

Archives

FISHERIES AND MARINE SERVICE

Translation Series No. 3108

Feeding of seals in the north of the Caspian Sea

by G. A. Vorozhtsov, V. D. Rumyantsev, G. A. Sklarova,
and L. S. Khuraskin

Original title: Pitanie tyuleny v Severnom Kaspii

From: Trudy Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta Morskogo
Rybnogo Khozyaistva i Okeanografii (VNIRO) (Proceedings of the
All-Union Research Institute of Marine Fisheries and Oceanography),
89 : 19-29, 1972

Translated by the Translation Bureau (YK)
Multilingual Services Division
Department of the Secretary of State of Canada

Department of the Environment
Fisheries and Marine Service
Arctic Biological Station
Ste. Anne de Bellevue, P. Q.

1974

16 pages typescript

DEPARTMENT OF THE SECRETARY OF STATE
TRANSLATION BUREAU
MULTILINGUAL SERVICES
DIVISION



SECRETARIAT D'ÉTAT
BUREAU DES TRADUCTIONS
DIVISION DES SERVICES
MULTILINGUES

F&M 3108

TRANSLATED FROM - TRADUCTION DE
Russian INTO - EN
English

AUTHOR - AUTEUR
G.A. Vorozhtsov et al.
TITLE IN ENGLISH - TITRE ANGLAIS

Feeding of seals in the north of the Caspian Sea

TITLE IN FOREIGN LANGUAGE (TRANSLITERATE FOREIGN CHARACTERS)
TITRE EN LANGUE ÉTRANGÈRE (TRANSCRIRE EN CARACTÈRES ROMAINS)
Pitanie tyuleny v Severnom Kaspii

REFERENCE IN FOREIGN LANGUAGE (NAME OF BOOK OR PUBLICATION) IN FULL. TRANSLITERATE FOREIGN CHARACTERS.
RÉFÉRENCE EN LANGUE ÉTRANGÈRE (NOM DU LIVRE OU PUBLICATION), AU COMPLET, TRANSCRIRE EN CARACTÈRES ROMAINS.
Trudy VNIRO

REFERENCE IN ENGLISH - RÉFÉRENCE EN ANGLAIS
Trudy VNIRO (All-Union Scientific Research Institute of Sea Fisheries and Oceanography)

PUBLISHER - ÉDITEUR -	DATE OF PUBLICATION DATE DE PUBLICATION			PAGE NUMBERS IN ORIGINAL NUMÉROS DES PAGES DANS L'ORIGINAL 19-29
	YEAR ANNÉE	VOLUME	ISSUE NO. NUMÉRO	
PLACE OF PUBLICATION LIEU DE PUBLICATION USSR	1972	89	-	NUMBER OF TYPED PAGES NOMBRE DE PAGES DACTYLOGRAPHIÉES 16

REQUESTING DEPARTMENT
MINISTÈRE-CLIENT Environment

TRANSLATION BUREAU NO.
NOTRE DOSSIER N° 784520

BRANCH OR DIVISION
DIRECTION OU DIVISION Fisheries Service
Office of the Editor

TRANSLATOR (INITIALS)
TRADUCTEUR (INITIALES) YK

PERSON REQUESTING
DEMANDÉ PAR Dr. E.D. Mitchell

YOUR NUMBER
VOTRE DOSSIER N°

DATE OF REQUEST
DATE DE LA DEMANDE 19/04/74

UNEDITED TRANSLATION
For information only
TRADUCTION NON RÉVISÉE
Information seulement



CLIENT'S NO. N ^o DU CLIENT	DEPARTMENT MINISTÈRE Environment	DIVISION/BRANCH DIVISION/DIRECTION Fisheries Service Office of the Editor	CITY VILLE Ottawa
BUREAU NO. N ^o DU BUREAU 784520	LANGUAGE LANGUE Russian	TRANSLATOR (INITIALS) TRADUCTEUR (INITIALES) YK	JUL - 8 1974

Trudy of the All-Union Scientific Research Institute of Sea Fisheries and Oceanography, 1972, Vol. 89, pp. 19-29.

/19*

UDC 599.745.3

UNEDITED TRANSLATION

For information only

TRADUCTION NON REVISEE

Feeding of seals in the north of the Caspian Sea information seulement

by G.A. Vorozhtsov, V.D. Rumyantsev, G.A. Sklyarova, and L.S.

Khuras'kin (KaspNIRKh - Caspian Scientific Research Institute of Sea Fisheries)

The question of the feeding habits of Phoca caspica is very important, since it permits the determination of this animal's role in the ecology of the Caspian Sea.

The following publications were devoted to the feeding of seals in the northern part of the sea: S.V. Dorofeev and S. Yu. Freiman (1928), P.E. Samofalov (1930), A.N. Roganov (1930), and B.I. Badamshin (1948). These authors, however, describe the feeding of seals in winter and fall and to a lesser degree in spring. No reference is made to summer feeding.

The purpose of this investigation is to establish the species

*Numerals in the right-hand margin refer to the pages in the original text.

composition of the feed, frequency of occurrence the different food items, the quality and quantity of the food consumed, and also to define the selective capability of the Caspian seal.

The specimens were collected in the northern Caspian Sea in 1971 during the entire year. 92 seals were killed. Of these 41.3% were shot while swimming, 7.6% were caught in nets, 38% were taken on ice, and 13% were taken on silt banks.

In the processing of the specimens the experience of the following research workers was taken into consideration: V.D. Pastukhov (1965), G.K. Panina (1966), Yu. I. Nazarenko, (1967), and V.N. Gol'tsev (1971). The method used was the one recommended in the "Handbook for The Study of Fish Feeding in Natural Conditions" (1961).

The weight and dimensions of digested fish were calculated using the table of I.N. Kovaleva (1956).

In order to establish the selective capabilities of seals, trawlings /20 were carried out at the locations where they were caught by means of 30- and 15-foot trawls.

Examinations have shown that more than half of the stomachs (56.6%) contained no food. The smallest percentage - 23.6% - of empty stomachs was found in the seals caught while swimming, as would be expected. For those caught by means of nets this figure was 71.4%, and for the seals caught on ice it was 77.1%. All the seals taken on silt banks had completely empty stomachs.

A.N. Roganov (1930) reports a higher percentage of empty stomachs in Caspian Sea seals. (70%). Similar results are reported by the following

authors: A.P. Shustov (1965) - 97.4% for ribbon seal of the Bering Sea, G.A. Fedoseev (1965) - 71% for ringed seal, G.A. Pikharev (1946) - 95.8% for far-eastern ringed seal, and V.N. Gol'tsev (1969) - 85.9% for Bering Sea harbour seals.

The lower percentage of empty stomachs reported by us is due to the fact that the largest part of our animals were caught while swimming, i.e., when they were hunting.

The seal feed composition is given in Table 1. It shows that in February mysids rank first in terms of frequency of occurrence (87,5) and quantity (65%). Crabs, however, predominate in terms of weight (43%). Of other crustaceans shrimps and amphipods are encountered. Fish (gobies and pipefish) make up 28% of the feed.

Similar findings are reported by A.N. Roganov (1930). According to P.E. Samofalov (1930a) the main constituent of seal feed in winter is the goby. The predominance of the gobies in this period of the year is reported also by S.V. Dorofeev and S. Yu. Freiman (1928). V.E. Terebenin (1930) and B.I. Badamshin (1948) report the presence of crustaceans together with gobies in seal stomachs, although the former are in smaller quantities.

Such a feed composition in winter is quite understandable, since this is the time when the seal forms rookeries on the ice of the northern Caspian Sea. The ice limits the hunting radius (Badamshin, 1966a). Furthermore, the fish species composition in the vicinity of rookeries is very poor; it consists primarily of gobies and sturgeons. The seals eat up the largest part of the gobies within a short time and then they switch to feeding on crustaceans, which often constitute the seal's basic feed during his stay on ice. /21

In April we killed 24 seals of which 19 were in the molt-stage and were taken on drifting ice. The stomachs of these animals were empty. The feed of the moulted animals consisted of southern sprats (50%) and Caspian silversides (50%).

The predomination of southern sprat and Caspian silverside in the spring diet of seals is reported also by other authors (Roganov, 1930a; Samofalov, 1930b).

Such a feed composition can be attributed to the mass run of the southern sprat towards the Mangyshlak shores during the March-April period, which attains its maximum during the first half of April. In this period also the silverside makes its appearance in the northern Caspian; it has its spawning grounds in the east, in littoral waters off the Buzachi peninsula (Kazanchev, 1963).

In May three stomachs were examined. Only one of them contained food which consisted primarily of gobies (90%) and vobla (Rutilus rutilus caspicus - Translator) (10%). Their sizes did not exceed 4-5 cm.

The examination of summer feeding of seals revealed that in terms of frequency of occurrence (53.8%) and quantity (53.5%), gobies come first. In terms of weight, however, vobla and other cyprinids predominate. The species of the latter could not be determined, because of the advanced degree of digestion.

It should be noted that the cyprinids found in all stomachs were affected by the helminths Digramma interrupta and Agamanema Diesing.

The cyprinids usually aggregate in schools. This propensity for

schooling gives the fish certain advantages in the face of predator attacks (Radakov, 1970). In the clear waters of the northern Caspian, schools usually manage to circumvent the predator, and after a few frustrated attempts the latter gives up the chase. Such cases involving seals were observed by E.N. Kazanchev (1969). This, however, is true only of the fish that possess one of the main characteristics of the schooling habit, namely, uniformity of behavior. As soon as a school individual begins to swim excitedly, or moves out of position - it is eaten.

It follows, then, that the victims of seals are primarily the sick /24 fish. A parasite on penetrating the organism of a fish disturbs the metabolism, causes the intoxication of the organism, and feeds on the body fluids of the host (Lyaiman, 1966). We have often observed cases where such fish loses its composure, darts about near the surface and becomes easy prey of predators.

Our seal summer feeding data can be compared only with those of our KaspNIRKh colleague G.G. Sibirtsev, collected in 1968-1969. Examination of 40 intestines has shown that in terms of frequency of occurrence (97.5%) and numbers (illegible) gobies come first. Other species present are silverside, southern sprat, crustaceans, and molluscs. Valuable commercial fishes were not found in the stomachs.

The data collected in the fall show that of 17 animals taken in the vicinity of, or on the silt banks of the northern Caspian Sea only four contained food consisting primarily of crustaceans and gobies.

P.E. Samofalov (1930b) reports the following fall stomach contents of seals: gobies, silversides, southern sprats, gammarids, and the

1. Таблица I

2. Характеристика питания тюленя по месяцам в % по количеству и весу

3. Число зверей	4. Количество желудков с пищей		6 Состав пищи	7. Частота встречаемости	8. Число жертв	9. Вес жертв, г	10 Значение в рационах, % по		
	5 шт.	%					11 количеству	12 весу	
			13 Ф е в р а л ь						
16	8	50	14 Бички	Gobiidae spp.	3	30	32	12,1	24,0
			15 Гаммариды	Gammaridae spp.	1	12	0,84	5,0	0,6
			16 Мизиды	Mysidae spp.	7	159	32	65,0	24,0
			17 Креветки	Leander spp.	4	6	6	2,4	4,5
			18 Краб	Rhythropanopeus harrissi	2	29	58	11,8	43,2
			19 Игла-рыба	Syngnathus nigrolineatus	1	9	5	3,7	3,7
			20 Итого				245	134	100
			21 А п р е л ь						
24	4	17	22 Атерина	Atherina moschon	4	122	610	40	50
			23 Килька	Clupeonella spp.	4	152	610	60	50
			20 Итого				274	1220	100
			24 М а й						
3	1	33	14 Бички	Gobiidae spp.	1	77	116	90	85
			25 Вобла	Rutilus rutilus caspicus	1	8	20	10	15
			20 Итого				85	136	100

		26 Июль - август						
II	13	14 Бычки	Gobiidae spp.	7	107	366	53,5	12,8
		27 Судак	Lucioperca Cuvier. spp.	1	1	10	0,5	0,3
		25 Вобля	Rutilus rutilus caspicus	3	26	732	13,0	25,5
		62 19 Игла-рыба	Syngnathus nigrolineatus	1	5	5	2,5	0,2
		22 Атерина	Atherina moschon	1	5	1,5	0,5	0,05
		28 Лещ	Abramis brama	1	1	196	0,5	6,9
		29 Неопределенные рыбы		7	59	1550	29,5	54,1
		20 Итого		200	2861	100	100	
		30 Октябрь						
I7	4	14 Бычки	Gobiidae spp.	1	1	2	11,0	17,4
		24 19 Игла-рыба	Syngnathus nigrolineatus	1	1	0,5	11,0	4,3
		17 Креветка	Leander spp.	2	7	9	78,0	78,3
				20 Итого		9	11,5	100
		31 Декабрь						
II	8	32 Густера	Blicca bjoergona	1	2	73	0,3	0,7
		25 Вобля	Rutilus rutilus caspicus	8	584	8981	95,9	89,7
		73 33 Чехонь	Pelecus cultratus	2	3	97	0,5	1,0
		27 Судак	Lucioperca Cuvier	3	20	861	3,3	8,6
		20 Итого		609	10021	100	100	

Key to Table 1:

1. Table 1
2. Seal feed composition by month and in percentages of total numbers and total weight
3. Number of animals
4. Stomachs with feed
5. Number
6. Feed composition
7. Frequency of occurrence
8. Number of victims
9. Weight of victims, in g
10. Proportion of the total feed ration, in % of
11. Numbers
12. Weight
13. February
14. Gobies
15. Gammarids
16. Mysids
17. Shrimps
18. Crab
19. Pipefish
20. Total
21. April
22. Silverside
23. Southern sprat
24. May
25. Vobla
26. July-August
27. Zander
28. Bream
29. Unidentified fishes
30. October
31. December
32. White bream
33. Sabrefish

occasional zander. Similar data are reported also by B.I. Badamshin (1948).

Not all seals stay around the silt banks during this period; part of them move into the vicinity of the Volga and Ural estuaries. We have examined 11 stomachs of animals taken at the exit of the Glavnyi bank of the Volga at the beginning of December. The main constituent in the daily feed of seals in this area is vobla - 95.9% by numbers and 89.7% by total fish weight, followed by zander with 3.3% and 8.6% respectively.

Fishing by seals in the pre-estuary area is facilitated by the fact that young vobla, bream and zander aggregate into very dense schools at this time of the year, probably because low water transparency hampers visual orientation. This is a good example where the school, which usually is an adaptive property of the species that permits a reduction of population losses, limiting them to the weak and ill members, has become an inadaptive property facilitating the task of predators.

It should be noted that the stomachs of all seals taken in this region exhibited a multitude of helminths which had been living in the voblas swallowed by the seals. Furthermore, pathological changes of the seal's inner organs were noticed, in the form of a degeneration of the liver cells, or a tumorous swelling of the duodenum. According to Zablotskii (1971), both pathological changes result from invasion by the helminths Pseudamphistomum truncatum. /25

A size comparison showed that the greatest part of the fish eaten by seals range within 3 to 12 cm. The proportion of fish exceeding 15 cm was 2%.

The seal feed size distribution is given below:

Length of the victim, in cm	frequency of occurrence, %
1 - 3	2.9
3 - 6	24.9
6 - 9	30.0
9 - 12	30.6
12 - 15	9.6
15	2.0

These data fully agree with those given by B.I. Badamshin (1948) and also by V.D. Pastukhov (1969), who showed that seals prefer small fish to large. In odd cases the seals attack large fish. In the stomach of a

seal killed off the Peshnyi peninsula, for instance, a fish was found that was longer than 30 cm.

A comparison of seal stomach contents and the ichthyofauna of the area where the kills were made is given in Table 2.

The table shows that vobla (90.6%) ranked first in fish catches made in the vicinity of the Peshnyi peninsula in August. The stomach contents of the seals killed in this area consisted of vobla (100%) also. As mentioned above, however, these were primarily sick fish. At the same time the fish catches made in the area of the Suendyki silt banks consisted primarily of vobla (54.5%) and silverside (43.6%). Yet, the seals were feeding in this area primarily on gobies (98.9%). In July the fish variety around the Malaya Zhemchuzhnaya island was quite considerable, yet seals fed primarily on pipefish (83.3%). In October the seals around Kulaly island were feeding mostly on shrimps.

/26

One can conclude, therefore, that seals possess a definite selectivity, i.e., they first feed on animals that can be caught easily at the given time. It should be taken into consideration that the selectivity is influenced by a great number of factors, such as: the degree of satiety of the predator, the population density of victims, the sizes of the predator and the prey, and various defense mechanisms (Ivlev, 1955).

Conclusions

1. The main winter feed of seals consists of crustaceans and gobies.
2. The main components of their early spring feed are Southern sprats and silversides.

1. Таблица 2

2. Состав ихтиофауны /I/ в местах добычи тюленя и содержание его желудков /II/ в %

3 Рыба	4 Район О-ва Пешного		5 Суенды- ковские палыги		6 О-в Малая Жемчужная		7 Район О-ва Куламы	
	8 Август				9 Июль		10 Октябрь	
	I	II	I	II	I	II	I	II
11 Бычки	5,5	-	1,7	98,9	70,50	16,7	59,0	II
12 Карповые	90,6	100	54,5	-	25,40	-	19,9	-
13 Атерина	1,6	-	43,6	1,1	-	-	-	-
14 Судак	1,6	-	0,2	-	0,48	-	-	-
15 Килька	-	-	-	-	3,40	-	-	-
16 Сом	-	-	-	-	0,24	-	-	-
17 Як	0,7	-	-	-	-	-	-	-
18 Игла-рыба	-	-	-	-	-	83,3	21,1	II
19 Креветка	-	-	-	-	-	-	-	78

Key to Table 2:

1. Table 2
2. Ichthyofauna composition /I/ in the areas of seal kills, and the stomach contents /II/ of the seals, in %
3. Fish
4. Peshnyi island area
5. Suendyki silt banks
6. Malaya Zhemchuzhnaya island
7. Kulaly island area
8. August
9. July
10. October
11. Gobies
12. Carp family
13. Silverside
14. Zander
15. Southern sprat
16. Sheatfish
17. Crayfish
18. Pipefish
19. Shrimp

3. In summer vobla and other cyprinids predominate in the feed composition of seals, in terms of weight. These species of fish were, as a rule, invaded by helminths. Gobies ranked first in terms of frequency of occurrence and numbers.

4. In the fall the greatest number of seals feed on crustaceans, gobies, and other animals which are of no value to man. The seals aggregating in the Volga and Ural pre-estuary areas, however feed on commercial species, primarily on vobla.

5. Seals possess a definite selectivity and give preference to small animals that are easy to catch, such as gobies, crustaceans, southern sprat, silverside, etc.

References

1. Badamshin, B.I., The feeding of Caspian seals, Trudy of KaspNIRKh, Astrakhan Vol. 10, 1948, pp. 129-133.
2. Badamshin, B.I., The Biology and exploitation of Caspian seals, Trudy of KazNIRKh, No. 5, Fish resources of the water bodies of Kazakhstan, and their exploitation, Alma-Ata, 1966, pp. 94-124.
3. Gol'tsev, V.N., Feeding of the Bering Sea harbour seal during the spring-summer period. The 4th All-Union conference on the study of sea mammals. Proceedings of the conference. Moscow, 1969, pp. 129-132.
4. Dorofeev, S.V., and Freiman, S. Yu., The Caspian seal and its exploitation on ice. Trudy of the Scientific Institute of Fisheries, Vol. 3, No. 3, 1928.
5. Zablotskii, V.N. Biology of the trematodes Gastrodiscoides hominis and Pseudamphistomum truncatum, the parasites of the wild and domestic animals of the Volga delta. Author abstract of Candidate thesis, Moscow, 1971.
6. Ivlev, V.S. Experimental ecology of the feed of fish, Moscow, Pishchepromizdat, 1955.
7. Kaznacheev, E.N., The fish of the Caspian sea, Moscow, 1963.

8. Kovalev, I.N., Weights and body sizes of some fish species of the Volga delta based on the lower pharyngeal bones, Trudy of the Astrakhan nature preserve, No. IV, "Volga" Publishing House, Astrakhan, 1958, pp. 237-267.
9. Leiman, E.M., Course on fish diseases, Moscow, 1966.
10. Nazarenko, Yu. I., Feeding of the ringed seal of the European North, Trudy of the PINRO, No. 21, 1967, pp. 81-85.
11. Panina, G.K., Feeding of the northern fur seal in the western Pacific Ocean, Comm. of TINRO, vol. 58, Vladivostok, 1966.
12. Pastukhov, V.D., Feeding of the Baikal seal, Coll. Limnological research of lake Baikal and the lake systems of Mongolia, Moscow, "Nauka" Publishing House, 1965.
13. Pastukhov, V.D., Observations of the Baikal seal in experimental conditions, The fourth All-Union conference on sea mammals, 1969, pp. 105-110. /28
14. Pikharev, G.A., The feeding of ring seals, Trudy of TINRO, Vol. 22, Vladivostok, 1946, pp. 259-261.
15. Radakov, D.V., The peculiarities of the schooling behavior of fish, Coll., The biological foundations of fish behavior, Moscow, "Nauka", 1970.
16. Roganov, A.N., Eider exploitation from vessels. Proceedings of the conference on Caspian seals and their exploitation, Astrakhan, 1930a.
17. Roganov, A.N. Résumé of a report on seal killing from sleighs in the Dzhabai district in 1929. Proceed. of the conf. on Casp. seals and their expl. Astrakhan, 1930b.
18. Textbook on the feeding of fish in natural conditions. The Publishing House of the Academy of Sciences of the USSR, 1961.
19. Samofalov, P.E., Winter killing from vessels in Mangyshlak. Proceed. of the conf. on Casp. seals and their expl. Astrakhan, 1930a.
20. Samofalov, P.E., Seal exploitation in the Mangyshlak district in 1928-1929. Trudy of the Astrakhan Scientific Fishery station, Vol. UP, No. 2, Astrakhan, 1930 b.
21. Terebenin, V.E., Résumé of a report on winter killing from the steam icebreaker Gl. Lopatin. Proceed. of the conf. on Casp. seals and their expl., Astrakhan, 1930.
22. Fedoseev, G.A., Feeding of the ringed seal. Izv. of TINRO, Vol. 59, Magadan, 1965.
23. Shustov, A.P., Feeding of the ribbon seal in the Bering Sea. Izv. of TINRO, Vol. 59, 1965.

Л и т е р а т у р а

1. Бадамшин Б.И. О питании каспийского тюленя. Тр.КаспНИРХ, т.Х, Астрахань, 1948, стр.129-133.
2. Бадамшин Б.И. Биология и промысел каспийского тюленя. Тр. КазНИРХ, вын.5, "Рыбные ресурсы водоемов Казахстана и их использование", Алма-Ата, 1966, стр.94-124.
3. Гольцев В.Н. Питание берингоморской ларги в весенне-летний период. 4-ое Всес.сов.по изучен.мор.млек. Тезисы докл. М., 1969, стр.129-132.
4. Дорофеев С.В., Фрейман С.Ю. Каспийский тюлень и его промысел во льдах. Тр.научн.ин-та Рыбного хоз-ва, т.Ш, вып.3, 1928.
5. Заблоцкий В.Н. Биология трематод *Gastrodiscoides hominis* и *Pseudamphistomum truncatum* паразитов диких и домашних животных дельты Волги. Автореф.канд.дис., М., 1971.
6. Ивлев В.С. Экспериментальная экология питания рыб. М., Пищепромиздат, 1955.
7. Казанчеев Е.Н. Рыбы Каспийского моря. М., 1963.
8. Ковалев И.Н. Справочные материалы по определению веса и длины тела некоторых видов рыб дельты Волги по нижнеглоточным костям. Тр.Астрах.запов., вып.IV, изд-во "Волга", Астрахань, 1958, стр.237-267.
9. Ляйман Э.М. Курс болезней рыб. М., 1966.
10. Назаренко Ю.И. Питание кольчатой нерпы европейского севера. Тр.ТИНРО, вып.XXI, 1967, стр.81-85.
11. Панина Г.К. Питание морских котиков в западной части Тихого океана. Изв.ТИНРО, т.58, Владивосток, 1966.
12. Пастухов В.Д. Питание байкальского тюленя. Сб."Лимнол.иссл. Байкала и накл.озер Монголии". М., изд-во "Наука", 1965.

13. Пастухов В.Д. Некоторые результаты наблюдений над байкальской нерпой в условиях эксперимента. 4-ое Всес. сов. по изуч. мор. млек. 1969, стр. 105-110.
14. Пихарев Г.А. О питании акибы. Тр. ТИПРО, т. XXII, Владивосток, Промиздат, 1946, стр. 259-261.
15. Радаков Д.В. Особенности стайного поведения рыб. Сб. "Биологические основы управления поведением рыб". М., изд-во "Наука", 1970.
16. Роганов А.Н. Гагачий промысел с судов. Протоколы сов. по исследованию каспийского тюленя и его промысла. Астрахань, 1930а.
17. Роганов А.Н. Резюме доклада о санном бое тюленя в районе Джамбая в 1929 г. Протоколы сов. по иссл. касп. тюленя и его промысла. Астрахань, 1930б.
18. Руководство по изучению питания рыб в естественных условиях. изд. АН СССР, 1961.
19. Самофалов П.Е. Зимний бой с судов Мангишлака. Протоколы сов. по иссл. касп. тюленя и его промысла. Астрахань, 1930а.
20. Самофалов П.Е. Промысел тюленя в Мангишлакском районе в 1928-1929 г. Тр. Астр. Научн. Рыбохоз. станции, т. УП, вып. 2, Астрахань, 1930б.
21. Теревенин В.Е. Резюме доклада о зимнем бое с пр-ла Гл. Лопатин, Протоколы сов. по иссл. касп. тюленя. Астрахань, 1930.
22. Федосеев Г.А. Питание кольчатой нерпы. Изв. ТИПРО, т. 59, Магадан, 1965.
23. Шустов А.П. Питание крылатки в Беринговом море. Изв. ТИПРО, т. 59, 1965.

THE FOOD HABITS OF SEAL FROM THE NORTH
CASPIAN SEA

G.A.Vorozhtsov, V.D.Rumyantsev,
G.A.Sklarova, L.S.Khuraskin

S u m m a r y

Based on the analysis of stomach content the food composition of seal in various seasons is described. A total of 92 specimens were examined. In winter seal feed mainly on crustaceans; in early spring they turn to kilka and silverside; in summer roach infested with helminths prevail among other food items by weight whereas goby dominate quantitatively and by the frequency of occurrence; in autumn the main concentrations of seal feed on crustaceans, goby and other non-valuable species. However seals which are concentrated in the pre-estuary areas of the Volga and Ural Rivers consume commercial species of fish, particularly roach. Seal show a certain preference to small-sized easy-to-catch items such as goby, crustaceans, kilka, silverside and so on.