Dynamics of the State of Macrobenthos in the Gulf of Tub-Karagan

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Abstract. The paper shows the results of studies conducted in the area of the Tub-Karagan Bay for the 2015 seasons. In the winter, 22 taxa of macrozoobenthos were presented at the Tub-Karagan Bay. They were dominated by a group of worms that met at all stations. In spring, in the area of Tyubkaragan Bay, the dominant species and abundance were representatives of crustaceans. During the summer, makrozoobentose insects are marked on the Tubkaragansky Bay (18 species/m²). In the fall, the species composition of macrobenthos was represented by 28 taxa if the previous 3 seasons had four groups, the fall in the number of major groups was five: Worms, shellfish, crustaceans, insects and others represented in the main class of Gidrozoi. A group of insects occurs pointwise. Most of this group was marked on the section Tyubkaragansky Bay as before, this brackish-water species Chironomusalbidus, a permanent inhabitant of the bottom biocenose in this region of the sea.

Keywords: Caspian Sea; Gulf of Tube-Karagan; Macrozooobenthos.

1. Introduction
The structure of the Tube-Karagan, based on seismic works and geological surveys carried out in the early 21st century, has caused hope of oil and gas bearing, but the results of the exploration drilling on the structure have refuted the prediction of hydrocarbons stock availability [1-2].

Today, both above the structures of the Tub-Karagan and below the Gulf, are developing large as per our view that the petroleum exploration work in this structure will not stop because the Caspian Sea is in the north and the south, with promising oil structures are open. Therefore, the background state of the hydrobionts must be surveyed in this area.

We previously published the results of the monitoring work carried out in 2014 [1-2].

As in previous years, the main three species of zooplankton were found: rotifers, cladocerans and copepods crustaceans, and species composition and abundance was dominated by copepod crustaceans 48, 87 %, and the biomass of the other 78 %.

Research object and methods. The object of the study selected region of Tubkaragan Gulf. Samples of makrozoobentosa were selected from the seabed by a Peterson grab and were fixed by 4% formalin.

In the laboratory samples were processed by conventional methods [3-6]; was determined the taxonomic composition, abundance (species per 1 m²) and biomass (mg. per 1 m²).

2. Results and Discussions
Study and analysis of the variability of the ecological state of the environment in terms of the development of oil and gas fields is one of the most important tasks of environmental protection. As in
2014, samples of bottom sediments for the study was collected from 9 monitoring stations, three North, three East and three from the North-East side. The species composition of macrobenthos is shown in table 1.

The qualitative composition of macrozoobenthos in Tupkaragan Gulf was slightly changed depending on the season. Thus, during the period of the winter-spring, a group of shellfish consists of three species. In the summer, up to 2 species are reduced, due to the loss of Dreissena polymorpha from the samples, which is small in the given sea region and occurs pointwise. In the autumn the number of species increases to 5 species. The most constant number of species was observed in the Group of Worms-6 species. Changes in the group of crustaceans also occurred due to the loss of the least numerous species, which is confirmed by the rates of occurrence of these taxa by season. The most crustaceans were presented in the autumn. The average number is noticeably decreasing from winter to summer by reducing the abundance of worms. In parallel, the role of crustaceans and shellfish in the formation of the total number is increasing. There is an inverse dependence of the numbers and biomass of shellfish. So, with minimum average winter abundance, the mollusks have the highest biomass and make up its basis.

This is due to the rise of shellfish and the predominance in winter photography of large specials with large individual weights. In the period of winter, biomass is being reduced, with the consequent increase in the fall.

In the winter of 2015, the macrozoobenthos in the explored section of the Tupkaragan Bay was represented by 22 taxa. They were dominated by a group of worms that met at all stations. A group of worms was represented by 6 species. The frequency of occurrence was dominated by oligochaetes and nereis - 93% (each), subdominal Hypaniolar되었swicki and Manayunki caspica - 89% and 70%. High rates of frequency of occurrence differ mollusks which are presented by 3 kinds: Abra ovata-89%, Cerastoderma Lamarcki-70%, Dreissena hansenula-4%. Shellfish also have the greatest biomass value. Station 7 has the highest biomass of shellfish-34943 mg/m². Crustaceans are represented by 12 species. The most common representative of this group is SchizorhynchusEudorelloides, whose frequency is 70 per cent. The average number of crustaceans is 136 species/m². The largest number of crustaceans is reported at station 9-380 species/m². The group of insects is represented by one species of Chironomus albidus, which occurs in 70% of the stations, but has a small number and biomass.

Table 1. Species composition of macrobenthos by seasons in 2015

| Types               | Winter | Spring | Summer | Autumn |
|---------------------|--------|--------|--------|--------|
| Vermes/Worms        | 6      | 6      | 5      | 6      |
| Mollusca/Shellfish  | 3      | 3      | 2      | 5      |
| Crustacea/Crustacean| 12     | 11     | 10     | 13     |
| Insecta/L. Insects  | 1      | 1      | 1      | 2      |
| Others/Other        | -      | -      | -      | 2      |
| Total taxa          | 22     | 21     | 18     | 28     |

Tables 2 and 3 represent the number and biomass of major groups of Macrobenothosbe seasons in 2015.
| Station | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | average |
|---------|---|---|---|---|---|---|---|---|---|---------|
| Vermes | W* 317 | 480 | 482 | 422 | 494 | 620 | 633 | 247 | 347 | 401 |
| S 351 | 673 | 338 | 326 | 335 | 210 | 391 | 187 | 249 | 273 |
| A 104 | 1446 | 250 | 122 | 105 | 154 | 163 | 547 | 837 | 265 |
| A 133 | 2987 | 113 | 321 | 127 | 102 | 163 | 249 | 347 | 9 |
| Mollusca | W* 713 | 0 | 580 | 310 | 347 | 193 | 283 | 347 | 87 | 318 |
| S 270 | 0 | 113 | 210 | 677 | 73 | 327 | 403 | 140 | 246 |
| S 887 | 1700 | 760 | 227 | 503 | 263 | 397 | 167 | 107 | 557 |
| A 256 | 53 | 255 | 501 | 890 | 967 | 900 | 843 | 172 | 2 |
| Crustacea | W* 57 | 47 | 33 | 150 | 40 | 87 | 347 | 80 | 380 | 106 |
| S 147 | 13 | 87 | 400 | 23 | 103 | 553 | 197 | 340 | 106 |
| S 127 | 700 | 177 | 97 | 17 | 203 | 250 | 150 | 313 | 207 |
| A 40 | 267 | 40 | 90 | 20 | 137 | 143 | 113 | 226 | 2 |
| Insecta | W* 40 | 0 | 30 | 7 | 63 | 67 | 0 | 23 | 100 | 106 |
| S 13 | 0 | 50 | 17 | 87 | 43 | 0 | 30 | 63 | 37 |
| S 3 | 0 | 30 | 33 | 13 | 20 | 23 | 7 | 33 | 34 |
| A 340 | 0 | 180 | 483 | 297 | 393 | 290 | 500 | 18 | 18 |
| Others | W* 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 310 |
| S 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| S 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| A 10 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 3 |
| Total | W* 398 | 527 | 547 | 469 | 539 | 654 | 696 | 292 | 404 | 450 |
| S 394 | 687 | 363 | 389 | 414 | 232 | 479 | 250 | 303 | 321 |
| S 205 | 1686 | 256 | 158 | 158 | 202 | 230 | 870 | 129 | 346 |
| A 428 | 3307 | 527 | 881 | 247 | 252 | 330 | 196 | 399 | 5 |

W* - season of the year
Table 3. Biomass of the main macrozoobenthos groups by 2015 seasons

| Station | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | average |
|---------|----|----|----|----|----|----|----|----|----|---------|
| Verme  | W* | 4861 | 6 | 6563 | 5386 | 8850 | 9554 | 8644 | 7312 | 6133 |
| S       | 5169 | 29 | 7733 | 5553 | 1098 | 3994 | 9460 | 6274 | 5964 | 6129 |
| A       | 4338 | 145 | 5747 | 3870 | 3619 | 4758 | 6894 | 2148 | 3175 | 3855 |
|         | 4649 | 27 | 6281 | 6588 | 3705 | 9195 | 8899 | 4874 | 5527 | 6274 |
| W*      | 1990 | 0  | 34720 | 2487 | 1636 | 1596 | 3494 | 3339 | 20632 |
| 7       | 0   | 7  | 0   | 3   | 0   | 5    | 3074 | 20632 |
| S       | 8907 | 0  | 10270 | 1685 | 3405 | 5960 | 3196 | 2466 | 1239 | 16118 |
| Molus  | S   | 1943 | 510 | 16280 | 9363 | 2984 | 1010 | 2894 | 3613 | 4980 |
| S       | 3   |    | 3   | 3   | 0   | 3   | 3   | 0   | 3   | 14814 |
| A       | 1641 | 6  | 3407 | 2725 | 1478 | 6369 | 1307 | 6359 | 14851 |
| W*      | 583  | 150 |    | 1622 | 878  | 545  | 1197 | 117  | 237  | 2095 |
| Crustae | S   | 3383 | 267 | 1655 | 1140 | 26   | 54   | 1197 | 117  | 237  |
| S       | 32   | 467 | 457 | 20   | 1288 | 1426 | 1861 | 33   | 58   | 627  |
| A       | 123  | 140 | 28  | 34   | 206  | 31   | 1957 | 39   | 219  |     |
| Insecta | W*  | 47   | 0  | 40   | 3    | 70   | 47   | 0    | 15   | 35   |
| S       | 18   | 0   | 60  | 17   | 123  | 60   | 0    | 67   | 130  | 53   |
|         | 10   | 0   | 25  | 38   | 35   | 22   | 12   | 3    | 47   | 21   |
| A       | 242  | 0   | 68  | 205  | 332  | 323  | 175  | 410  |     |     |
| Others  | W*  | 0    | 0  | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| S       | 0    | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| S       | 0    | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| A       | 0    | 0   | 0   | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Total   | W*  | 2539 | 156 | 41485 | 3113 | 2583 | 2570 | 6128 | 4073 | 1319 |
| S       | 1747 | 295 | 19718 | 2356 | 4519 | 1006 | 5340 | 3112 | 1872 | 24395 |
| S       | 3813 | 571 | 2508 | 3291 | 4789 | 6308 | 7706 | 5798 | 8259 | 18687 |
| A       | 2143 | 507 | 40583 | 3408 | 1902 | 1591 | 2410 | 1168 | 20917 |

Figures 1-4 show the abundance and biomass of the main macrozoobenthos in 2014 and 2015.
Figure 1. Number of major groups of Macrobenthos in 2014

Figure 2. Number of major groups macrobenthos in 2015

Figure 3. The biomass of major groups of macrobenthos by 2014 seasons.
In the spring of 2015, the Tupkaragan Gulf was dominated by species diversity and number of crustaceans.

During the summer, makrozoobenthose insects are marked on the Tubkaragansky Bay (18 species/m²).

In the fall of 2015, the species composition of macrobenthos was determined by five major groups: Worms, shellfish, crustaceans, insects and others represented in the main class of Gidrozoii. A group of insects occurs pointwise. Most commonly, this group is marked on the Tupkaraganskij Bay, as it was previously the Solonovatovodnyj species of Chironomusalbidus, a permanent resident of bottom biocenosis in a given area of the sea.

3. References
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