



**17/07/2023**

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**Cliente:** Shelter srl.

**Indirizzo:** Viale Gran Sasso, 13 – 20131 Milano (ITALY)

**C/A:** Dott. Paolo Bigoni

|                                                         |                                                             |
|---------------------------------------------------------|-------------------------------------------------------------|
| <b>Commessa:</b> 2238H04                                |                                                             |
| <b>Descrizione campione (matrice):</b> Acqua di mare    |                                                             |
| <b>Codice campione:</b> RAV2304T1 -R1, -R2, -R3         | <b>Codice Accettazione:</b> 1375-23/1, 1648-23/1, 1671-23/1 |
| <b>Data campionamento:</b> 06/04/2023                   | <b>Luogo:</b> FSRU Ravenna                                  |
| <b>Campionamento effettuato da:</b> CIBM                |                                                             |
| <b>Procedura di campionamento:</b> Bottiglia Niskin     |                                                             |
| <b>Documentazione di Riferimento Interno:</b> MP 138/23 |                                                             |
| <b>Data ricezione campione in laboratorio:</b> 26/04/23 |                                                             |
| <b>Trasporto del campione:</b> TA                       | <b>Conservazione campione:</b> TA                           |

**Risultati di Prova:**

|                                                                   |                                  |
|-------------------------------------------------------------------|----------------------------------|
| <b>Data inizio prove:</b> 26/04/23                                | <b>Data fine prove:</b> 07/07/23 |
| <b>Metodi di prova:</b> ISPRA-SIBM. Manuali e Linee Guida 56/2010 |                                  |
| <b>Dati di abbondanza:</b> espressi in n. cellule/litro           |                                  |

| Specie o Taxon                                                                                | R1    | R2    | R3    |
|-----------------------------------------------------------------------------------------------|-------|-------|-------|
| <b>Diatomee</b>                                                                               |       |       |       |
| <i>Amphora laevis</i> Gregory 1857                                                            |       |       |       |
| <i>Amphora</i> spp.                                                                           | 3116  |       |       |
| <i>Asterionellopsis glacialis</i> (Castracane) Round 1990                                     | 6233  |       |       |
| <i>Bacteriastrum delicatulum</i> Cleve 1897                                                   |       |       | 3127  |
| <i>Bacteriastrum hyalinum</i> Lauder 1864                                                     |       |       |       |
| <i>Bacteriastrum jadrinum</i> Godrijan, Maric & Pfannkuchen 2012                              |       |       |       |
| <i>Bacteriastrum parallelum</i> Sarno, Zingone & Marino 1997                                  |       | 2458  |       |
| <i>Cerataulina pelagica</i> (Cleve) Hendey 1937                                               | 6233  |       |       |
| <i>Chaetoceros affinis</i> Lauder 1864                                                        |       |       |       |
| <i>Chaetoceros brevis</i> Schütt 1895                                                         |       |       |       |
| <i>Chaetoceros</i> cf. <i>costatus</i> Pavillard 1911                                         |       |       |       |
| <i>Chaetoceros compressus</i> Lauder 1864                                                     | 99725 | 71288 | 50039 |
| <i>Chaetoceros curvisetus</i> Cleve 1889                                                      | 37397 | 19666 | 37529 |
| <i>Chaetoceros decipiens</i> Cleve 1873                                                       |       | 4916  |       |
| <i>Chaetoceros laciniosus</i> Schütt 1895                                                     |       |       |       |
| <i>Chaetoceros neogracile</i> Van Landingham 1968                                             |       |       |       |
| <i>Chaetoceros socialis</i> Lauder 1864                                                       |       |       |       |
| <i>Chaetoceros</i> spp.                                                                       | 37397 | 63913 | 84441 |
| <i>Chaetoceros subtilis</i> Cleve 1896                                                        |       |       |       |
| <i>Chaetoceros tenuissimus</i> Meunier 1913                                                   |       |       |       |
| <i>Chaetoceros thronsdonii</i> (Marino, Montresor & Zingone) Marino, Montresor & Zingone 1991 |       | 2458  |       |
| <i>Chaetoceros wighamii</i> Brightwell 1856                                                   |       |       | 9382  |
| <i>Cyclotella</i> spp.                                                                        |       |       |       |
| <i>Cylindrotheca closterium</i> (Ehrenberg) Reimann & Lewin 1964                              | 68561 | 29498 | 31274 |
| <i>Cylindrotheca gracilis</i> (Brébisson ex Kützing) Grunow 1882                              |       |       |       |
| <i>Dactyliosolen blavyanus</i> (Peragallo) Hasle 1975                                         |       |       |       |
| <i>Dactyliosolen fragilissimus</i> (Bergon) Hasle 1996                                        | 24931 | 4916  | 25020 |



| Specie o Taxon                                                                 | R1      | R2     | R3     |
|--------------------------------------------------------------------------------|---------|--------|--------|
| <i>Dactyliosolen phuketensis</i> (Sundstrom) Hasle 1996                        |         |        |        |
| <i>Diatomea pennata</i> n.i. (forma p)                                         |         |        |        |
| Diatomee centriche $\leq 20 \mu\text{m}$ n.i.                                  | 12466   |        |        |
| Diatomee centriche $> 20 \mu\text{m}$ n.i.                                     |         |        |        |
| Diatomee pennate $\leq 20 \mu\text{m}$ n.i.                                    | 3116    | 9833   |        |
| Diatomee pennate $> 20 \mu\text{m}$ n.i.                                       |         |        | 15637  |
| <i>Entomoneis</i> spp.                                                         |         |        |        |
| <i>Hantzschia amphioxys</i> (Ehrenberg) Grunow 1880                            |         |        |        |
| <i>Leptocylindrus danicus</i> Cleve 1889                                       | 3116    | 7375   | 6255   |
| <i>Licmophora flabellata</i> (Grev.) Agardh 1831                               |         |        |        |
| <i>Lithodesmium undulatum</i> Ehrenberg 1839                                   |         |        |        |
| <i>Navicula cancellata</i> Donkin 1872                                         |         |        |        |
| <i>Navicula</i> cf. <i>transitans</i> Heimdal 1970                             |         |        |        |
| <i>Navicula</i> spp.                                                           | 6233    |        |        |
| <i>Nitzschia</i> (sez. <i>sigmatae</i> ) sp.                                   |         | 2458   | 3127   |
| <i>Nitzschia bilobata</i> Smith 1853                                           |         |        |        |
| <i>Nitzschia longissima</i> (Brébisson) Ralfs 1861                             | 31164   | 22124  | 34402  |
| <i>Nitzschia lorenziana</i> Grunow 1879                                        |         |        |        |
| <i>Nitzschia spathulata</i> Smith 1853                                         | 3116    |        |        |
| <i>Nitzschia</i> spp.                                                          |         |        |        |
| <i>Plagiotropis</i> sp.                                                        |         |        |        |
| <i>Pleurosigma naviculaceum</i> Brébisson 1854                                 |         |        |        |
| <i>Pleurosigma normanii</i> Ralfs 1861                                         |         |        |        |
| <i>Proboscia alata</i> (Brightwell) Sundström 1986                             |         |        |        |
| <i>Pseudo-nitzschia</i> cf. <i>fraudulenta</i> (Cleve) Hasle 1993              |         |        |        |
| <i>Pseudo-nitzschia</i> sp. (seriata complex)                                  |         |        |        |
| <i>Pseudo-nitzschia</i> spp. (delicatissima complex)                           | 1530149 | 875121 | 841283 |
| <i>Pseudo-nitzschia</i> spp. (pseudodelicatissima complex)                     | 34280   | 14749  | 53167  |
| <i>Pseudo-nitzschia subfraudulenta</i> (Hasle) Hasle 1993                      |         |        | 9382   |
| <i>Rhizosolenia hebetata</i> f. <i>semispina</i> (Hensen) Gran 1905            |         |        |        |
| <i>Rhizosolenia imbricata</i> Brightwell 1858                                  |         |        |        |
| <i>Rhizosolenia</i> sp.                                                        |         |        |        |
| <i>Skeletonema costatum</i> (Greville) Cleve 1873                              |         |        |        |
| <i>Skeletonema marinoi</i> Sarno & Zingone 2005                                |         |        |        |
| <i>Skeletonema pseudocostatum</i> Medlin 1991                                  |         |        |        |
| <i>Synedra</i> cf. <i>affinis</i> Kützing 1844                                 |         |        |        |
| <i>Thalassionema</i> cf. <i>bacillare</i> (Heiden) Kolbe 1955                  |         |        | 3127   |
| <i>Thalassionema frauenfeldii</i> (Grunow) Hallegraeff 1986                    | 6233    |        |        |
| <i>Thalassionema nitzschioides</i> (Grunow) Mereschkowsky 1902                 |         |        |        |
| <i>Thalassiosira angulata</i> (Gregory) Hasle 1978                             |         |        |        |
| <i>Thalassiosira delicatula</i> Ostensfeld 1908                                |         |        |        |
| <i>Thalassiosira rotula</i> Meunier 1910                                       |         |        |        |
| <i>Thalassiosira</i> spp.                                                      | 12466   | 4916   | 25020  |
| <b>Dinoflagellati</b>                                                          |         |        |        |
| <i>Alexandrium catenella</i> (Whedon & Kofoid) Balech 1985                     |         |        |        |
| <i>Alexandrium</i> cf. <i>margalefii</i> Balech 1994                           |         |        |        |
| <i>Alexandrium</i> cf. <i>minutum</i> Halim 1960                               |         | 2458   |        |
| <i>Alexandrium ostenfeldii</i> (Paulsen) Balech & Tangen 1985                  |         |        |        |
| <i>Alexandrium pseudogonyaulax</i> (Biecheler) Horiguchi ex Kita & Fukuyo 1992 |         |        |        |
| <i>Alexandrium tamarense</i> (Lebour) Balech 1995                              |         |        |        |
| <i>Amphidinium</i> cf. <i>flagellans</i> Schiller                              |         |        |        |
| <i>Amphidinium</i> cf. <i>globosum</i> Schröder 1911                           |         |        |        |
| <i>Amphidinium</i> cf. <i>sphenoides</i> Wulff 1916                            |         |        |        |
| <i>Amphidinium longum</i> Lohmann 1908                                         |         |        |        |



| Specie o Taxon                                                              | R1   | R2   | R3   |
|-----------------------------------------------------------------------------|------|------|------|
| <i>Amphidinium</i> spp.                                                     |      |      |      |
| <i>Amphidoma languida</i> Tillmann, Salas & Elbrächter 2012                 |      |      |      |
| <i>Azadinium caudatum</i> var. <i>margalefii</i> Nézan & Chomérat 2012      |      |      |      |
| <i>Azadinium spinosum</i> Elbrächter & Tillmann 2009                        |      |      |      |
| <i>Cochlodinium helix</i> (Pouchet) Lemmermann 1899                         |      |      |      |
| <i>Cochlodinium pulchellum</i> Lebour 1917                                  |      |      |      |
| <i>Cochlodinium pupa</i> Lebour 1925                                        |      |      |      |
| <i>Cochlodinium</i> sp.                                                     |      |      |      |
| Dinoflagellati tecati $\leq 20 \mu\text{m}$ n.i.                            | 6233 |      |      |
| Dinoflagellati tecati $> 20 \mu\text{m}$ n.i.                               | 6233 |      |      |
| <i>Dinophysis acuminata</i> Claparède & Lachmann 1859                       |      |      |      |
| <i>Dinophysis hastata</i> Stein 1883                                        |      |      |      |
| <i>Dinophysis sacculus</i> Stein 1883                                       |      |      |      |
| <i>Diplopsalis lenticula</i> Bergh 1881                                     |      |      |      |
| <i>Gonyaulax spinifera</i> (Claparède & Lachmann) Diesing 1866              |      |      |      |
| Gymnodiniaceae $\leq 20 \mu\text{m}$ n.i.                                   |      |      | 3127 |
| Gymnodiniaceae $> 20 \mu\text{m}$ n.i.                                      | 3116 | 2458 | 3127 |
| <i>Gymnodinium voukii</i> Schiller 1928                                     |      |      |      |
| <i>Gyrodinium fusiforme</i> Kofoid & Swezy 1921                             |      |      |      |
| <i>Gyrodinium</i> spp.                                                      |      |      |      |
| <i>Heterocapsa circularisquama</i> Horiguchi 1995                           |      |      |      |
| <i>Heterocapsa horiguchii</i> Iwataki, Takayama & Matsuoka 2002             |      |      | 3127 |
| <i>Heterocapsa illdefina</i> (Herman & Sweeney) Morrill & Loeblich III 1981 |      |      |      |
| <i>Heterocapsa minima</i> Pomroy 1989                                       |      |      |      |
| <i>Heterocapsa niei</i> (Loeblich III) Morrill & Loeblich III 1981          |      |      |      |
| <i>Heterocapsa orientalis</i> Iwataki Botes & Fukuyo 2003                   |      |      |      |
| <i>Heterocapsa triquetra</i> (Ehrenberg) Stein 1883                         |      |      |      |
| <i>Karenia brevis</i> (Davis) Hansen & Moestrup 2000                        |      |      |      |
| <i>Karenia mikimotoi</i> (Miyake & Kominami ex Oda) Hansen & Moestrup 2000  |      |      |      |
| <i>Karenia papilionacea</i> Haywood & Steidinger 2004                       |      |      |      |
| <i>Karenia</i> spp.                                                         |      |      |      |
| <i>Lessardia elongata</i> Saldarriaga & Taylor 2003                         |      | 2458 | 3127 |
| <i>Mesoporos adriaticus</i> (Schiller) Lillick                              |      |      |      |
| <i>Mesoporos perforatus</i> (Gran) Lillick 1937                             |      |      |      |
| <i>Minuscula bipes</i> (Paulsen) Lebour 1925                                | 3116 |      |      |
| <i>Neoceratium furca</i> (Ehrenberg) Gómez, Moreira & López-García 2010     |      |      |      |
| <i>Neoceratium fusus</i> (Ehrenberg) Gómez, Moreira & López-García 2010     |      |      |      |
| <i>Neoceratium horridum</i> (Gran) Gómez, Moreira & López-García 2010       |      |      |      |
| <i>Oxytoxum adriaticum</i> Schiller 1937                                    |      |      |      |
| <i>Oxytoxum coronatum</i> Schiller 1937                                     |      |      |      |
| <i>Oxytoxum laticeps</i> Schiller 1937                                      |      |      |      |
| <i>Oxytoxum longum</i> Schiller 1937                                        |      |      |      |
| <i>Oxytoxum mediterraneum</i> Schiller                                      |      |      |      |
| <i>Oxytoxum variabile</i> Schiller 1937                                     |      |      |      |
| <i>Pentapharsodinium dalei</i> Indelicato & Loeblich III 1986               |      |      |      |
| <i>Phalacroma rotundatum</i> (Claparède & Lachmann) Kofoid & Michener 1911  |      |      |      |
| <i>Prorocentrum balticum</i> (Lohmann) Loeblich 1970                        |      |      |      |
| <i>Prorocentrum compressum</i> (Bailey) Abé ex Dodge 1975                   | 3116 |      |      |
| <i>Prorocentrum cordatum</i> (Ostenfeld) Dodge 1975                         |      |      |      |
| <i>Prorocentrum gracile</i> Schütt 1895                                     |      |      |      |
| <i>Prorocentrum micans</i> Ehrenberg 1833                                   |      |      |      |
| <i>Prorocentrum minimum</i> (Pavillard) Schiller 1933                       | 3116 |      |      |
| <i>Prorocentrum scutellum</i> Schröder 1900                                 |      | 2458 |      |
| <i>Protoperidinium breve</i> Paulsen 1907                                   |      |      |      |



| Specie o Taxon                                                           | R1    | R2    | R3    |
|--------------------------------------------------------------------------|-------|-------|-------|
| <i>Protoperidinium brevipes</i> (Paulsen, 1908) Balech 1974              |       |       |       |
| <i>Protoperidinium cerasus</i> (Paulsen) Balech 1973                     |       |       |       |
| <i>Protoperidinium cf. globulus</i> (Stein) Balech 1974                  |       |       |       |
| <i>Protoperidinium conicum</i> (Gran) Balech 1974                        |       |       |       |
| <i>Protoperidinium divergens</i> (Ehrenberg) Balech 1974                 |       |       |       |
| <i>Protoperidinium leonis</i> (Pavillard) Balech 1974                    |       |       |       |
| <i>Protoperidinium oceanicum</i> (VanHöffen) Balech 1974                 |       |       |       |
| <i>Protoperidinium ovum</i> (Schiller) Balech 1974                       |       |       |       |
| <i>Protoperidinium pentagonum</i> (Gran 1902) Balech 1974                |       |       |       |
| <i>Protoperidinium quarnerense</i> (Schröder, 1900) Balech 1974          |       |       |       |
| <i>Protoperidinium tuba</i> (Schiller) Balech 1974                       |       |       |       |
| <i>Scrippsiella trochoidea</i> (Stein) Balech ex Loeblich III 1965       |       | 2458  |       |
| <i>Spatulodinium pseudonociluca</i> (Pouchet) Cachon & Cachon 1968       |       |       |       |
| <i>Torodinium robustum</i> Kofoid & Swezy 1921                           |       |       |       |
| <b>Prymnesiophyceae/Coccolitofori</b>                                    |       |       |       |
| <i>Acanthoica quattrosipina</i> Lohmann 1903                             |       |       |       |
| <i>Calcidiscus leptoporus</i> (Murray & Blackman) Loeblich & Tappan 1978 |       |       |       |
| <i>Calciosolenia brasiliensis</i> (Lohmann) Young 2003                   |       |       |       |
| <i>Calyptrorphaera oblonga</i> Lohmann 1902                              |       |       |       |
| Coccolitofori $\leq 10 \mu\text{m}$ n.i.                                 |       |       | 3127  |
| <i>Daktylethra pirus</i> (Kamptner) Norris 1985                          | 18698 | 4916  | 9382  |
| <i>Emiliania huxleyi</i> (Lohmann) Hay & Mohler 1967                     | 3116  |       |       |
| <i>Helladosphaera cornifera</i> (Schiller) Kamptner 1937                 |       |       |       |
| <i>Ophiaster hydroideus</i> (Lohmann) Lohmann 1913                       |       |       |       |
| <i>Pontosphaera</i> sp.                                                  |       |       |       |
| <i>Sphaerocalyptra quadridentata</i> (Schiller) Deflandre 1952           |       |       |       |
| <i>Syracosphaera cf. molischii</i> Schiller 1925                         |       |       |       |
| <i>Syracosphaera histrica</i> Kamptner 1941                              |       |       |       |
| <i>Syracosphaera pulchra</i> Lohmann 1902                                | 6233  | 7375  |       |
| <i>Zygospaera hellenica</i> Kamptner 1937                                | 3116  |       |       |
| <b>Altro</b>                                                             |       |       |       |
| Cryptophyceae n.i.                                                       | 15582 | 12291 | 6255  |
| <i>Plagioselmis prolunga</i> Butcher ex Novarino, Lucas & Morrall 1994   |       |       |       |
| <i>Apedinella radians</i> (Lohmann) Campbell 1973                        |       |       |       |
| <i>Dictyocha fibula</i> Ehrenberg 1839                                   |       |       |       |
| <i>Dictyocha speculum</i> Ehrenberg 1839                                 |       |       |       |
| <i>Dinobryon faculiferum</i> (Willén) Willén 1992                        | 3116  |       | 3127  |
| <i>Ollicola vangoorii</i> (Conrad) Vørs 1992                             |       |       |       |
| <i>Pseudopedinella pyriformis</i> Carter 1937                            |       |       |       |
| <i>Euglena acusformis</i> Schiller                                       | 3116  | 4916  |       |
| <i>Eutreptia lanowii</i> Steuer 1904                                     |       |       |       |
| <i>Eutreptia viridis</i> Perty 1852                                      |       |       |       |
| <i>Eutreptiella braarudii</i> Throndsen 1969                             |       |       |       |
| <i>Eutreptiella gymnastica</i> Throndsen 1969                            |       |       |       |
| <i>Ankistrodesmus falcatus</i> (Corda) Ralfs 1848                        |       |       |       |
| <i>Desmodesmus communis</i> (Hegewald) Hegewald                          |       |       | 12510 |
| <i>Halosphaera viridis</i> Schmitz 1878                                  |       |       |       |
| <i>Pachysphaera pelagica</i> Ostenfeld 1899                              |       |       |       |
| <i>Pseudoscofieldia marina</i> (Throndsen) Manton 1975                   |       |       |       |
| <i>Pyramimonas</i> spp.                                                  |       |       | 3127  |
| <i>Tetraselmis</i> sp.                                                   | 6233  |       |       |
| <i>Phaeocystis</i> sp.                                                   | 21815 |       |       |
| <i>Pseudanabaena</i> sp.                                                 |       |       |       |
| Flagellati indeterminati $< 10 \mu\text{m}$                              | 3116  | 4916  | 3127  |



| <b>Specie o Taxon</b>                                               | <b>R1</b>      | <b>R2</b>      | <b>R3</b>      |
|---------------------------------------------------------------------|----------------|----------------|----------------|
| <i>Commation cryoporinum</i> Thomsen & Larsen 1993                  | 3116           |                |                |
| <i>Heterosigma akashiwo</i> (Hada) Hada ex Hara & Chihara 1987      |                |                |                |
| <i>Leucocryptos marina</i> (Braarud) Butcher 1967                   | 6233           |                |                |
| <i>Mesodinium rubrum</i>                                            |                |                |                |
| <i>Paulinella ovalis</i> (Wulff) Johnson, Hargraves & Sieburth 1988 |                |                |                |
| <i>Telonema</i> sp.                                                 |                | 2458           | 3127           |
|                                                                     |                |                |                |
| <b>Totale</b>                                                       | <b>2044354</b> | <b>1184855</b> | <b>1288508</b> |
| <b>Diatomee</b>                                                     | <b>94,21%</b>  | <b>95,85%</b>  | <b>95,63%</b>  |
| <b>Dinoflagellati</b>                                               | <b>1,22%</b>   | <b>1,04%</b>   | <b>0,97%</b>   |
| <b>Prymnesiophyceae Coccolitofori</b>                               | <b>1,52%</b>   | <b>1,04%</b>   | <b>0,97%</b>   |
| <b>Altro plancton</b>                                               | <b>3,05%</b>   | <b>2,07%</b>   | <b>2,43%</b>   |
| <b>N. taxa</b>                                                      | <b>36</b>      | <b>26</b>      | <b>28</b>      |

- I risultati riportati sono riferiti al solo campione sottoposto a prova.
- Il presente rapporto di prova non può essere riprodotto in forma parziale, salvo l'approvazione scritta del Dipartimento di Biologia dell'Università di Firenze.

**OPERATORI TECNICI:**

Laura Frittitta  
Francesca Polonelli

**Responsabile di Laboratorio**