



NEWLY DISCOVERED AND UNCODIFIED INTERTIDAL MARINE HABITATS OF THE NORTH-WESTERN BLACK SEA AND NEARBY AREAS

Son M.O. – PhD, Senior Researcher

Institute of Marine Biology of the National Academy of Sciences of Ukraine, michail.son@gmail.com

Koshelev A.V. – PhD, Senior Researcher

Institute of Marine Biology of the National Academy of Sciences of Ukraine, koshelev2006@ukr.net

Uncodified intertidal marine habitats of the NWBS and nearby areas were inventory. Because of research, 17 new habitats were identified: “Pontic supralittoral rock with marine Diptera”, “Limestone pavement with supralittoral rockpools”, “Drainage of fresh water on the rocks”, “Diptera and Enchytraeidae on strandline”, “Pontic multispecies communities on strandline”, “Freshwater springs on the sandy beaches and associated pools”, “Long-existing pools and ponds with marine fauna on the sandy beach”, “Pontic mediolittoral granule with *Saccocirrus papillocerus*”, “Mediolittoral sands with Enchytraeidae”, “Pontic mediolittoral gravel with *Donacilla cornea* and *Saccocirrus papillocerus*”, “Pontic mediolittoral fine-medium sands with *Pontogammarus maeoticus* and bivalves”, “Pontic mediolittoral shelly gravel with crustaceans”, “Pontic soft rock beds with *Barnea candida* burrows”, “Pontic infralittoral coarse sediments with Rhodophyta”, “Pontic infralittoral sands with crustaceans”, “Pontic scoured sublittoral cobbles and pebbles with *Mytilaster*”, “Aggregation dead remnants of angiosperms in infralittoral zone”. Some of the selected habitats are covered by the less detailed “Bern” habitats “A2.2: Littoral sand and muddy sand”; “Bern” habitat “A3: Infralittoral rock and other hard substrata”; “Bern” habitat “A5: Sublittoral sediment”. These habitats should be protected for a long time by creating the Emerald Network of Ukraine. Selected habitats relatively well covered by protected areas, with the exception of those associated with soft rocks. The creation of protected areas covering these landscapes between Chornomorsk City and Tiligul Liman is necessary.

Key words: habitats, intertidal zone, classification, Black Sea.

Introduction

The use of codified habitats in ecological monitoring and bioindication systems in recent years has become a major new trend in the environmental assessments of coastal and marine waters.

An assessment of the status and distribution of habitats occupies a key place in a number of environmental quality descriptors used in the EU Marine Strategy Framework Directive. Elements of indications related to habitats in environmental assessments can be very diverse: diversity of habitats, their area, connectivity, mosaics, the presence of key, typical or rare settlements, the condition of individual habitats, etc. The nomenclature base of such assessment is the European Habitat Classification Framework, developed by the European Environment Agency, which is an element of the European Nature Information System (EUNIS), which provides both the work of the European Environment Agency and various departments and environmental projects. Public access to this system is provided in the form of the official EUNIS database (European Environment Agency 2019).

EUNIS Habitat Classification highlights a number of broad categories: A “Marine habitats”, B “Coastal

habitats”, C “Inland surface waters”, D “Mires, bogs and fens”, E “Grasslands and lands dominated by forbs, mosses or lichens”, F “Heathland, scrub and tundra”, G “Woodland, forest and other wooded land”, H “Inland unvegetated and sparsely vegetated habitats”, I “Regularly or recently cultivated agricultural, horticultural and domestic habitats” and J “Constructed, industrial and other artificial habitats”. Each of them is divided into many codes, organized in the form of a multistage pyramidal hierarchy.

The predecessor of the EUNIS classification was the classification of the European Agency for the Environment's predecessor, the CORINE project (Co-ordination of Information on the Environment), based on the habitats of the public interest were determined by the Habitats Directive. At the same time, neither the CORINE classification, nor the Palaeartic Habitat Classification (its extended version for central and northern Europe) contained a detailed classification of marine habitats sufficient for mapping and monitoring (Evans 2012).

In addition to the CORINE and Palaeartic Habitat Classification classifications, the EUNIS classification partially absorbed a number of regional marine classifi-

cations – the OSPAR Atlantic habitats, the British Bio-Mar, etc. As a result, the level of elaboration and detail is extremely different for both different regions and different habitats. Regarding marine and coastal habitats, their classification were based on oceanic and macrotidal seas conditions, but secondary adapted to the conditions of non-tidal seas by including a large number of the Baltic, Mediterranean and Black Sea habitats.

However, the added Black Sea habitats were based mostly not on special studies, but on various existing lists of important Black Sea “biocenoses”. As a result, many habitats, especially those characteristic of the North-Western Black Sea (NWBS), were not codified. The largest gap was the habitats of the intertidal zone, which are usually not covered by research during marine expeditions.

In this paper we attempt to inventory of uncodified intertidal marine habitats of the NWBS and nearby areas. We do not include the Black Sea estuaries, which require separate consideration.

Materials and methods

This work is based on long-term field investigation of intertidal zone of the Black Sea during 2007–2018 (Fig. 1). The field locations cover different geomorphological types of coasts, salinity and wave conditions and other key elements of landscape diversity of the study region. The structure of habitat descriptions and their names were made similar to the existing habitat profiles in EUNIS habitat classification, so that they can be integrated into this system.

The scale of habitat selection, according to the EUNIS ideology, was determined by the conditions of habitat of small vertebrates, large invertebrates and vascular plants. Specific habitats of small invertebrates and lower plants, usually not exceeding 1 m² in this system, are not regulated by this EUNIS classification due to the complexity of their isolation and mapping.

The selection of new habitats was carried out in stages:

1. Classification of the vertical zone as littoral (supralittoral and midlittoral) or sublittoral (infralittoral in the studied cases).
2. Classification of the dominated substrate as sediments (not only sand and mud, but also mobile gravel) or rocks (not only stones, but also hard clays).
3. Classification of the surf or flow regime as high, moderate, or low energy, and also tidal or riverine currents in transitional waters.
4. Reclassification of substrates (taking into account particle size) and salinity regimes.
5. Final wording indicating characteristic indicator species or communities. Communities themselves and their quantitative properties are not subject to classification, but only a convenient indicator of environ-

mental conditions (with the exception of environmental engineers who themselves create conditions such as, for example, seagrasses).

At stage 3–5 (where appropriate), a habitat is separated as “Pontic” or “Mediterranean and Pontic”.

A key issue that can cause confusion is the mismatch between the Soviet particle size decimal scale and the worldwide Wenworth logarithmic scale used in the EUNIS system.

Main problem of Soviet particle size decimal scale – mismatch of the size boundaries between sand and larger particles with the natural hydrodynamic properties of the particles.

The most important are the natural dimensional boundaries between sand and smaller particles, as well as between sand and gravel because at these boundaries the movement of particles in the water flow (drawing, saltation and transport as a suspension) and the possibility of capillary raising of water in the sand are change (Прошляков, и Кузнецов 1991).

Such properties of particles are important for the environmental conditions of supralittoral and interstitial fauna (for example, “saccocirrus sand”, which is sand in the Soviet decimal scale of debris, in the Wenworth scale refers to a “very fine gravel”, which clearly corresponds to its properties as a habitat.

Results and discussions

Because of research, 17 new habitats were identified. There are also undoubtedly uncodified habitats associated with the meadows of Charophyceae algae and pondweed angiosperms present in this region. Our studies have poorly covered locations where they are common and therefore we decided that in this work their description would be premature.

In addition, some other sublittoral habitats differ from descriptions of already codified habitats, but in reality are minor varieties (as example *Mytilaster* mussels instead of *Mytilus*) and this does not require the introduction of new codes, but a slight redescription of the already established.

1. Pontic supralittoral rock with marine Diptera.

Supralittoral zone of marine rocks in zones of freshened water influence (especially, Dnieper River), which are colonized by specialized marine Diptera, especially *Thalassomyia frauenfeldti* Schiner, 1856. In areas with higher salinity this habitat is replaced by more usual “A1.161 – Pontic upper shore with *Chthamalus*, *Ligia*, *Melaraphe*, *Rivularia* (cyanophites)” (Сон 2015). Communities characteristic of these two habitats can also inhabit man-made constructions and classified as artificial habitats, for example “J4.5 – Hard-surfaced areas of ports” or “J2.53 Sea walls”.

The need for describing: Different salinity regime and indicator communities than similar described habitats.

Distribution. Widespread between the city of Chernomorsk and Dnieper-Bug Liman mouth.

2. Limestone pavement with supralittoral rock-pools. Natural karst landform consisting of a flat, incised surface of exposed limestone with hollows (“Tarkhankut cauldrons”). This landscape form network of rockpools, which is specific habitat for marine crabs and fishes as well as for supralittoral crustaceans, especially *Ligia italica* Fabricius, 1798.

The need for describing: local special type of abiotic conditions (the so-called “features” in the EUNIS classification).

Distribution. Tarkhankut Peninsula.

3. Drainage of fresh water on the rocks. Obviously, it is not specific to the Black Sea, but very characteristic of it due to the prevalence of soft rocks here. Forms a specific habitat that can be colonized by both marine, supralittoral and freshwater organisms.

The need for describing: local special type of abiotic conditions (the so-called “features” in the EUNIS classification).

Distribution. Widespread on rocky shores.

4. Diptera and Enchytraeidae on strandline. Zone of strandline, which are colonized by Talitridae on undisturbed open shores (A2.211 Talitrids on the upper shore and strandline), changes as conditions deteriorate. This usually occurs because of recreation, when the original habitat is destroyed by trampling. However, in NZBW such situation also common as result of enormous storm wracks of marine algae, seagrass or local concentration of clay, gravel and other substrates, which are unfavorable for Talitridae. In all this cases, strandline often colonized by opportunistic communities of littoral Diptera and Enchytraeidae (Сон 2015).

The need for describing: Different substrate composition and indicator communities than similar described habitats.

Distribution. Widespread in the NWBS.

5. Pontic multispecies communities on strandline. Specific supralittoral community forms along the Black Sea coasts in seagrass wracks and sometimes under clusters of large flat stones. It include different species of specialized molluscs, annelids, and crustaceans. Talitrids are common, but do not represent a sharply dominant group as in the case of habitat “A2.211 Talitrids on the upper shore and strandline”, which are widespread on sandy and rocky shores.

The need for describing: Different substrate composition and indicator communities than similar described habitats.

Distribution. Shores of bays with seagrasses meadows (Dzharylhach, Yahorlyk and Tendra gulfs), separate sections of the stony coasts of Crimea.

6. Freshwater springs on the sandy beaches and associated pools. This phenomenon occurs in

groundwater discharge sites near the cliffs and leads to the emergence of various kinds of watercourses on the surface part of the beach or in the intertidal zone, as well as sometimes puddles or small lakes formed by them. It can be colonized by both marine, supralittoral and freshwater organisms.

The need for describing: local special type of abiotic conditions (the so-called “features” in the EUNIS classification).

Distribution. Periodically appear in the area between the Dniester and the Tiligul Limans.

7. Long-existing pools and ponds with marine fauna on the sandy beach. Long-existing pools and ponds with marine fauna are common for depressions of sandy beaches of non-tidal seas. This is a kind of marine exclaves, which may be not connected to the sea for many months except filtering water through sand unlike pools in supralittoral zone of tidal seas and oceans, which appear and disappear during the tidal cycle. This habitat is different from the coastal habitats “B1.221 – Facies of depressions with residual humidity” and “B1.81 Dune-slack pools” by marine origin of its community, which can include different marine amphipods, isopods, bivalves, etc.

The need for describing: local special type of abiotic conditions (the so-called “features” in the EUNIS classification).

Distribution. Widespread on sand spits of limans and on lowland areas near the Danube Delta.

8. Pontic mediolittoral granule with *Saccocirrus papillocerus*. According recent widespread classification of particle size “Saccocirrus sand” is classified as a granule – a clast of rock gravel with a particle size of 2 to 4 mm (larger than sand and smaller than pebbles). In the Black Sea, this substrate can form specific habitat for massive populations of polychaetes *Saccocirrus papillocerus* Bobretzky, 1872.

The need for describing: codes of individual Pontic gravel habitats have not been identified previously.

Distribution. In the NWBS was reported for Uzkaya Gulf (Tarkhankut Peninsula) according to the research of the 1930s (Арнольди 1949). Our research has shown its disappearance in the area and we found it only in Sevastopol sector of the Black Sea.

9. Mediolittoral sands with Enchytraeidae. Fine-medium sands with massive development of Enchytraeidae worms, such as *Lumbricillus* and *Enchytraeus* species are often presented in two situations. On exposed sand coasts this is ephemeral stage of other habitats of littoral sands, especially “A2.262 – *Pontogammarus maeoticus* in fine mediolittoral sands”, which appear after hard winter conditions, mass release of algal wracks, and different man-made impacts, which depress the rest of the fauna. However, on the inner sides of the sand spits and inside the Black

Sea limans such habitat is long exists in areas in organic-rich sediments.

The need for describing: Decreasing of environmental engineers at extremely conditions or man-made impacts with forming other indicator communities than in similar habitats.

Distribution. Widespread in the NWBS.

10. Pontic mediolittoral gravel with *Donacilla cornea* and *Saccocirrus papillocerus*. The threatened bivalve *Donacilla cornea* (Poli, 1791) are known in the Black Sea mostly from sand beach (habitat A2.261: *Donacilla cornea* in medium-coarse mediolittoral sands). However, in Western Crimea was found also specific mediolittoral habitat of fine/medium gravel with massive populations of *D. cornea* (Son, and Koshelev 2014; Линецкий, и Сон 2016) and *S. papillocerus*.

The need for describing: codes of individual Pontic gravel habitats have not been identified previously.

Distribution. Gravel spit of Sasyk-Sivash Lake near Yevpatoriya (Western Crimea).

11. Pontic mediolittoral fine-medium sands with *Pontogammarus maeoticus* and bivalves. Medioltoral fine-medium sands outside fronts of large rivers, where common for the NWBS amphipod *Pontogammarus maeoticus* (Sovinskij, 1894) lives together with bivalve *D. cornea*. Threatened *D. cornea* is critically declining and in some areas where it is currently absent, it is replaced by the young *Donax trunculus* Linnaeus, 1758, which probably migrates to the depth as it grows up. *Scolelepis polychaetes* and *Euridice* isopods can be additional species in this habitats. In the more freshened areas or locations in which *D. cornea* died out this habitat replaced by “A2.262 – Pontogammarus maeoticus in fine mediolittoral sands”. In the areas with full Black Sea salinity and larger sands other two habitats are developed: “A2.261: *Donacilla cornea* in medium-coarse mediolittoral sands” and “A2.251 Facies with *Ophelia bicornis*”. In the place of border between “A2.262 – *Pontogammarus maeoticus* in fine mediolittoral sands” and different infralittoral habitats with massive populations of bivalve *Lentidium mediterraneum* (O.G. Costa, 1830), especially in the freshened Zhebriany Bay, can arise an intermediate zone of their joint settlement. We do not include such case in the considered habitat.

The need for describing: Different salinity regime and indicator communities than similar described habitats.

Distribution. Was observed on exposed marine sides of Dzharylhach Island and Shabolatsky Liman spit with *D. cornea* and Tuzlovsky Limans with *Donax trunculus*.

12. Pontic mediolittoral shelly gravel with crustaceans. Shelly gravel is rarely the dominant substrate of the coast but in, but most often forms clusters in the lower zone mediolittoral between sands above and below this zone. In this case, such habitat serves

as an important shelters for *Diogenes pugilator* (Roux, 1829) and other higher crustaceans (decapods, isopods and amphipods), which form here large concentrations.

The need for describing: codes of individual Pontic gravel habitats have not been identified previously.

Distribution. Widespread on sandy coasts of the NWBS.

13. Pontic soft rock beds with *Barnea candida* burrows. Piddocks *Barnea candida* (Linnaeus, 1758) forms aggregations of burrows on soft clay rocks. These colonies can extend to circalittoral zone, where they are often replaced by another habitat “A3.244 – Pontic soft rock beds with *Pholas dactylus* burrows”.

The need for describing: absence of analogic habitat code for non-tidal seas (only for eulittoral zones).

Distribution. Widespread in the NWBS.

14. Pontic infralittoral coarse sediments with Rhodophyta. Mixed coarse sediments, which include coarse sand and shelly gravel with sparse vegetation with the dominance of *Laurencia* red algae.

The need for describing: absence of analogic habitat codes.

Distribution. Dzharylhach Bay.

15. Pontic infralittoral sands with crustaceans. Mobile sands without vegetation in infralittoral zone, which colonized by higher crustaceans. An indispensable key inhabitant is hermit crab *D. pugilator*. Depending on the region and habitat conditions, swimming crabs, sand shrimps, mysids, cumaceans, and *Euridice* isopods can also be massive. Often, below this habitat, where the effects of the waves are less felt, present the habitats with populations of bivalve mollusks, such as “A5.13B2 Medium-coarse clean sands with *Chamelea gallina*” and “A5.13B1 – Medium-coarse clean sands with *Donax trunculus* and sometimes *Donacilla cornea*”.

The need for describing: Different salinity regime and indicator communities than similar described habitats.

Distribution. Widespread in the NWBS.

16. Pontic scoured sublittoral cobbles and pebbles with *Mytilaster*. Scoured sublittoral cobbles, which colonized by *Mytilaster lineatus* (Gmelin, 1791). Additional inhabitants may be other mollusks, small crabs, bryozoans, sea anemones and other species. It is observed in areas with a high level of eutrophication. Under similar conditions of hydromorphology in areas not impacted by eutrophication, it is replaced by the habitat “A5.13H Pontic scoured sublittoral cobbles and pebbles with sparse crustaceans”. In areas dominated by flat non-rolled stones it replaced by habitat “A5.13I – Pontic silted cobbles with *Balanus eburneus*, ascidians, *Actinia aequina*, *Mytilus galloprovincialis* and *Pisidia longicornis*” and different habitats with developed vegetation. In most cases, all the above

habitats do not form extended areas, but alternate with other habitats of stones and sand. In such cases, they are considered as habitat complexes “X32 – Mosaics of mobile and non-mobile substrata in the infralittoral zone” and “X31 – Mosaics of mobile and non-mobile substrata in the littoral zone”.

The need for describing: Decreasing of environmental engineers at extremely conditions of eutrophication with forming other indicator communities than in similar habitats.

Distribution. Widespread between Chornomorsk City and the Dnieper-Bug-Liman.

17. Aggregation dead remnants of angiosperms in infralittoral zone. Dead remnants of angiosperms decomposes very slowly in comparison with algae and can form long-term accumulations between sea grasses meadows and a coast. In such places, poor oxygen conditions and dramatic declining of the bottom fauna can be observed.

The need for describing: local special type of abiotic conditions (the so-called "features" in the EUNIS classification) formed by dead remnants of angiosperms.

Distribution. Formed in semi-flowing shallow bays, such as the Dzharylhach Bay.

Relationship with EUNIS parent habitat codes and “Bern” habitats. Relationship with EUNIS parent habitat codes and proposed Ukrainian name are given in the Table 1.

Some of the selected habitats are covered by the less detailed “Bern” habitats, which are listed in the Resolution No. 4 (1996) of the Standing Committee to the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats).

“Bern” habitat “A2.2: Littoral sand and muddy sand” covers: “Pontic mediolittoral fine-medium sands with *Pontogammarus maeoticus* and bivalves”, “Mediolittoral sands with Enchytraeidae”, “Diptera and Enchytraeidae on strandline”.

Table 1

Relationship of the non-codified habitats with EUNIS parent habitat codes and proposed Ukrainian name

Habitat	Proposed Ukrainian name	EUNIS parent habitat code
Pontic supralittoral rock with marine Diptera	Чорноморська супралітораль скель з морськими Diptera	A1.16: Pontic communities of exposed mediolittoral rock
Drainage of fresh water on the rocks	Виходи прісної води на скелях	A1.4: Features of littoral rock
Limestone pavement with supralittoral rockpools	Супраліторальні водойми на каррових полях	A1.42: Communities of rockpools in the supralittoral zone
Pontic mediolittoral shelly gravel with crustaceans	Чорноморська ракуша з ракоподібними в медіоліторалі	A2.132: Pontic mediolittoral gravel and shingle
Pontic mediolittoral gravel with <i>Donacilla cornea</i> and <i>Saccocirrus papillocerus</i>	Чорноморський медіоліторальний гравій з <i>Donacilla cornea</i> and <i>Saccocirrus papillocerus</i>	A2.132: Pontic mediolittoral gravel and shingle
Pontic mediolittoral granule with <i>Saccocirrus papillocerus</i>	Чорноморські медіоліторальні гранули з <i>Saccocirrus papillocerus</i>	A2.132: Pontic mediolittoral gravel and shingle
Pontic multispecies communities on strandline	Чорноморське багатовидове угруповання в смузі штормових викидів	A2.21: Strandline
Diptera and Enchytraeidae on strandline	Diptera и Enchytraeidae в смузі штормових викидів	A2.21: Strandline
Pontic mediolittoral fine-medium sands with <i>Pontogammarus maeoticus</i> and bivalves	Чорноморські медіоліторальні піски з <i>Pontogammarus maeoticus</i> та двостулковими молюсками	A2.26: Strictly Pontic communities of mediolittoral sands
Mediolittoral sands with Enchytraeidae	Медіоліторальні піски з Enchytraeidae	A2.26: Strictly Pontic communities of mediolittoral sands
Long-existing pools and ponds with marine fauna on the sandy beach	Водойми з морською фауною, що довготривало знаходяться на піщаному пляжі	A2.8: Features of littoral sediment
Freshwater springs on the sandy beaches and associated pools	Прісноводні струмки на піщаних пляжах та асоційовані водойми	A2.8: Features of littoral sediment
Pontic soft rock beds with <i>Barnea candida</i> burrows	Чорноморські м'які скали з норами <i>Barnea candida</i>	A3.24: Faunal communities on moderate energy infralittoral rock
Pontic infralittoral sands with crustaceans	Чорноморські інфраліторальні піски з ракоподібними	A5.237: Pontic communities of well sorted fine sands
Pontic scoured sublittoral cobbles and pebbles with <i>Mytilaster</i>	Чорноморський окатаний кругляк в субліторалі з <i>Mytilaster</i>	A5.13: Infralittoral coarse sediment
Pontic infralittoral coarse sediments with Rhodophyta	Чорноморські інфраліторальні жорсткі седименти з Rhodophyta	A5.52: Kelp and seaweed communities on sublittoral sediment
Aggregation dead remnants of angiosperms in infralittoral zone	Скупчення відмерлих вищих рослин в інфраліторалі	A5.7: Features of sublittoral sediments

“Bern” habitat “A3: Infralittoral rock and other hard substrata” covers “Pontic soft rock beds with *Barnea candida* burrows”.

“Bern” habitat “A5: Sublittoral sediment” covers: “Aggregation dead remnants of angiosperms in infralittoral zone”, “Pontic infralittoral coarse sediments with Rhodophyta”, “Pontic infralittoral sands with crustaceans”, “Pontic scoured sublittoral cobbles and pebbles with *Mytilaster*”.

These habitats should be protected for a long time by creating the Emerald Network of Ukraine.

Covering by Ukrainian protected areas.

The habitats “Pontic supralittoral rock with marine Diptera” and “Pontic scoured sublittoral cobbles and pebbles with *Mytilaster*” are connected with soft rocks between Chornomorsk City and Tiligul Liman. This region is not covered by protected areas and is at risk of destroying landscapes in connection with coastal development and recreation. Another habitat, “Pontic soft rock beds with *Barnea candida* burrows” is present also on a long stretch of the Tuzly Lagoons national nature Parks.

Three sensitive habitats “Pontic mediolittoral shelly gravel with crustaceans”, “Pontic multispecies communities on strandline”, and “Pontic infralittoral sands with crustaceans” are widespread in the region. They are protected by number marine reserves, especially, “Ivory

Coast of Sviatoslav”, Dzharylhach and Tuzly Lagoons national nature parks, and Black Sea Biosphere Reserve.

All known localities of the habitats “Pontic mediolittoral fine-medium sands with *Pontogammarus maoticus* and bivalves” and “Pontic infralittoral coarse sediments with Rhodophyta” are known exclusively within protected areas: Dzharylhach and Tuzly Lagoons national nature parks in the first case and only in Dzharylhach National Nature Park – in the second case.

Three habitats (“Limestone pavement with supralittoral rockpools”, “Pontic mediolittoral gravel with *Donacilla cornea* and *Saccocirrus papillocerus*”, and “Pontic mediolittoral granule with *Saccocirrus papillocerus*”) are known only from Crimean coast, which is currently not controlled by Ukraine.

Other selected habitats are optional or periodic features of landscapes and do not require special protection.

Conclusions

Now, significant number of marine habitats distributed along Ukrainian coasts (especially, in the north-western Black Sea) are not covered by the existing EUNIS Habitat Classification. Selected habitats relatively well covered by protected areas, with the exception of those associated with soft rocks. The creation of protected areas covering these landscapes between Chornomorsk City and Tiligul Liman is necessary.

References

- Арнольди, Л.В. 1949. Материалы по количественному изучению зообентоса Черного моря. 2. Каркинитский залив. Труды Севастопольской биологической станции 7: 127–192.
- Evans, D. 2012. The EUNIS habitats classification – past, present and future. *Revista de Investigación Marina, AZTI-Tecnalia* 19(2): 28–29.
- Линецкий, Б.Г., и М.О. Сон. 2016. Морфометрические показатели двух черноморских популяций *Donacilla cornea* (Poli, 1791). *Научный вестник Ужгородського університету* 40: 67–69.
- Прошляков, Б.К., и В.Г. Кузнецов. 1991. *Литология*. Москва : Недра.
- Сон, М.О. 2015. Супралиторальные местообитания северо-западной части Черного моря. *Наукові записки Тернопільського національного педагогічного університету* 64(3-4): 616–619.
- Son, M.O., and A.V. Koshelev. 2009. About new records of rare species *Donacilla* (Mollusca, Bivalvia) and *Ophelia bicornis* in the Black Sea intertidal zone. *Vestnik Zoologii* 48(2):189.
- European Environment Agency. 2019. EUNIS habitat type hierarchical view. URL: <https://eunis.eea.europa.eu/habitats-code-browser.jsp>.

НЕЩОДАВНО ВІДКРИТІ ТА НЕКОДИФІКОВАНІ МОРСЬКІ ОСЕЛИЩА ПРИБІЙНОЇ ЗОНИ ПІВНІЧНО-ЗАХІДНОЇ ЧАСТИНИ ЧОРНОГО МОРЯ ТА ПРИЛЕГЛИХ ТЕРИТОРІЙ

Сон М.О., к.б.н., с.н.с.

Інститут морської біології Національної академії наук України, michail.son@gmail.com

Коселев О.В., к.б.н., с.н.с.

Інститут морської біології Національної академії наук України, koshelev2006@ukr.net

Некодифіковані морські оселища прибічної зони Північно-Західної частини Чорного моря та прилеглих територій були інвентаризовані. В результаті досліджень ідентифіковано 17 нових оселищ: «Чорноморська супралітораль скель з морськими Діптера», «Виходи прісної води на скелях», «Супраліторальні водойми на карбових полях», «Чорноморська ракуша з ракоподібними в медіоліторалі», «Чорноморський медіоліторальний гравій з *Donacilla cornea* and *Saccocirrus papillocerus*», «Чорноморські медіоліторальні гранули з *Saccocirrus papillocerus*», «Чорноморське багатовидове угруповання в смузі штормових викидів», «Diptera и Enchytraeidae

в смузї штормових викидів», «Чорноморські медіоліторальні піски з *Pontogammarus maoticus* та двостулковими молюсками», «Медіоліторальні піски з *Enchytraeidae*», «Водойми з морською фауною, що довготривало знаходяться на піщаному пляжі», «Прісноводні струмки на піщаних пляжах та асоційовані водойми», «Чорноморські м'які скали з норами *Barnea candida*», «Чорноморські інфраліторальні піски з ракоподібними», «Чорноморський окатаний кругляк в субліторалі з *Mytilaster*», «Чорноморські інфраліторальні жорсткі седименти з *Rhodophyta*», «Скупчення відмерлих вищих рослин в інфраліторалі». Деякі з них охоплені менш деталізованими «Бернськими» оселищами “A2.2: Littoral sand and muddy sand”; “Bern” habitat “A3: Infralittoral rock and other hard substrata”; “Bern” habitat “A5: Sublittoral sediment”. Виділені оселища відносно добре охоплені заповідними територіями, за винятком тих, що асоційовані з м'якими скелями. Створення заповідних територій, що охоплюють такі ландшафти, необхідно в районі між м. Чорноморськ та Тилігульським лиманом

Ключові слова: оселища, прибійна зона, класифікація, Чорне море.