have been  
288 introduced (Table 1).

289 The comparison among the CDs included in the current and in the repealed Ministerial decrees  
290 highlighted the modification of a total of 112 designations (Table 4SM). Recurring changes to the  
291 CDs are represented by the inclusion or the modification of the geographic origin mention within  
292 the designation. Interestingly, in 9 CDs the reference to the geographical origin has replaced the  
293 adjectives referring to morphological characters as in the case of the SN *Epinephelus multinotatus*  
294 previously associated to the CD “*Cernia maculata*” (spotted grouper) and currently labelled as  
295 “*Cernia atlantica*” (Atlantic grouper). In 65 CDs a modification of the reference to the geographic  
296 area consisted in the extension (N=44) of the reference to the geographical origin previously used,  
297 e.g. Austral vs Australian or Oceanic vs Pacific/Atlantic, or, on the contrary, in a more accurate  
298 specification of the geographical origin (N=21), e.g.g. Indo-Pacific/Pacific vs Asian or Eastern. In  
299 few cases the removal of any reference to the distribution area (N=4) or of adjectives referring to  
300 morphological characters (N=4) has also been observed. The amendments highlighted are generally  
301 in agreement with the FAO data relating to the geographical distribution of the corresponding  
302 species as shown in Table 4SM and might be interpreted as a way to standardize the rules for  
303 granting the CD to individual records of species. Nevertheless, relevant exceptions have been  
304 pointed out with respect to several SNs such as *Lophius vomerinus*, *Ensis directus* or *Semele*  
305 *solida* reported belonging to South east Atlantic, North- Western Atlantic Ocean and Southeast  
306 Pacific Oceans respectively, for which the previous accepted CD “*Rana Pescatrice Sudafricana*”  
307 (South-African Anglerfish), “*Cannolicchio atlantico*” (Atlantic knife clam) and “*Vongola cilena*”  
308 (Chilean clam) more accurately described the seafood origin compared to the new designations

309 assigned (“*Rana pescatrice oceanica*”/Oceanic Anglerfish; “*Cannolicchio oceanico*”/Oceanic knife  
310 clam and “*Vongola oceanica*”/Oceanic clam). Finally, few SNs appear associated to the wrongly  
311 amended CD, as illustrative highlighted for the SN *Mactromeris polynyma* previously designated as  
312 “*Vongola Pacifica*” (Pacific clam) and currently renamed as “*Vongola australe*” (Austral clam)  
313 despite being exclusively distributed in the North Pacific and Arctic areas.

314 Furthermore, although, as described, the majority of the listed CDs consist of a common name  
315 often associated to the geographic origin, several records are still represented by local use names or  
316 CDs including the clear mention to specific morphological characters, specifically identifying a  
317 given SN record. In specific cases, an inverse trend compared to the one above described is  
318 observed, with the substitution of the geographical reference with an adjective related to a peculiar  
319 morphological character (e.g “*Dentice rosa*”/Pink seabream replacing the previous “*Dentice*  
320 *marocchino*”/Morocco seabream). The use of local designation (e.g pagello “*Pezzogna*” associated  
321 to *Pagellus bogaraveo*/Blackspot seabream or “*Natica*” associated to *Neverita josephinia*/  
322 Josephine’s moon-shell) and the specific reference to morphological characteristics (e.g Sarago  
323 “*fasciato*”/ two-banded seabream associated to the species *Diplodus vulgaris*) are frequently used to  
324 describe species and genus SN belonging to Eastern Atlantic and Mediterranean. This is probably  
325 because these species are well known on the Italian market and immediately associated to the  
326 corresponding SN by the final consumers. [The familiarity of the final consumers towards local  
327 designations clearly emerged by a survey about Labelling and marketing of bivalve and gastropod  
328 molluscs conducted in Sardinia by Meloni \(Meloni, 2015\) pointing out frequent cases of improper  
329 product labelling due to the use of dialectal names replacing the official designations.](#)

### 330 ***3.3 List comparison with market trends and conservation status***

331 ***3.3.1 Market trends and geographical distribution.*** Seafood included in the list appeared in  
332 accordance with consumption data reported at Italian level by EUMOFA institute and effectively  
333 describes the average Italian consumers’ fresh and processed seafood basket. According to the  
334 EUMOFA report on European seafood expenditures trend, Italian consumers’ demand, led by

335 mussels and clams, is then oriented towards fish valued species within seabream (Sparidae), cod  
336 and hake (Gadidae and Merluccidae), grouper, salmon and salmon-like leaded by both fresh and  
337 processed Atlantic salmon (*Salmo salar*), clupeids and anchovies (Clupeidae and Engraulidae), and  
338 cephalopods (Loliginidae, Ommastrephidae, Octopodidae and Sepiidae) categories, together with  
339 European seabass (Moronidae), which altogether represent 30% of the total consumption  
340 (EUMOFA, 2017b). ~~In particular, the~~ analysis of the list SN records within F category  
341 highlighted the presence of two leading Family ranking (Table 1SM), Sparidae (SN=38) and  
342 Serranidae (SN=36), collecting high valued fish species—predominantly sold as fresh or frozen  
343 product on the Italian market  
344 (<http://www.ismea.it/flex/FixedPages/IT/WizardPescaMercati.php/L/IT>). The Scombridae Family,  
345 consisting of a total of 29 SN records, includes all the major species intended for canned product  
346 processing (tuna and mackerel species) which is still the main segment of the Italian fish processing  
347 industry, heavily depending on imports of frozen tuna and tuna loins (Dincer, 2017).

348 The only data apparently out of the averaged variety of Italian expenditure is represented by the  
349 relatively high increase in the number of Cypriniformes and Siluriformes records which constitute  
350 8.6% (13/151) and 10% (15/151) of the new F SN records included. The two orders in fact collect  
351 fish species traditionally not appreciated by the Italian consumers whose purchase attention is  
352 generally paid to marine (wild and cultured species) and anadromous (sturgeon, salmon, rainbow  
353 trout) species and only marginally to catadromous (eel) species and ~~and~~ inner water basins fish  
354 species ~~(such as goby, agone, tench)~~  
355 ([https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Italian%20Fishery%20Report\\_Rome\\_Italy\\_4-13-2011.pdf](https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Italian%20Fishery%20Report_Rome_Italy_4-13-2011.pdf); Gaviglio, Demartini, Mauracher, & 2014, Roncarati & Melotti 2007). The  
356 analysis of the geographic distribution showed that the Indian subcontinent (India, Bangladesh,  
357 Pakistan), Vietnam and China are the prevalent origins of the species added to the list (Table 3SM).  
358 This considered, the increased commercial interest for these species and the need of new official  
359 commercial designations to guarantee an adequate products traceability and labelling has plausibly  
360

361 to be reconducted to the settlement of extra EU migrants to Italy, mainly represented by Asian  
362 (Chinese, Philippine, Bengalese and Pakistan ethnic groups) or East Europe (Romania, Bulgaria)  
363 citizens, often engaged in industrial or food-related business activities (Albani, Guarneri, &  
364 Piovesan, 2014; Guidi et al., 2010; D'Amico et al., 2014)). ~~The rise of well-established Chinese and  
365 Bengalese and East European food business activities (restaurants, take-aways and retail markets)  
366 has led to a significant increase of the imports demand of ethnic seafood species and the need of  
367 new official commercial designations to guarantee an adequate products traceability and labelling  
368 on the national territory.~~

369 As regards CEP, “octopus” is the most affected category by the list revision both in terms of  
370 update and removal of records. Moreover, 10 out the 12 SN records newly included refer to Pacific  
371 and Indo-Pacific species. In this respect Italy is currently counted as the third octopus importer and  
372 processor within European countries. According to the latest FAO Globefish report, the octopus  
373 market is mainly supplied by Morocco, and Indian subcontinent countries (Indonesia, Vietnam,  
374 India, Pakistan), exporting the landings directly to Europe or through China intermediation  
375 ([file:///C:/Users/lara/Documents/articolo%20denominazioni/biblio%20discussione%20dati/Globefis  
376 h%20FAO%202018.pdf](file:///C:/Users/lara/Documents/articolo%20denominazioni/biblio%20discussione%20dati/Globefish%20FAO%202018.pdf)). A recent survey on seafood products imported from extra-European  
377 countries, conducted at the Border Inspection Post of Livorno-Pisa (BIP), highlighted significant  
378 labelling issues on cephalopod products, involving the highest percentage of mislabelling cases  
379 among the analysed seafood products (Guardone et al., 2017). Although in that study the majority  
380 of the mislabelling incident were recollected to unintentional substitution, plausibly related to  
381 morphological similarities between substituent and substitute species, the need of a strengthening of  
382 the products traceability and the need of labelling update were highlighted. ~~This is particularly true  
383 in the light of the study of Wen et al. (2017), conducted on the Chinese market, that highlighted  
384 how cephalopods products are usually sold under generic names that do not allow a species-specific  
385 recognition.~~ This considered, the list revision significantly contributes to enlarging the number of  
386 accepted marketable species within the national borders. Nonetheless, as highlighted in Table 1, the



387 low variety of CDs and the association, on average, of 1 CD for two distinct and not necessarily  
388 phylogenetically related SN records (SI=0.49) may represent a source of confusion and a limit to  
389 consumers' right to informed purchases. [In this respect, Meloni, Piras and Mazzette, \(2015\) had](#)  
390 [already pointed out the need of an increase in the commercial designation variability and the](#)  
391 [opening to the use of local names as officially recognized commercial designation to facilitate the](#)  
392 [recognition of products by the final consumer.](#)

393 As regards C category, the two most represented families (Penaeidae and Palinuridae) include  
394 together the majority of warm water and cold-water shrimps and prawns with the highest  
395 commercial interest for the European market  
396 ([http://www.seafish.org/media/Publications/Factsheet\\_-\\_Prawn\\_and\\_Shrimp\\_Industry\\_2015.pdf](http://www.seafish.org/media/Publications/Factsheet_-_Prawn_and_Shrimp_Industry_2015.pdf)).

397 Finally, the OI category, although marginally represented (1.2%), has been significantly  
398 modified and updated and includes high commercially valuable sea urchin species, particularly  
399 appreciated by the Italian consumers and collected both from local catches (Stony sea  
400 urchin/*Paracentrotus lividus*) and Pacific or Atlantic areas as (Green sea urchin/*Strongylocentrotus*  
401 *droebachiensis*) as well as seafood of growing interest due to their medicinal and nutraceutical  
402 value such as jellyfish (*Rhizostoma pulmo* and *Rhopilema esculenta*) or sea cucumber (*Holothuria*  
403 *tubulosa*, *Stichopus regalis*) (Sicuro & Levine, 2011; Armani, Castigliero, Tinacci, Gianfaldoni, &  
404 Guidi, 2012; Stefánsson, Kristinsson, Ziemer, Hannon, & James, 2017, Meloni & Esposito, 2018).

405 The analysis of the origin of the newly included products places the Pacific area and the Asian  
406 countries as the main sources of fish and seafood species, followed by North-Eastern Atlantic areas  
407 (Table 3SM) as already pointed out by official surveys annual reports conducted at border  
408 inspection posts on the Italian territory (Italian Ministry of Health, 2015). ~~In the work of Guardone~~  
409 ~~et al. (2017) China, Vietnam and Thailand were found to be the third countries most frequently~~  
410 ~~involved in mislabelling cases.~~

411 Noteworthy, a conspicuous number of new SNs also belong to the Mediterranean Sea and  
412 European inner water basins, mostly represented by species of local interest such as *Scorpaena*

413 *elongate* (Ragonese, Gancitano, Norrito, Rizzo, & Bono 2003), *Peristedion cataphractum*  
414 (<http://www.iucnredlist.org/details/full/198742/1>) *Leucoraja naevus* (Lauria, Gristina, Attrill,  
415 Fiorentino, & Garofalo, 2015), and *Padogobius nigricans* (Bianco, 2014). ~~The inclusion of such  
416 species of seemingly marginal importance may find a motivation in the policy promoted by the  
417 European Union fostering the exploitation of underutilised regional species as a potential driver of  
418 their regional and national economic development (EUMOFA, 2017b).~~

419 3.3.2 *List comparison and conservation status.* The evaluation of the conservation status of the  
420 species listed in the new ministerial decree was extrapolated according to data released by the  
421 International Union for Conservation of Nature and Natural Resources (see section 2.1). 102  
422 records referring to the 97 Genus SN designations, 3 hybrid SN and the fictional 2 SN records were  
423 preliminarily excluded from the analysis, which was conducted on a subgroup of 899 records. Each  
424 record was included in 7 out of the 9 categories defined by the IUCN since no SN records refers to  
425 either EW or EX species (Figure 1). As illustrated in Figure 1, the results show that 50% of the  
426 analysed records do not present a criticality assessment as they are not evaluated against the IUCN  
427 criteria (NE: 44%) or an adequate statistical analysis of the stock population is still not available  
428 (DD: 6%). NE and DD records are principally related to invertebrate species of less and recent  
429 economic interest confirming the need of research in this area (Collen, Böhm, Kemp, & Baillie,  
430 2017). ~~However, major criticalities in obtaining statistically significant data for these organisms are  
431 related to the sporadic nature of the catches, by catch or mixed landings which prevent an accurate  
432 assessment of the fishing volumes, as well as the objective difficulty in obtaining statistically  
433 significant data on the of the target species.~~ The need to retrieve information on the status of  
434 population stocks is considerable especially for some species, such as sea cucumbers, which in the  
435 latest year has gained ever increasing attention on the global supply market under the pressuring  
436 demand of Asian consumers and stakeholders. In this respect, Meloni & Esposito (2018) have  
437 recently pointed out the need for a close monitoring of the catches along the Mediterranean coast

438 denouncing a systematic exploitation of sea cucumbers in Italian waters directly consequent to the  
439 perpetration of illegal and unregulated fishery of these species.

440 The remaining 40% of SN seems to belong to wide spread species supported by abundant  
441 population stock assessments (LC). Nevertheless, as already highlighted by Bonanomi, Colombelli,  
442 Malvarosa, Cozzolino, & Sala, (2017), also for these species a local species stock overexploitation  
443 due to specific local fishing systems that directly undermine the establishment of fish stocks cannot  
444 be excluded. This is the case of *Sardina pilchardus* (LC) stocks within the Mediterranean Sea  
445 whose population has been classified as in overexploitation (SAC-GFCM, 2014) mainly due to the  
446 considerable fishing effort targeting the species and a catching system specifically targeting juvenile  
447 form (“Bianchetto”) traditionally requested for the preparation of several Italian traditional  
448 delicacies (Armani et al., 2012; Carpi et al., 2016). ~~In this respect, since 2006, an official ban to the  
449 use of trawling net with mesh size < 5mm has been imposed (Council Regulation No. 1967/2006) to  
450 prevent the species threatening and finally applied in Italy since 2010 after several years of  
451 derogation.~~

452 The remaining 10% of SN records (Figure 1; Table 2) represented by potentially threatened  
453 (NT), threatened (VU, EN) and critically endangered species (CR), includes several high valuable  
454 species frequently included in IUU analysis studies as they raise significant concerns about the  
455 impacts of their trade on the species sustainability (Sadovy et al., 2013; Helyar et al., 2014; Pramod  
456 et al., 2014). This considered, and in the light of the increased consumers’ awareness with respect to  
457 the environmental impact related to different food resources supply, the clear information on the  
458 conservation status of the species of commercial interest included in the list is relevant and may  
459 constitute a discriminating factor for the selection of fish species both for FBO and for the final  
460 consumer. In this respect, the rising and preeminent role of fishery ecolabelling certification  
461 systems on fishery sustainability on European and Italian consumers’ expenditure has been recently  
462 highlighted (Conte, Passantino, Longo, & Vossilářová, 2014; Bonanomi et al., 2017).

463 ***3.4. Strengths and weaknesses of the new Italian official list of fish and seafood trade***  
464 ***designations***

465 The expansion of the marketable species, on the thrust of new preferences of the final consumer,  
466 and the strengthening and rediscovery of the local products image, driven by national fishery  
467 development plans, has significantly complicated the seafood compartment. In this light the new and  
468 updated official list represent a valuable tool for a fair seafood labelling within the Italian market  
469 and the SNs records reflect the current trend of purchase demand. However, in front of these  
470 strengths, the analysis of the list also highlighted the following weaknesses and improvable aspects:

471 1) the attribution of CDs consisting of a common name associated with a reference to the  
472 geographical distribution area represent a sensible attempt, by the Italian Legislator, to identify an  
473 effective criterion of simplification and standardization in the trade names attribution. Nevertheless,  
474 the use of CDs referring to a very wide geographical origin may, on the contrary, weaken the  
475 effectiveness of this information for the product traceability, species identification and potentially  
476 favour the occurrence of fraudulent incidents;

477 2) the increase of “designation generalization”, together with the use of CDs barely referring to a  
478 generic catching area and not univocally associated to the species scientific name, may mislead a  
479 full conscious consumers choice with respect to species biodiversity and fishery sustainability;

480 3) Although the new list provides a meticulous review of scientific nomenclatures, in accordance  
481 with the requirements imposed by European legislation, invalid terms concerning the species  
482 binomial classification, the Family and/or the Order ranking are still present;

483 4) the drafting framework limits the list consultation. In this respect, the division of the list into  
484 sections corresponding to the main macro categories may improve the usability of the document by  
485 facilitating the search of the official trade names corresponding to individual SN.

486 **4. Conclusions**

487 The newly enacted list meets the requirements of the European legislator in terms of  
488 classification and species coding for a correct identification and labelling of seafood products on the

489 national market. However, the new policy adopted by the Ministry of Agriculture and Forestry for  
490 the designation of official names, although it has been plausibly determined by the need to provide  
491 the market an instrument capable of responding to the continuous expansion of the number of  
492 potentially tradable fish species, is not aligned with the one-species one name approach advocated  
493 at the international level as the goal system for ensuring a fair and transparent marketplace.

494

## 495 **Acknowledgments**

496

## 497 **Figure captions**

498

499 Figure 1: Distribution of the conservation Status of the SN records listed in the Annex I of  
500 Ministerial Decree n. 19105 of September the 22th, 2017 according to the nine categories defined  
501 by the IUCN

502

503

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667 Table 1: Seafood macro-categories evolution of the official designations lists carried out in three subsequent periods 2002-2005; 2008-2012 and 2017 and calculation of overall  
 668 and within macro-categories Species Index (SI) and cumulative Species Index (C-SI). CD: commercial Designation, SN: Scientific name, F: fish, C: crustacean, MB: Mollusc  
 669 Bivalve, CEP: Cephalopod, G: Gastropod, OI: Other Invertebrate

CAT.	2002-2005						2008-2012						2017					
	CD (n.)	Total SN (n.)	Genus SN (n.)	SN C-SI (n.)	SI	C-SI	CD (n.)	Total SN (n.)	Genus SN (n.)	SN C-SI (n.)	SI	C-SI	CD (n.)	Total SN (n.)	Genus SN (n.)	SN C-SI (n.)	SI	C-SI
F	368	419	21	862	0,88	0,43	491	617	31	1192	0,80	0,41	521	691	72	1904	0,75	0,27
C	60	76	7	203	0,79	0,30	100	121	10	301	0,83	0,33	94	134	13	369	0,70	0,25
MB	47	55	3	81	0,85	0,58	59	73	4	103	0,81	0,57	58	81	6	122	0,72	0,48
CEP	27	38	0	38	0,71	0,71	31	51	0	51	0,61	0,61	30	61	1	69	0,49	0,43
G	13	13	0	13	1,00	1,00	13	18	2	89	0,72	0,15	18	24	5	178	0,75	0,10
OI	2	2	0	2	1,00	1,00	6	5	0	5	1,20	1,20	10	12	0	12	0,83	0,83
<b>TOT</b>	<b>517</b>	<b>603</b>	<b>31</b>	<b>1199</b>	<b>0,86</b>	<b>0,43</b>	<b>700</b>	<b>885</b>	<b>47</b>	<b>1741</b>	<b>0,79</b>	<b>0,40</b>	<b>731</b>	<b>1003</b>	<b>97</b>	<b>2654</b>	<b>0,73</b>	<b>0,28</b>

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684 Table 2: List of species included in the Ministerial Decree for which the IUCN report a medium-high risk of extinction.

NT- Near threatened		VU- Vulnerable		EN- Endangered		CR- Critically	
SN	English name	SN	English name	SN	English name	SN	English name
<i>A. medirostris</i>	Green sturgeon	<i>A. ruthenus</i>	Sterlet sturgeon	<i>A. baerii</i>	Siberian sturgeon	<i>A. gueldenstaedtii</i>	Danube sturgeon
<i>A. bengalensis</i>	Indian mottled eel	<i>S. tudes</i>	Smalleye hammerhead	<i>C. rubrum</i>	Mediterranean red coral	<i>A. naccarii</i>	Adriatic sturgeon
<i>C. acronotus</i>	Blacknose shark	<i>S. zygaena</i>	Smooth hammerhead	<i>A. japonica</i>	Japanese eel	<i>A. nudiventris</i>	Fringebarbel sturgeon
<i>P. glauca</i>	Blue shark	<i>C. cirrhosus</i>	Mrigal carp	<i>A. rostrata</i>	American eel	<i>A. stellatus</i>	Starry sturgeon
<i>L. smithii</i>	Barbeled houndshark	<i>C. carpio</i>	Common carp	<i>C. soetta</i>	Europe, Adriatic basin	<i>A. sturio</i>	Sturgeon
<i>M. canis</i>	Dusky smooth-hound	<b>G. morhua</b>	<b>Atlantic cod</b>	<b>T. thynnus</b>	<b>Atlantic bluefin tuna</b>	<i>H. huso</i>	Beluga
<i>B. meridionalis</i>	Mediterranean barbel	<b>M. aeglefinus</b>	<b>Haddock</b>	<b>E. marginatus</b>	<b>Dusky grouper</b>	<i>A. anguilla</i>	European eel
<i>H. molitrix</i>	Silver carp	<i>I. oxyrinchus</i>	Shortfin mako	<i>A. castelnaui</i>	Spotback skate	<i>T. maccoyii</i>	Souther bluefin tuna
<i>M. bilinearis</i>	Silver hake	<i>I. paucus</i>	Longfin mako	<i>L. circularis</i>	Sandy ray	<i>S. carpio</i>	NR
<b>L. vomerinus</b>	<b>Devil Anglerfish</b>	<i>L. ditropis</i>	Salmon shark	<i>Leucoraja ocellata</i>	Winter skate	<i>S. marmoratus</i>	NR
<b>T. alalunga</b>	<b>Albacore</b>	<i>L. nasus</i>	Porbeagle	<b>P. hypophthalmus</b>	<b>Striped catfish</b>	<i>S. squatina</i>	Angelshark
<b>T. albacares</b>	<b>Yellowfin tuna</b>	<i>T. picturatus</i>	Blue jack mackerel	<i>Mustelus schmitti</i>	Narrownose smooth-hound		
<b>E. aeneus</b>	<b>white grouper</b>	<i>T. trachurus</i>	Atlantic horse mackerel				
<b>E. bleekeri</b>	<b>Duskytail grouper</b>	<i>K. albida</i>	Atlantic white marlin				
<b>E. malabaricus</b>	<b>Malabar grouper</b>	<i>M. nigricans</i>	Blue marlin				
<b>E. morio</b>	<b>Red grouper</b>	<i>R. aurorubens</i>	Vermilion snapper				
<b>E. polylepis</b>	<b>Smallscaled grouper</b>	<i>P. maculatus</i>	Spotted goatfish				
<i>A. argyrozona</i>	Carpenter seabream	<i>P. prayensis</i>	West African goatfish				
<b>D. angolensis</b>	<b>Angolan dentex</b>	<i>P. saltatrix</i>	Blue fish				
<i>P. bogaraveo</i>	Blackspot seabream	<i>A. aequidens</i>	Geelbeck croaker				
<i>D. innominatus</i>	N. Zealand smooth skate	<i>C. othonopterum</i>	Gulf weakfish				
<i>R. asterias</i>	Medit. starry ray	<i>T. obesus</i>	Bigeye tuna				
<i>R. clavata</i>	Thornback ray	<i>T. orientalis</i>	Pacific bluefin tuna				
<i>A. coila</i>	Gangetic ailia	<i>D. dentex</i>	Common dentex				
<i>O. bimaculatus</i>	Butter catfish	<i>A. radiata</i>	Starry ray				
<i>O. pabda</i>	Pabdah catfish	<i>A. cyclophora</i>	Eyespot skate				
<i>W. attu</i>	Wallago	<i>C. lavaretus</i>	European whitefish				
<i>D. licha</i>	Kitefin shark	<i>C. lusitanicus</i>	Lowfin gulper shark				
<i>S. capensis</i>	Yellowspotted catshark	<i>C. squamosus</i>	Leafscale gulper shark				
<i>S. stellaris</i>	Nursehound	<i>Alopias vulpinus</i>	Thresher				
<i>C. coelolepis</i>	Portuguese dogfish	<i>S. acanthias</i>	Picked dogfish				
<i>P. charlestoni</i>	Cape verde spiny lobster	<i>G. galeus</i>	Tope shark				
<i>V. casina</i>	Tick ridged venus						
<i>V. verrucosa</i>	Warty venus						
<i>E. esculentus</i>	European edible sea urchin						



## **Highlights**

The new Italian list of official seafood commercial designations was analysed

Correctness, validity and accuracy of the list were verified

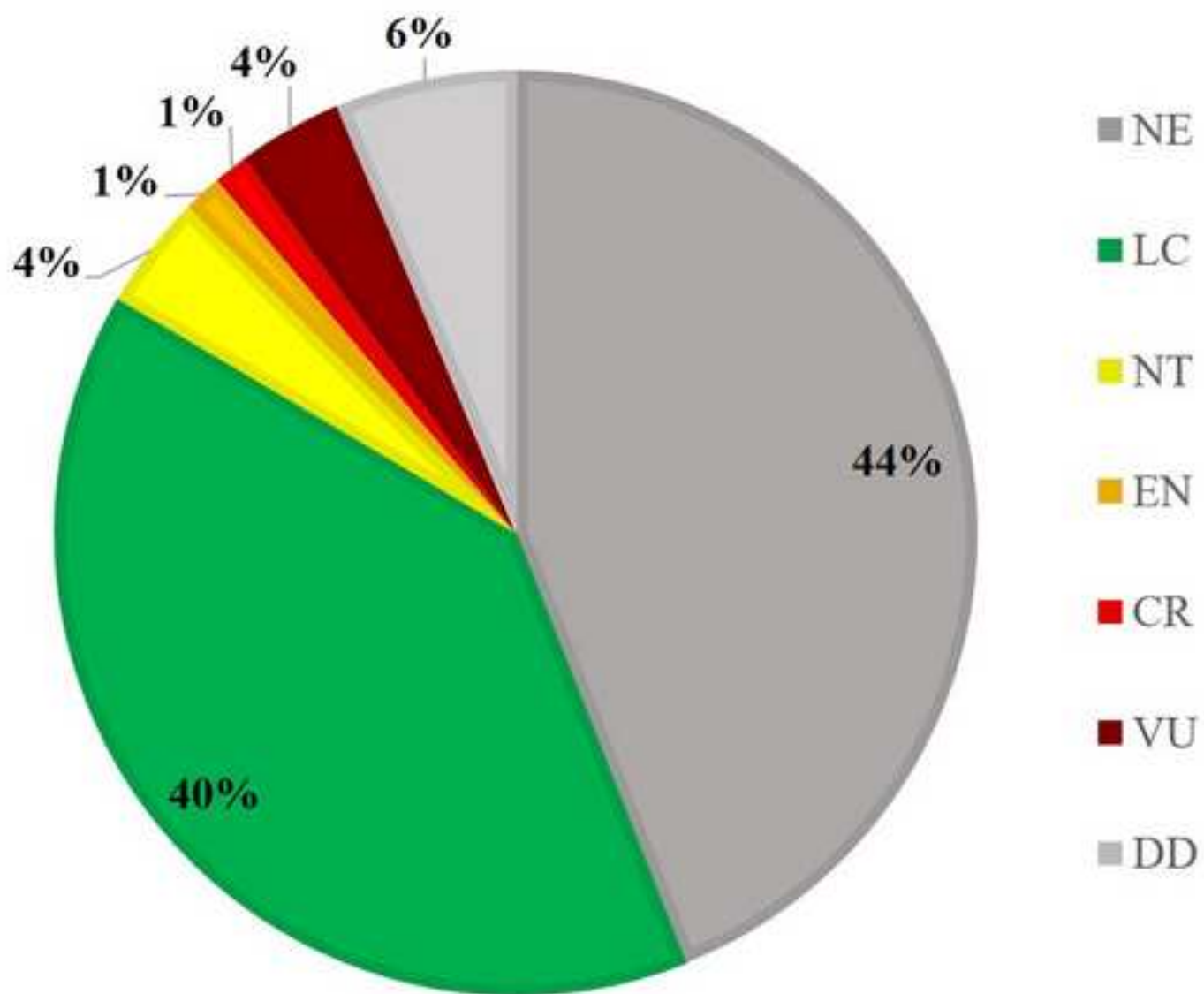
The list meets the requirements of the EU Commission

Results highlight a meticulous revision of the taxonomical nomenclature

An increase of “designation generalization” was observed

Figure

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