

Ramsar site management plans -- Russian Federation, Kamchatka Peninsula



RAMSAR CONVENTION BUREAU

CENTER FOR INTERNATIONAL PROJECTS

STATE COMMITTEE OF THE RUSSIAN FEDERATION FOR ENVIRONMENTAL PROTECTION

CENTER FOR STUDYING MIGRATORY ANIMALS OF EURASIA

Approved _____

Director of Center
For International Projects
S. E. Tikhonov

**DEVELOPMENT OF MONITORING PROGRAMME
AND DRAFT MANAGEMENT PLANS FOR THE RAMSAR SITES LOCATED ON THE
KAMCHATKA PENINSULA**

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R E S U M E

According to the goals of the project, the information about the state of biological diversity and nature resource users for four Ramsar sites (Parapolsky Dol, Moroshechnaya River, Utkholok Cape, Karaginsky Island) has been prepared.

The preliminary inventory of the wetlands (classification, natural characteristics, and areas) has been carried out. Based on the checklists of major species of vascular plants and vertebrate animals, including rare and threatened and endangered ones, the richness of biological diversity of

each site has been revealed. The resources of main groups of vertebrates – birds and mammals (in thousand individuals after breeding period and during migration) have been evaluated. The indices for the fish abundance are given in numbers, for migratory salmon – in million individuals. The number of animals was calculated for habitat types. The resources of vertebrate animals have been evaluated in USD. Their cost in "Parapolsky Dol" is 21.0 million, "Karaginsky Island" – 60.0, "Moroshechnaya River" – 37.5, and in "Utkholok Cape" is 27.5 million USD.

The statements – documents regulating economic activity in the sites and their protection as well as determining the site boundaries and area were prepared and approved by the Administration of the Koryak Autonomous Area.

Management plans for each site have been elaborated on the basis of the information obtained and normative documents. The following measures and procedures are included into the management plans:

1. Recommendations for monitoring of biodiversity and anthropogenic impact;
2. Improvement of the legislation for protection of the wetlands (legislative division of rights and obligations between the Administration of the Koryak Autonomous Area and Federal Center on behalf of the Ministry of Natural Resources);
3. Elaboration of economic mechanisms for the biodiversity protection while in nature management;
4. Organisation of new protected areas (Ramsar sites) in Kamchatka region;
5. Organisation of work with local population;
6. Search for sources of funding.

The experience obtained should be disseminated at the Russia's Ramsar sites and among wide sections of the public.

P R E F A C E

The implement of the project "Development of monitoring programmes and draft management plans for the Ramsar sites located on the Kamchatka Peninsula" has made possible owing to the financial means (40,000 Swiss francs) allocated through the fund of Ramsar grants. We are very much obliged to the Secretariat of the Ramsar Convention, General Secretary Delmar Blasco, and regional co-ordinator for Europe Mr. Talias Salathé for the unceasing attention and financial and consultative assistance in solving problems regarding the wetland conservation in Russia.



The project was implemented by the Centre of international projects of the State Committee on Ecology of Russia (Director- Dr. S. Tikhonov) and the Centre for Study of Eurasian Migratory Animals (Director – Dr. V. Avdanin).

The project had been implemented since January 1999 to September 30, 2000.

Academician of Russian Academy of Natural Sciences, a Ramsar Convention Award Winner V.G.Krivenko provided guidance of the project. Responsible executors are E.S.Gusakov and Yu.N.Gerasimov.

Chairman of the Committee on Environmental Protection of the Koryak Autonomous Area I.G.Tsulya and main specialist of this Committee A.P.Zolotuyev participated actively in the work on implementing the project.

Dr. N. N. Gerasimov, a known naturalist, zoologist, and specialist on the nature of Kamchatka provided a useful guide in studying Ramsar sites.

OBJECTIVES AND TASKS OF THE PROJECT

The project aims at the determination of major strategic and practical lines in the activity of state and public organisations for conservation of the Kamchatka's Ramsar sites.

The following actions for each Ramsar site were performed to solve the tasks of the project:

1. Inventory of animal habitat;
2. Improvement of the site boundaries and area;
3. Inventory of biodiversity (vertebrate animals, vascular plants) and resources of the main animal species;
4. Estimation of a biosphere, ecological, and economic importance of each Ramsar sites and various habitats within it;
5. Inventory of land and nature users, pollution sources on watersheds. Determination of major negative impacts on site ecosystems;
6. Inventory of acting legislative documents and other legal acts providing conservation of Ramsar sites;
7. Determination of major lines in the strategy of the site conservation and optimisation of nature management;

8. Elaboration of organisational and methodical grounds for monitoring the state of natural ecosystems and anthropogenic impacts;
9. Elaboration of Management plans providing the conservation of sites;
10. Popularisation of ideas about protection of the Kamchatka's Ramsar sites and dissemination of the experience obtained in other Russian regions.

The work of the experts was diversified and distributed among them as follows:

- V.G.Krivenko - methodology, general guidance, arrangement, editing of materials, complex and value assessment of biological resources, and major work on elaboration of a monitoring system and management plans for all Ramsar sites.
- E.S.Gusakov - "Parapol'sky Dol"- introduction, inventory of habitats, description of plant communities, inventory of bird resources, the number of terraneous mammals, distribution and use of sea mammals and local fish populations, participation in elaboration of monitoring programs and management plans, preparation of a performance specification for the project, and general coordination of experts' actions.
- Yu.N.Gerasimov - "Moroshechnaya River", Utkholok Cape", "Karaginsky Island"- introduction, inventory of bird habitats and resources, the number of mammals, quantitative characteristics of migratory salmon populations, participation in preparing monitoring programs and management plans, and organisational work.
- A.P.Zolotuev and I.G.Tsulya - all four sites - inventory of nature users and pollution sources, collection of information about protected natural areas and threatening factors, main data on numbers and distribution of sea mammals, inventory of regional normative-legal acts for nature conservation, preparation of cartographic materials on nature management, and participation in preparing monitoring programs and management plans.
- B.A.Sheiko - all four sites - compilation of annotated taxonomic checklists of fish, ecological and faunistic analysis of ichthyofauna, preparation of sketches on migratory commercial fish species and fish of small value and their distribution over the region.
- A.S.Valentsev - all four sites - characteristic of fauna and terraneous mammals.
- O.A.Chernyagina and V.V.Yakubov - all four sites - compilation of checklists for plant species, floristic and general description of vegetation, participation in inventory and description of "Moroshechnaya River", Utkholok Cape", "Karaginsky Island".
- V.Zykov and V.B.Petrinin (with participation of other experts) - habitat maps. V.P.Petrinin - creation of electronic database (by GIS) using habitat maps and other cartographic materials.

- V.O.Avdonin - preparation of reference materials and instructions on evaluation of damage to biodiversity.
- R.S.Kareva - completed much work on technical design of the project.

The project text was translated by L.B.Kholopova.

The major information (inventory of fauna, waterfowl resources) was collected by the executors of the project in the territory of the Ramsar sites according to their methods (Gerasimov, 1979; Gusakov, 1983; 1986; 1988). Some materials were obtained in 1999 by Yu.N.Gerasimov in "Moroshechnaya River", "Utkholok Cape" sites, by V.G.Krivenko and E.S.Gusakov in "Parapol'sky Dol". As for "Karaginsky Island", for its characteristic the data obtained by Yu.N.Gerasimov in the 1970s were used because of the island is difficult to access. The sites studied are weakly disturbed and reflect the current situation.

The information on ichthyofauna and terraneous mammals is based on the departmental and numerous literary data collected at the areas adjacent to the Ramsar sites and similar in nature. The authors considered possible to use these data for characteristic of the Ramsar sites. The resources of migratory and spawning salmon fishes in "Moroshechnaya River" and "Utkholok Cape" sites were evaluated from the summarised incomplete data of "Kamchatrybvod". The results obtained are very approximate and may be considered only as an expert's estimation.

The inventory of fauna and distribution of birds of prey, woodpeckers, passerines and some other groups were completed based on the published and authors' materials. The results may be estimated as preliminary ones.

The characteristic of vegetation rests on few various in time publications, two incomplete herbariums, reports of expeditionary works, private collections, and individual observations.

Collection and generalisation of departmental materials, their generalisation and cartographic interpretation provided for the information on nature users and anthropogenic impact. A separate block on collecting information and its analysis includes materials on inventory of regional and federal legal documents. The final results of this work were applied in preparing management plans for the Ramsar sites of Kamchatka.

The systematisation of the collected materials and complex evaluation of biological resources were carried out by the methodology regarding the compilation of regional cadastres for the animal world suggested by V.G.Krivenko (1988). The economic evaluation of biological resources and elaboration of damage estimates were completed by special methods (Krivenko, 1998).

Management plans for the Kamchatka Ramsar sites were elaborated in accordance with the methodical recommendations of the Ramsar Convention Bureau.

Kamchatka region includes the Koryak Autonomous Area (KAA) with the centre of Palana. It covers an area of 301,5 thousand sq. km. The population of the Kamchatka region is 424,100 (January 1, 1998); 31,000 live in the KAA. The mean population density is 0,9 persons/sq. km in Kamchatka region and 1.1 persons/10 sq. km in the KAA. There are four towns in the regions - Petropavlovsk-Kamchatsky, Elizovo, Vilyuchinsk, and Klyuchi.

The economy of Kamchatka region rests on fishery (80% of the industrial and economic potential). Timber, light and food industries are only auxiliary ones. The regional energetics rests only on imported fuel. Only in recent years hydro- and geothermal power engineering is only now being developed.

Kamchatka continues to be one of the satisfactory regions in Russia with respect to ecological situation. Its natural complex is of global importance. In 1996 five specially protected natural areas (general name is "Kamchatka Volcanoes") were included into the List for objects of the UNESCO World Cultural and Natural Heritage. The system of specially protected natural areas includes 3 reserves (zapovednik), 3 natural parks of regional importance, 25 protected areas (zakaznik), one of them is of federal importance, and 89 state nature monuments.

By the Decree of the RF Government (N 1050, September 13, 1994) four areas of Kamchatka obtained the status of wetlands of international importance protected by the Ramsar Convention. All the sites are located within the Koryak Autonomous Area and have their own distinguishing features.

"Parapol'sky Dol" is the most northern Ramsar site. It is swampy lowland with numerous lakes surrounded by mountains. "Karaginsky Island" is an island system in the Bering Sea area. "Moroshechnaya River" and "Utkholok Cape" located on the western Sea of Okhotsk coast represent combinations of continental wetlands and sea shallows.

The goal of the project is solution of many problems for each Ramsar site: inventory of biodiversity, identification of major threatening factors to biodiversity, elaboration of measures for conservation of the sites (Management plans).

1. Parapolsky Dol (1,200,000 hectares)
2. <u>Karaginsky Island (193,597 hectares)</u>
3. Moroshechnaya River
4. Utkholok

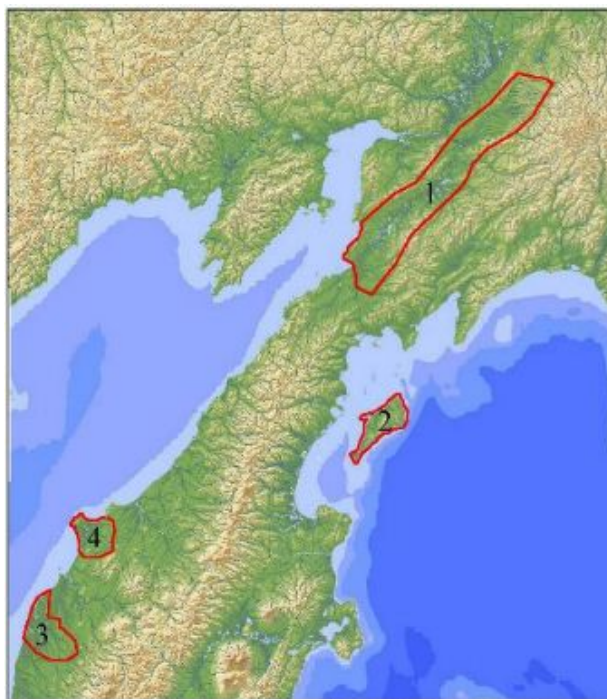


Fig.1. Location of Ramsar sites in the territory of the Kamchatka peninsula

- | | |
|-----------------------|-------------------------|
| 1 - Parapolsky Dol | 3 - Moroshechnaya River |
| 2 - Karaginsky Island | 4 - Utkholok |



K A R A G I N S K Y I S L A N D

"KARAGINSKY ISLAND" RAMSAR SITE

Geographical location:

Karaginsky Island is in the western part of the Bering Sea, at the northeastern coast of Kamchatka peninsula (the Koryak Autonomous Area, Karaginsky rayon). The distance from the rayon centre (Ossora village) is 55 km (Fig. 1, 4).

Geographical coordinates: 58° 28' – 59° 16' N; 163° 24' – 164° 22' E.

Wetland area: 193,597 hectares

Altitude: 0 - 434 m above sea level

Wetland types:

According to the Ramsar classification – A, D, F, G, E, M, O

According to the Russian classification – 1.1.1.1., 1.3.1.0., 3.8.1.3, 2.5.1.3, 2.5.2.0

Criteria for including into the list: 1a, 2a, 3a. The major criterion (3a) is an area of mass waterfowl aggregations.

Brief characteristics: Karaginsky Island with 2-km coastal zone is of great importance for conserving migratory birds and their habitats. The river mouth is an area of moulting of waterfowl; rocky terrains are grounds for bird colonies.

1. INFORMATION OF THE ENVIRONMENTAL STATUS

1.1. PHYSICAL

CLIMATE

Winter (from setting the snow cover to snow melting) lasts about 7 months. About three fourth of precipitation falls as snow. The mean February air temperature is - 11° C only on the island, usually it is lower. The absolute minimum is - 18.9° C. In some years, snowstorms are frequent in winter (39 - 42 snowstorm days, sometimes, > 90 days). Snow melts at the period from May 15 to June 7, in some years much later. Even in July some stream valleys are packed with snow to a depth of 5 m. Large snow blankets are kept on mountain slopes to the new snow.

In summer mists are frequent on the eastern side of the island. The mean June and July temperatures are +11.7° C and +11.8° C, respectively. The day temperature seldom exceeds +14° C. Frost-free period is 101 days (Reference book on climate of the USSR, 1970. 27, I, III, V parts).

TOPOGRAPHY AND HYDROGRAPHY

Karaginsky Island is located in the western part of the Bering Sea, at the northeastern coast of Kamchatka peninsula. The Strait of Litke of 40-50 km wide separates the island from the peninsula. The length of the island from Golenishchev cape on the north to Krashennikov cape on the south is 111 km, its greatest width is 45 km, and area is 2,000 sq.km.

The island is divided into 2 almost equal parts, which are very different in topography: western and eastern. The first is a plain of marine origin and consists of several sea terraces. This plain is dissected by rivers and represents flattop hills, the elevation of which is not more than 100 m above sea level. The shoreline of northwestern and western coasts of the island is smooth; there are no large gulfs, except the Bay of Lozhnykh vestei that is formed by Lekalo bar. The mountain part of the island is composed of three ridges. The largest Central ridge extends from north to south as a narrow (3-6 km) monolithic one of 30 km long. The highest mountain of the island is Vysokaya (912

m). The eastern and southeastern coasts have indented shoreline with a number of small bays and gulfs. The only large Severnaya Bay permits sea crafts to approach the island from its eastern side. The rest 120 km of the coast, which is abundant in cliffs and reefs, do not allow sea boats to land.

The branched river network of Karaginsky Island includes 1,105 rivers and streams. A rather high water level in the rivers is kept for the whole summer. Alimentation of rivers is provided mostly by atmospheric precipitation. However, there are some springs in the plain of the island. The largest river of the island is the Maminkvayam with the catchment basin of 100 sq. km. The right long and branched tributaries of the Maminkvayam flow mostly over the plain. In the upper reaches they are of mountain type: shallow with fast current, many rapids and rifts. They run in narrow and rocky valleys. When the rivers run on the plain, their flow becomes lower, and they form branches, islands, and shallows. In summer in the middle Maminkvayam reaches, the depth is 1-1.2 m,;in the lower reaches, the depth is about 1.5 m (Yudin, Grinchenko, 1952).

The second large river of the island, the Gnunvayam, is of 22 km long with a catchment basin area of 80-85 sq. km. It flows through the elevated plain and has a valley with bluffs. Only in the mouth before falling into the Litke Straight the river current is slowed down. The mean river depth here is 1.2-1.5 m, in some places, 3 m.

The third river falling into the Litke Straight is the Markelovskaya River of 17 km long. The catchment basin area is 100 sq. km. The river rises in the eastern mountain ridge, runs over depression between ridges, and at the mouth it may be referred to the type of plain rivers.

The rest island rivers are smaller than those mentioned above in length and catchment basin area. They are mountain rivers with rapids and rifts. In summer, when snow melts in the mountains, the water level rises in daytime, at nights it is lowered. In the lower reaches the rivers have different depths depending on high and low tides. Besides, many streams and rills dissect the coast of Karaginsky Island.

Sea bars at mouths of the Maminkvayam and Markelovskaya Rivers form vast shallow lagoons, the water level of which ranges: in high tide they are full-flowing, in low water shallow. Sometimes the Markelovskaya River lagoon is entirely drained.

The El'navan River lagoon of 15-20 km long extending inland Yuzhnyi peninsula is connected with the sea only during high tides. Its water is fresh, the water level ranges moderately. In reality, this lagoon is a lake.

Hundreds of lakes occupy 0.5% of the Karaginsky Island area. Couples with River branches and coastal water pools, lakes and wetlands are of exclusive value for waterfowl reproduction.

1.2. ECOLOGICAL

FLORA

According to the geobotanic zoning, Karaginsky Island belongs to the Beringian forest-tundra region (Kolesnikov, 1961). In the authors' opinion, that have given a more complete floristic review of the island vegetation (Barkalov et al., 1986), this territory should be referred to the North-Pacific meadow-deciduous forest region due to the presence of *Betulaermanii* forests and tall grass vegetation on the flat interfluve.

FLORISTIC CHARACTERISTIC

The major source that describes the island flora is a publication of V.Yu.Barkalov et al. (1986). This work describes 490 vascular plant species (according to the present ideas, their number is smaller since the authors differently consider the species volume). Table 1 shows the species composition of large families of the island flora.

Table 1: Species composition of large plant families in the flora of Karaginsky Island

No.	Family	Number of species in the flora	Position by species number
1	Poaceae	61	1
2	Cyperaceae	33	2-3
3	Asteraceae	33	2-3
4	Rosaceae	28	4
5	Ranunculaceae	18	5
6	Salicaceae	13	6
7	Ericaceae	11	7-8
8	Brassicaceae	11	7-8
9	Scrophulariaceae	9	9-13
10	Caryophyllaceae	9	9-13
11	Polygonaceae	9	9-13
12	Apiaceae	9	9-13

13	Juncaceae	9	9-13
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CHECKLIST OF VASCULAR PLANTS WITHIN THE KARAGINSKY ISLAND WETLAND

1.2.1. INVENTORY OF HABITATS

CLASSIFICATION AND CHARACTERISTIC OF HABITATS

GENERAL CHARACTERISTIC OF VEGETATION

The territory of Karaginsky Island was never considered as reindeer pastures (domestic reindeer was brought here not so long ago), therefore, there is no information regarding them. (The major sources of the information about vegetation of the KAO are materials of the Angara expedition). The main information of the island vegetation is given in publications of A.S.Plotnikov, N.V.Trulevich (1974), and V.Yu.Barkalov et al. (1986).

Betula ermanii forests of park type grow mostly on sea terraces and foothills of the western part of the island, from Pereval Mountain to Vysokaya Mountain over a space of 50 km. They occupy elevations from 20 to 280 m above sea level, their area is about 1% of the total territory. The major plant formations composing landscapes of the island are dwarf shrub hummock tundra (the most widespread tundra are dwarf shrub- lichen, short grass meadow, heather, and crowberry that cover about half of the area) and Siberian dwarf-pine and alder elfin woods. The Siberian dwarf-pine (*Pinus pumila*) predominates, forming thickets on more drained terrain, especially in middle and upper parts of the subalpine belt, to an elevation of 700 m above sea level. Dense alder (*Alnus fruticosa*) thickets (shrubby alder and elfin woods) occupy predominantly narrow creek valleys of the northern part of the island. They also occur in the lower portion of the subalpine belt. In the alpine belt (more than 700 m above sea level) mountain tundra predominates. Just this belt is characterised by mosaic and complex plant communities with diverse species composition due to contrast conditions and diverse topography. Here, there occur patches of sedge-cotton grass hummock tundra vegetation with *Eriophorum vaginatum* and *Carex lugens* as dominants and sphagnum bogs with *Andromeda polifolia* and *Saxifraga hirculus*. On patches formed due to snow thawing, scarce nival groups composed of alpine and arctoalpine forbs (*Juncus beringensis*, *Primula cuneifolia*, *Anemone sibirica*, *veronica grandiflora*, *Lloydia serotina*, and oth.) are common. On drained substrate at snow patches and stream banks, the nival small meadows occur with dominance of *Carex koraginensis*, *C. micropoda*, *C. eleusinoides*, *Trisetum spicatum*, *Pedicularis oederi*, *Valeriana capitata*, *Artemisia tilesii*, and oth. Scarce petrophytic groups composed of *Papaver microcarpum*, *Thalspi kamtschaticum*, *Emania parryodes*, *Dianthus repens*, *Astragalus alpinus* are present on friable gravel substrates on hill slopes in the subalpine and alpine belts and on cliffs are grown with.

Communities of coastal halophytes are characteristic of the sandy and gravel seashore. On slopes of marine terraces and in inland areas, the forb and grass-forb meadows prevail. At the large river mouths one can meet wattens (mud flats) – saline meadows regularly flooding during high tides. On flat terrain of marine terraces, flat wet watersheds, and gentle slopes of river valleys, sedge and sphagnum bogs are common, in some places lakes are abundant. Thickets of *Salix alaxensis*, *S. pulchra*, *S. lanata*, and *S. fuscescens* occupy river valleys and depressions on flat coasts.

DOMINANT PLANT COMMUNITIES

Betula ermanii forests. *Betula ermanii* forests of park type (stocking 0.3-0.4) are typical for eastern Kamchatka. The undergrowth consists of *Sorbus sambucifolia* and *Pinus pumila*. In the grass cover *Calamagrostis langsдорffii* prevails, common plants are *Maianthemum dilatatum*, *Veratrum oxysepalum*, *Iris setosa*, and *Athyrium filix-femina*, and oth.

Shrub and dwarf shrub tundra. Flat areas of marine terraces are covered with tundra communities dominated by *Pinus pumila* and *Alnus fruticosa* and some other shrubs as an admixture. Heather tundra with domination of *Empetrum nigrum*, *Phyllodoce caerulea*, *Rhododendron aureum* and others are confined to drained elevations of watersheds.

Elfin woods. Alder elfin woods (wood-reed - fern with *Calamagrostis purpurea* and *Dryopteris expansa*) are typical for the site. The data regarding Siberian dwarf-pine elfin woods is absent.

Mountain tundra. Grass-dwarf shrub-lichen tundra prevails in the mountains. Their dominants are heather and *Cladonia* lichens. In saddles, weakly drained slopes and stream banks, moss-dwarf shrub-grass tundra develops with green moss and sphagnum as well as with willows (*Salix arctica*, *S. sphenophylla*, *S. reticulata*) and sedges (*Carex fuscidula*, *C. rotundata*, *C. lugens*, *C. rariflora*, and oth.). Bald mountain slopes remain without snow in winter because it is blown off. Heather tundra occupies these areas, whereas the sites well snow-protected are occupied by short-grass meadow tundra with diverse species composition without distinct dominants.

Sandy and gravel coasts, dunes. The coastal 10-15-m breaker zone is unvegetated. The next from the sea is a belt of scattered supralittoral halophytic vegetation represented by *Senecio pseudoarnica*, *Honckenya oblongifolia*, *Mertensia maritima*, and *Lathyrus japonicus* with a projective coverage about 15%. The sandy coastal swells are covered with lyme-grass meadows composed of only *Leymus mollis* (projective coverage 30%) or with the admixture of the halophytes mentioned above and forbs (*Ligusticum scoticum*, *Geranium erianthum*, *Chamerion angustifolium*, *Chamaepericlymenum*, and oth.).

Mud flats (wattens). In the silt areas, at mouths of large rivers regularly flooding during high tide, the meadows with dominance of tussock *Carex* are widespread. Among other species are *Puccinellia phryganodes*, *Carex cryptocarpa*, and others. On the bottom of dry lagoons and in depressions, some patches of *Agrostis clavata* occur. On the loamy soils, which are saline due to seawater, *Atriplex gmelinii*, *Cochlearia officinalis*, and *Potentilla stolonifera* are common.

Bogs. Grass-dwarf shrub-moss bogs occupy river floodplains, lowlands of the seacoast, and wet territories of watersheds. In many cases, *Salix fuscescens* is the dominant (projective coverage 80%). Typical plants are *Betula exilis*, *Andromeda polifolia*, *Ledum decumbens*, *Oxycoccus palustris*, *O. microcarpus*, and *Vaccinium uliginosum* (25%).

Among sedges, *Carex appendiculata*, *C. cryptocarpa*, *C. cinerea*, *C. rariflora* (10-15%) predominate. *Parnassia palustris*, *Comarum palustre*, *Equisetum palustre*, *Iris setosa*, *Rubus arcticus*, *Pedicularis labradorica*, *Polemonium campanulatum*, *Trientalis europaea* s.l., *Galium trifidum*, and others (projective coverage 3-8 %) represent bog forbs. Sphagnum bogs develop on smaller areas and occur mostly on watersheds in the central part of the island. Their dominant is sphagnum moss; among forbs are *Rubus chamaemorus*, *Drosera rotundifolia*, *Carex globularis*, *C. gynocrates*, *Pinquicula villosa*, and others.

Boggy tundra occupies relatively small areas on the island in lower parts of river valley slopes or in the mountains or wet watersheds. Hummocks are characteristic of the valley microrelief. They can reach a height of 60 cm and diameter of 1 m. *Vaccinium uliginosum* (projective coverage 60 %); *Empetrum nigrum* s.l. (30 %), *Betula exilis*, *Lonicera caerulea*, *Loiseleuria procumbens*, *Ledum decumbens*, and *Spiraea beauverdiana* are abundant on hummocks. The space between hummocks is grown with grasses and forb (*Calamagrostis purpurea*, *Chamerion angustifolium*, *Carex globularis*, and oth. In the mountains sedge tundras with *Carex lugens*, *Eriophorum vaginatum*, and *E. polystachyon* predominate.

Wet meadows occur in the lower parts of slopes and in depressions of river valleys. Forb-grass meadows are dominated by sedges (*Carex cryptocarpa*, *C. diastena*, *C. stans*, and others). *Cardamine pratensis*, *Calamagrostis purpurea* s.l., *Arctophila fulva*, *Cicuta virosa*, and *Angelica genuflexa* are also representatives of the meadow grass cover. In wet meadows willow thickets are common (*Salix pulchra*, *S. lanata*, *S. fuscescens*, and *S. chamissonis*). In well-drained sites wood-reed and wood-reed-forb meadows develop with the dominant *Calamagrostis purpurea* s.l. Among other plants are *Cirsium kamtschaticum*, *Cacalia hastata*, *Veratrum oxysepalum*, *Chamerion angustifolium*, and *Delphinium brachycentrum*.

Lakes. Aquatic vegetation is mainly represented by *Potamogeton natans*, *Sparganium hyperboreum*, *Hippuris vulgaris*, *Menyantha trifoliata*, *Isoetes asiatica*, *Utricularia intermedia*, and *Callitriche palustris*.

Rivers and streams. The aquatic vegetation is poor in species composition and represented by thickets of *Batrachium eradicatum*. Rivers and stream banks are overgrown with thickets composed of moisture-loving species (*Senecio palustris*, *Chamerion latifolium*, *Angelica genuflexa*, *Anthriscus sylvestris*, *Ranunculus repens*, *Caltha arctica*, and others). Muddy river shallows are covered with *Limosella aquatica*, *Alopecurus aequalis*, *Equisetum arvense*, *Equisetum arvense*, and others.

HABITAT MAP

Habitats map reflects the accepted classification and habitats location (Fig.5).

Habitat types of "Karaginsky island " Ramsar site.

No.	Habitat types	Area, sq. km
1	Siberian dwarf-pine elfin wood	793.26
2	<i>Betula ermanii</i> forests	46.2
3	<i>Betula ermani</i> open woodland	42.69
4	Grass tundra	295.55
5	Lichen tundra	431.91
6	Shrub tundra	273.99
7	Includes bogs	41.28
8	Golets (bald rocks)	3.02
9	Marine water area	1200
	Total	3127.9

1.2.2. FAUNA AND VERTEBRATE ANIMALS OF "KARAGINSKY ISLAND" RAMSAR SITE

TAXONOMIC CHARACTERISTIC AND CHECKLIST OF VERTEBRATES

The main checklist of vertebrates in the Ramsar wetland "Karaginsky Island" includes 305 species (119 birds, 13 mammals, and 173 fishes). Table 2.

BIRDS

BIRD POPULATION IN BREEDING PERIOD

Nesting period. Eighty species of nesting birds (without birds of prey and owls) were found on the island. Thirty-five species nest in floodplain forests. Twenty-two species inhabit various open woodless areas, 23 species dwell Siberian dwarf-pine elfin woods. Sixteen species nest in *Betula ermanii* forests. The maximum density (374.1 pairs/sq. km) of bird population is registered in the floodplain forests. In Siberian dwarf-pine elfin woods this parameter is 116.6 pairs/sq. km, open woodless areas, 97.8; in *Betula ermanii* forests, 94.4 pairs/sq. km.

The most abundant species in the floodplain are Arctic Warbler, Yellow Wagtail, and Red-throated Pipit. In *Betula ermanii* forests Rustic Bunting, Pine Grosbeak, and Arctic Warbler predominate. In Siberian dwarf-pine elfin woods, Yellow Wagtail, Red-throated Pipit, and Middendorff's Grasshopper Warbler prevail. In open woodless areas, Lapland Longspur (Lapland Bunting), Red-throated Pipit, and Yellow Wagtail are dominants.

The island is of great importance as an area for nesting > 400,000 sea colonial birds including Black-legged Kittiwake (120,000 pairs), Thick-billed Murre (Brunnich's Guillemot) and Common Murre (Gullemot) (60,000 pairs), Pelagic Cormorant (Pelagic Shag) (10,000 pairs), Pigeot Guillemot (8,000 pairs), Tufted Puffin (2,500 pairs), and Anseriformes (Gerasimov, 1970; 1977a; 1979b; 1986; Vyatkin et al, 1975; Vyatkin, 1986; Gerasimov and Vyatkin, 1972; Gerasimov 1979). These species are the most abundant among nesting birds in the territory of the Ramsar wetland. The next in abundance are passerines: Dusky Thrush (~ 60,000) and Red-throated Pipit (~ 50,000) (Table 3).

In various habitats the percentage of bird groups is different. In *Betula ermanii* forests, passerines account for about 99% of the total number of birds; in tundra and Siberian dwarf-pine elfin woods, 88%; in floodplains, 75% (Table 4,5). Ducks are more abundant in the floodplain (13% of the total number of nesting birds); in tundra their number decreases to 6%, in Siberian dwarf-pine elfin woods, to 3%. The number of gallinaceous birds is maximum in elfin woods (9%); that of gulls, in floodplain (7%), and of auks, in tundra and floodplain (3%).

Table 2: Abundance of birds in the "Karaginsky Island" Ramsar site at the nesting period

	Population density (pairs/sq.km) and total number (individuals) of some species in various habitats				
Species	Floodplain forest	<i>Betula ermanii</i> forest	Siberian dwarf-pine elfin woods	Tundra and bogs (open woodless areas)	Bank scarps

	Populat ion density	Numb er	Populat ion density	Numb er	Populat ion density	Numb er	Populat ion density	Numb er	Populat ion density	Numb er
1	2	3	4	5	6	7	8	9	10	11
Red-throated Loon (Red-throated Diver) <i>G. stellata</i>	0,3	600	-	-	-	-	-	-	-	-
Arctic Loon <i>G. arctica</i>	0,01	20	-	-	-	-	-	-	-	-
Red-necked Grebe <i>P. grisegena</i>	0,02	40	-	-	-	-	-	-	-	-
Northern Fulmar <i>Fulmarus glacialis</i>	-	-	-	-	-	-	-	-	0,2	40
Pelagic Cormorant (Pelagic Shag) <i>Ph. pelagicus</i>	-	-	-	-	-	-	-	-	100	20000
Mallard A. <i>platyrhynchos</i>	0,1	200	-	-	2,5	200	-	-	-	-
Green-winged Teal <i>A. crecca</i>	2,0	4000	-	-	7,5	600	-	-	-	-
Eurasian Wigeon <i>A penelope</i>	0,1	200	-	-	2,5	200	-	-	-	-
Pintail <i>A. acuta</i>	1,6	3200	-	-	12,5	1000	-	-	-	-
Tufted duck <i>A. fuligula</i>	0,3	600	-	-	10,0	800	-	-	-	-
Greater Scout <i>A. marila</i>	0,2	400	-	-	2,5	200	-	-	-	-
Harlequin Duck <i>H. histrionicus</i>	-		3,1	5000	-		-	-	-	-
Oldsquaw <i>Clangula hyemalis</i>	0,01	20	-	-	-		-	-	-	-
Common Goldeneye <i>Bucephal a clangula</i>	-		-	-	10	20	-	-	-	-
Common Eider <i>Somateria mollissima</i>	0,4	800	-	-	-		-	-	-	-
Black Scoter <i>Melanitta americana</i>	0,5	1000	-	-	-		-	-	-	-
White-winged Scoter <i>M. deglandi</i>	0,3	600	-	-	-		-	-	-	-

<i>schistisagus</i>										
Mew Gull <i>L. canus</i>	-	-	-	-	1,2	400	-	-	-	-
Black-legged Kittiwake <i>Rissa tridactyla</i>	-	-	-	-	-	-	-	-	1200	240000
Common Tern S. <i>hirundo</i>	0,05	100	-	-	1,5	100	-	-	-	-
Arctic Tern S. <i>paradisaea</i>	0,5	1000	-	-	12,5	1000	-	-	-	-
Aleutian Tern S. <i>aleutica</i>	0,01	200	-	-	10,0	800	-	-	-	-
Common Murre <i>Uria aalge</i>	-	-	-	-	-	-	-	-	600	120000
Thick-billed Murre (Brunnich's Gullemoth) <i>Uria lomvia</i>								-		
Pigeon Guillemot <i>Cephus columba</i>	-	-	-	-	-	-	-	-	3	600

Table 2 continued

1	2	3	4	5	6	7	8	9	10	11
Marbled Murrelet <i>Brach. marmoratus</i>	-	-	-	-	-	-	-	-	0,5	100
Kittlitz's Murrelet <i>Brach. brevirostris</i>	-	-	-	-	-	-	-	-	0,5	100
Ancient Murrelet <i>Synthliboramphus antiquus</i>	-	-	-	-	-	-	-	-	2	400
Crested Auklet <i>Aethia cristatella</i>	-	-	-	-	-	-	-	-	1,0	200
Least Auklet <i>Aethia pusilla</i>	-	-	-	-	-	-	-	-	0,5	100
Parakeet Auklet <i>Cyclorhynchus psittacula</i>	-	-	-	-	-	-	-	-	1,0	200
Horned Puffin <i>Fratercula corniculata</i>	-	-	-	-	-	-	-	-	5,0	1000
Tufted Puffin <i>Lunda cirrhata</i>	-	-	-	-	-	-	-	-	25,0	5000
Common Cuckoo C. <i>canorus</i>	-	-	0,1	220	-	-	0,3	50	-	-
Oriental Cuckoo C.	-	-	-	-	-	-	0,2	40	-	-

<i>saturatus</i>										
Great Spotted Woodpecker <i>D. major</i>	-	-	-	-	-	-	0,4	70	-	-
Bank Swallow (Sand Martin) <i>Riparia riparia</i>	-	-	-	-	-	-	-	-	10,0	2000
Eurasian Skylark <i>A. arvensis</i>	4,0	4000	-	-	-	-	-	-	-	-
Indian (Olive) Tree Pipit <i>A. hodgsoni</i>	-	-	-	-	-	-	4,0	700	-	-
Pechora Pipit <i>A. gustavi</i>	4,0	4000	-	-	2,5	200	-	-	-	-
Red-throated Pipit <i>A. cervinus</i>	25,0	25000	13,0	20800	31,0	2500	-	-	-	-
Yellow Wigtail <i>M. flava</i>	24,0	24000	19,0	30400	54,0	4300	-	-	-	-
Gray Wagtail <i>Motacilla cinerea</i>	-	-	-	-	6,5	500	-	-	-	-
White (Pied) Wagtail <i>Motacilla alba</i>	1,0	1000	4,0	6400	4,5	400	-	-	-	-
Brown Shrike <i>L. cristatus</i>	-	-	0,5	800	-	-	2,0	300	-	-
Nutcracker <i>N. caryocatactes</i>	-	-	0,2	320	-	-	1,0	180	-	-
(Common, Northern) Raven <i>C. corax</i>		-	-	-	-	-	-	-	1,0	200

Table 2 continued

1	2	3	4	5	6	7	8	9	10	11
Siberian Accentor <i>Prunella montanella</i>	-	-	0,1	160	-	-	-	-	-	-
Middendorff's Grasshopper Warbler <i>L. ochotensis</i>	-	-	13,0	20800	29,5	2400	2,0	300	-	-
Arctic Warbler <i>Ph. borealis</i>	-	-	11,0	17600	83,0	6600	9,0	1600	-	-
Dusky Warbler <i>Ph. fuscatus</i>	-	-	6,4	10200	11,0	900	-	-	-	-
Siberian Rubythroat <i>L. calliope</i>	-	-	8,0	12800	2,5	200	2,0	400	-	-
Bluethroat <i>L. svecica</i>	-	-	1,3	2000	12,0	1000	5,0	900	-	-

Dusky Thrush <i>Turdus eunomus</i>	-	-	5,0	80200	28,0	2400	7,5	1400	-	-
Willow Tit <i>P. montanus</i>	-	-	-	-	-	-	0,7	100	-	-
Oriental Greenfinch <i>Ch. sinica</i>	0,5	500	4,0	6400	1,3	100	-	-	-	-
Common Redpoll <i>Acanthis flammea</i>	-	-	0,8	1300	-	-	-	-	-	-
Rosy Finch <i>Leucosticte arctoa</i>	-	-	2,0	3200	-	-	-	-	-	-
Common Rosefinch <i>C. erythrinus</i>	-	-	6,0	9600	4,5	400	1,0	200	-	-
Pine Grosbeak <i>P. enucleator</i>	-	-	3,0	4800	1,3	100	18,0	3200	-	-
Rustic Bunting <i>E. rustica</i>	-	-	-	-	-	-	22,0	4000	-	-
Yellow-breasted Bunting <i>E. aureola</i>	-	-	-	-	1,0	80	3,3	600	-	-
Lapland Longspur (Lapland Bunting) <i>C. lapponicus</i>	27,0	27000	6,0	9600	10,0	800	-	-	-	-
Total	97,82	106620	166,6	258800	374,1	30060	78,4	14040	2019,7* 10	403740* 2200

* - Numerator is the number of birds nesting at the rocky eastern coast, denominator is that at the western coast

The first place by the species diversity belongs to passerines (27 species or 34% of the total number of nesting birds without birds of prey and owls). Next are ducks (13 species or 16%), auks (11 species or 14%), waders (10 species or 13%), and gulls (9 species or 11%). Passerines are the first by the nesting density (77.5-282.6 pairs/sq. km) in various biotopes. In nesting period the total number of passerines is 360,000 birds (44% of the total number of nesting birds). Next in abundance are gulls (>262000, 32%) and auks (> 127,000 birds, 16%). Table 5.

Table 3: The number of birds in the "Karaginsky Island" Ramsar site at the nesting period (by orders)

Population density (pairs/sq.km) and total number (individuals) of some species in
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1	2	3	4	5	6	7	8	9	10	11
Red-throated Loon (Red-throated Diver) <i>G. stellata</i>	0,3	660	-	-	-	-	-	-	-	-
Arctic Loon <i>G. arctica</i>	0,01	20	-	-	-	-	-	-	-	-
Red-necked Grebe <i>P. grisegena</i>	0,02	60	-	-	-	-	-	-	-	-
Northern Fulmar <i>Fulmarus glacialis</i>	-	-	-	-	-	-	-	-	0,5	50
Pelagic Cormorant (Pelagic Shag) <i>Ph. pelagicus</i>	-	-	-	-	-	-	-	-	220,0	22000
Mallard A. <i>platyrhynchos</i>	0,1	440	-	-	11,0	440	-	-	-	-
Green-winged Teal A. <i>crecca</i>	2,0	8800	-	-	33,0	1320	-	-	-	-
Eurasian Wigeon A <i>penelope</i>	0,1	440	-	-	11,0	440	-	-	-	-
Pintail A. <i>acuta</i>	1,6	7040	-	-	55,0	2200	-	-	-	-
Tufted duck A. <i>fuligula</i>	0,3	1320	-	-	44,0	1760	-	-	-	-
Greater Scout A. <i>marila</i>	0,2	880	-	-	11,0	440	-	-	-	-
Harlequin Duck <i>H. histrionicus</i>	-	-	13,6	11000	-	-	-	-	-	-
Oldsquaw <i>Clangula hyemalis</i>	0,01	50	-	-	-	-	-	-	-	-
Common Goldeneye <i>Bucephala clangula</i>	-	-	-	-	44,0	50	-	-	-	-
Common Eider <i>Somateria mollissima</i>	0,4	1760	-	-	-	-	-	-	-	-
Black Scoter <i>Melanitta americana</i>	0,5	2200	-	-	-	-	-	-	-	-
White-winged Scoter <i>M. deglandi</i>	0,3	1320	-	-	-	-	-	-	-	-
Red-breasted Merganser <i>M. serrator</i>	0,2	880	-	-	2,2	880	-	-	-	-
Willow Ptarmigan <i>L. lagopus</i>	1,8	5200	34,8	27800	-	-	-	-	-	-

Table 4 continued

1	2	3	4	5	6	7	8	9	10	11
Rock Ptarmigan <i>L. mutus</i>	-	-	23,2	18600	29,0	1200	-	-	-	-
Mongolian Plover <i>Charadrius</i>	-	-	0,3	280	-	-	-	-	-	-

Murrelet <i>Brach. marmoratus</i>											
Table 4 continued											
1	2	3	4	5	6	7	8	9	10	11	
Kittlitz's Murrelet <i>Brach. brevirostris</i>	-	-	-	-	-	-	-	-	1,1	110	
Ancient Murrelet <i>Synthliboramphus antiquus</i>	-	-	-	-	-	-	-	-	4,4	440	
Crested Auklet <i>Aethia cristatella</i>	-	-	-	-	-	-	-	-	2,2	220	
Least Auklet <i>Aethia pusilla</i>	-	-	-	-	-	-	-	-	1,1	110	
Parakeet Auklet <i>Cyclorhynchus psittacula</i>	-	-	-	-	-	-	-	-	2,2	220	
Horned Puffin <i>Fratercula corniculata</i>	-	-	-	-	-	-	-	-	11,0	1100	
Tufted Puffin <i>Lunda cirrhata</i>	-	-	-	-	-	-	-	-	55,0	5500	
Common Cuckoo <i>C. canorus</i>	-	-	0,4	260	-	-	1,3	60	-	-	
Oriental Cuckoo <i>C. saturatus</i>	-	-	-	-	-	-	0,9	50	-	-	
Great Spotted Woodpecker <i>D. major</i>	-	-	-	-	-	-	1,8	80	-	-	
Bank Swallow (Sand Martin) <i>Riparia riparia</i>	-	-	-	-	-	-	-	-	44,0	4400	
Eurasian Skylark <i>A. arvensis</i>	17,6	8800	-	-	-	-	-	-	-	-	
Indian (Olive) Tree Pipit <i>A. hodgsoni</i>	-	-	-	-	-	-	17,6	1500	-	-	
Pechora Pipit <i>A. gustavi</i>	17,6	8800	-	-	11,0	400	-	-	-	-	
Red-throated Pipit <i>A. cervinus</i>	110,0	55000	57,2	47800	136,4	5500	-	-	-	-	
Yellow Wagtail <i>M. flava</i>	105,6	52800	83,6	66900	237,6	9500	-	-	-	-	
Gray Wagtail <i>Motacilla cinerea</i>	-	-	-	-	28,6	1100	-	-	-	-	
White(Pied)Wagtail <i>Motacilla alba</i>	4,4	2200	17,6	14000	19,8	900	-	-	-	-	
Brown Shrike <i>L. cristatus</i>	-	-	2,2	1800	-	-	8,8	600	-	-	
Nutcracker <i>N. caryocatactes</i>	-	-	0,9	700	-	-	4,4	400	-	-	

(Common,Northern)Raven <i>C.corax</i>	-	-	-	-	-	-	-	-	4,4	440
Siberian Accentor <i>Prunella montanella</i>	-	-	0,4	350	-	-	-	-	-	-
Middendorff's Grasshopper Warbler <i>L.ochotensis</i>	-	-	57,2	45800	129,8	5300	8,8	600	-	-
Table 4 continued										
1	2	3	4	5	6	7	8	9	10	11
Arctic Warbler <i>Ph. borealis</i>	-	-	48,4	38700	365,2	14500	39,6	3500	-	-
Dusky Warbler <i>Ph. fuscatus</i>	-	-	28,2	22400	48,4	2000	-	-	-	-
Siberian Rubythroat <i>L.calliope</i>	-	-	35,2	28200	11,0	400	8,8	900	-	-
Bluethroat <i>L. svecica</i>	-	-	5,7	4400	52,8	2200	22,0	2000	-	-
Dusky Thrush <i>Turdus eunomus</i>	-	-	22,0	17640	123,2	5300	33,0	3000	-	-
Willow Tit <i>P. montanus</i>	-	-	-	-	-	-	3,1	200	-	-
Oriental Greenfinch <i>Ch. sinica</i>	2,2	1100	17,6	14100	5,7	200	-	-	-	-
Common Redpoll <i>Acanthis flammea</i>	-	-	8,8	2800	-	-	-	-	-	-
Rosy Finch <i>Leucosticte arctoa</i>	-	-	26,4	7000	19,8	-	4,4	-	-	-
Common Rosefinch <i>C. erythrinus</i>	-	-	13,2	21100	5,7	900	79,2	400	-	-
Pine Grosbeak <i>P. enucleator</i>	-	-	-	10600	-	200	96,8	7000	-	-
Rustic Bunting <i>E. rustica</i>	-	-	-	-	4,4	-	14,5	8800	-	-
Yellow-breasted Bunting <i>E. aureola</i>	-	-	-	-	4,4	200	14,5	1300	-	-
Lapland Longspur (Lapland Bunting) <i>C. lapponicus</i>	118,8	59400	26,4	21100	44,0	1800	-	-	-	-
Total	424,68	229040	526,8	582090	1589,8	63370	345,0	30390	3509,2*	469280*
									48,4	4840

* - Nominator is the number of birds, nesting on rocky eastern coast; denominator is that number on the lowland eastern coast.

Table 5: The number of birds in "Karaginsky Island" Ramsar site at the postbreeding period (species order)

Species group	Density (pairs/sq.km) and total number (individuals) of some species in various habitats									
	Floodplain forest		Betula ermanii forest		Siberian dwarf-pine elfin woods		Tundra and bogs (open woodless areas)		Bank scarps	
	Population density	Number	Population density	Number	Population density	Number	Population density	Number	Population density	Number
Loons	0,73	1360	-	-	-	-	-	-	-	-
Grebes	0,06	90	-	-	-	-	-	-	-	-
Shearwaters	-	-	-	-	-	-	-	-	0,5	50
Cormorants	-	-	-	-	-	-	-	-	220,0	22000
Geese	25,04	25130	13,6	11000	211,2	7530	-	-	-	-
Gallinaceous birds	10,4	5200	58,0	46400	29,0	1200	-	-	-	-
Sandpipers	7,6	4060	0,3	280	37,2	1480	-	-	-	-
Gulls	4,65	5810	-	-	69,0	2760	-	-	480,0	307200
Auks	-	-	-	-	-	-	-	-	216,7	140470
Cuckoos	-	-	0,4	260	-	-	2,2	110	-	-
Woodpeckers	-	-	-	-	-	-	1,8	80	-	-
Passerines	376,2	188100	454,5	524150	1243,4	50400	341,0	30200	48,4	4840
Total	424,68	229040	526,8	582090	1589,8	63370	345,0	30390	3509,2* 48,4	469280* 4840

Postbreeding period. To the end of breeding the density of bird (without nonbreeding birds) population in Betula ermanii forests of the wetland is 345 ind./sq. km; in tundra- 425; in Siberian dwarf-pine elfin woods- 527; in floodplain- to 1,590 ind./sq. km (Table 6).

Table 6: The number of waterfowl passing through the "Karaginsky island" Ramsar site

Species	Spring			Autumn		
	Tundra and	Coastal water	Total	Tundra and	Coastal water	Total

	bog	surface		bog	surface	
1	2	3	4	5	6	7
Red-throated Loon (Red-throated Diver) <i>G. stellata</i>	-	5000	5000		5500	5500
Arctic Loon <i>G. arctica</i>	-	5000	5000		5500	5500
Yellow-billed Loon <i>Gavia adamsi</i>	-	1000	1000		1100	1100
Red-necked Grebe <i>P. grisegena</i>	-	500	500		1400	1400
Northern Fulmar <i>Fulmarus glacialis</i>	-	10000	10000		10800	10800
Pelagic Cormorant (Pelagic Shag) <i>Ph. pelagicus</i>	-	30000	30000		32400	32400
Bean goose <i>Anser fabalis</i>	200		200	440		440
Whooper swan <i>Cygnus cygnus</i>	100		100	220		220
Mallard <i>Anas platyrhynchos</i>	200		200	440		440
Green-winged Teal <i>Anas crecca</i>	5000		5000	11000		11000
Eurasian Wigeon <i>Anas penelope</i>	10000		10000	22000		22000
Pintail <i>Anas acuta</i>	10000		10000	22000		22000
Northern Shoveler <i>Anas clypeata</i>	100		100	220		220
Tufted Duck <i>Aythya fuligula</i> +Greater Scaup <i>Aythya marila</i>	5000	5000	10000	11000	11000	22000
Harlequin Duck <i>H. histrionicus</i>		20000	20000		44000	44000
Oldsquaw <i>Clangula hyemalis</i>		50000	50000		100,000	100,000
Common Goldeneye <i>Bucephala clangula</i>		100	100		220	220

Common Eider <i>S. mollissima</i>		20000	20000		44000	44000
King Eider <i>S. spectabilis</i>		1000	1000		2200	2200
Steller's Eider <i>Polysticta stelleri</i>		10000	10000		22000	22000
Black Scoter <i>M. americana</i>		20000	20000		44000	44000
White-winged Scoter <i>M. deglandi</i>		20000	20000		44000	44000
Red-breasted Merganser <i>Mergus serrator</i>		8000	8000	5000	12600	17600
Common Merganser <i>M. merganser</i>		4000	4000		8800	8800
Pacific Golden Plover <i>P. fulva</i>	200		200	280		280
Mongolian Plover <i>Ch. mongolus</i>		300	300		420	420
Ruddy Turnstone <i>Arenaria interpres</i>		200	200		280	280
Wood sandpiper <i>Tringa glareola</i>	500		500	700		700
Greenshank <i>Tringa nebularia</i>	500		500	700		700
Gray-tailed Tattler <i>H. brevipes</i>	1000		1000	1400		1400
Common sandpiper <i>Actitis hypoleucos</i>	500		500	700		700
Terek Sandpiper <i>Xenus cinereus</i>	500		500	7000		7000
Red (Gray) Phalarope <i>Ph. fulicarius</i>		1000	1000		14000	14000
Table 6 continued						
1	2	3	4	5	6	7
Northern (Red-necked) Phalarope <i>Ph. lobatus</i>		50000	50000		70000	70000
Rufous-necked Stint <i>C.</i>	10,000		10,000	14000		14000

<i>ruficollis</i>						
Long-Toed Stint <i>C. subminuta</i>	500		500	700		700
Dunlin <i>Calidris alpina</i>	10,000		10,000	14000		14000
Sharp-tailed sandpiper <i>C. acuminata</i>	200		200	280		280
Common Shipe <i>Gallinago gallinago</i>	500		500	700		700
Whimbrel <i>N. phaeopus</i>	2000		2000	2800		2800
Pomarine Jaeger (Pomarine Skua) <i>St pomarinus</i>		200	200		240	240
Parasitic Jaeger <i>St. parasiticus</i>		500	500		600	600
Long-tailed Jaeger <i>St. longicaudus</i>		300	300		360	360
Common Black-headed Gull <i>Larus ridibundus</i>		500	500		600	600
Slaty-backed Gull <i>L. schistisagus</i>		40000	40000		48000	48000
Glaucous Gull <i>Larus hyperboreus</i>		500	500		600	600
Mew Gull <i>Larus canus</i>		10000	10000		12000	12000
Black-legged Kittiwake <i>Rissa tridactyla</i>		200000	200000		240000	240000
Common Tern <i>Sterna hirundo</i>		500	500		600	600
Arctic Tern <i>S. paradisaea</i>		2000	2000		2400	2400
Aleutian Tern <i>Sterna aleutica</i>		500	500		600	600
Common Murre (Guillemot) <i>Uria aalge</i> + Thick-billed Murre (Brunnich's Guillemot) <i>Uria lomvia</i>		100000	100000		108000	108000
Pigeon Guillemot <i>C columba</i>		1000	1000		1080	1080

Marbled Murrelet <i>Br. marmoratus</i>		200	200		220	220
Kittlitz's Murrelet <i>Br. brevirostris</i>		200	200		220	220
Ancient Murrelet <i>Synthliboramphus antiquus</i>		1000	1000		1080	1080
Crested Auklet <i>Aethia cristatella</i>		1000	1000		1080	1080
Least Auklet <i>Aethia pusilla</i>		1000	1000		1080	1080
Parakeet Auklet <i>C. psittacula</i>		1000	1000		1080	1080
Horned Puffin <i>Fratercula corniculata</i>		1000	1000		1080	1080
Tufted Puffin <i>Lunda cirrhata</i>		10000	10000		10800	10800
Total	37020	632500	669520	115580	806040	921620

The total number of nesting birds and their offspring reaches 1,800,000 individuals. At this time the most numerous species are Black-legged Kittiwake (288,000), Dusky Thrush (185,000), Yellow Wagtail (130,000), Red-throated Pipit (108,000), and Common Murre and Thick-billed Murre (132,000 individuals) Table 6.

The total abundance of passerines to the end of the breeding season is about 800,000 or ~ 58% of the total number of birds (without nonbreeding), including 315,000 gulls and 140,000 auks (Table 5).

WATERFOWL MIGRATING THROUGH THE WETLAND

The wetland "Karaginsky Island" is on the Central Kamchatka migration way of waterfowl, waders, sea colonial, and other birds. Rich coastal marine water of the island provides birds with food during migration, moulting, and wintering.

Along the eastern Kamchatka coast an intense migration of geese and sea colonial birds is observed. Hundreds of oldsquaws, white-winged and black scoters, and three eider species pass through this wetland. Masses of auks, blacklegged kittiwakes and pelagic cormorants migrate to nesting grounds. Diving ducks and seabirds fly low over water and nearby the seashore. Bird flocks straighten their way to the north in order not to round Shipunsky, Kronotsky, Kamchatsky, and Ozernyi capes of the eastern Kamchatka coast.

Karaginsky Island is located on the way of migratory birds to the north of Ozernyi peninsula. The Central Kamchatka migration way of geese passes from the western coast of this peninsula to the northeast Kamchatka coast. Here, from the Malamvayam lagoon to the Ukinskaya inlet most of ducks and geese continue their way over the northeastern tundra. Other birds fly towards Karaginsky Island.

Diving ducks predominate among migratory birds. The number of them coming to Karaginsky Island for rest and feeding changes from year to year and is related to the ice regime and seasonal weather conditions. In the spring of 1976-1978 in coastal waters and lagoons of Karaginsky Island about 150,000-200,000 diving ducks had rest and feeding. River ducks are less numerous. In the spring of 1976 their number was 28,000-30,000 birds. The major area for bird rest and feeding is Yuznyi peninsula and valleys of the Malamvayam and Markelovskaya rivers (Gerasimov, 1979). The total number of migratory birds is 700,000 (waterfowl and water-related) in spring and about 900,000 birds in autumn (Table 6, 7).

Table 7: The number of waterfowl passing through the "Karaginsky island" Ramsar site

Species	Spring			Autumn		
	Tundra and bog	Coastal water surface	Total	Tundra and bog	Coastal water surface	Total
Loons		11000	11000		12100	12100
Grebes		500	500		1400	1400
Shearwaters		10000	10000		10800	10800
Cormorants		30000	30000		32400	32400
Ducks	30600	158100	188700	73220	232920	305240
Waders	6420	51500	57920	43260	84700	127960
Gulls		255000	255000		306000	306000
Auks		116400	116400		125720	125720
Total	37020	632500	669520	115580	806040	921620

MOULTING AND WINTERING WATERFOWL IN THE WETLAND

The coastal water of Karaginsky Island is an area for moulting of Harlequin Duck, Common Eider, White-winged Scoter, and Common Merganser (Gerasimov, 1972; 1979).

In the moulting period, small groups of harlequin ducks occur in the 50-m belt of the stony eastern coast on the island and in river mouths. Common eiders moult in various sites of the coastal water independently of the coastline pattern. Three moulting grounds of white-winged scoters are known: at the southern termination of the island, opposite the Gnunvayam mouth and in the Severnaya Bay.

Common Merganser starts moulting in lagoons and offshore. In the beginning of the moulting period mergansers occur regularly along the western island coast; in late July they move outward the shore and are dispersed throughout 1-km coastal area.

Steller's eider appears on the island in late June and is abundant in early July. In summer, the bird prefers the eastern stony coast and does not visit sandy terrain. The 200-m coastal area is a place of their residence (Gerasimov, 1979).

The total number of waterfowl and water-related birds that moult at the wetland territory exceeds 40,000 birds (Table 8).

Table 8: The number of moulting and wintering waterfowl at the "Karaginsky Island" Ramsar site

Species	Number in various periods (individuals)	
	Moulting	Wintering
Red-throated Loon <i>Gavia stellata</i>	200	
Arctic Loon <i>Gavia arctica</i>	20	
Yellow-billed Loon (White-billed Diver) <i>Gavia adamsi</i>	20	
Hurlequin Duck <i>Histrionicus histrionicus</i>	3000	
Oldsquaw <i>Clanduls hyemalis</i>		10 000*
Common Eider <i>Somateria molissima</i>	2500	
King Eider <i>Somateria spectabilis</i>	100	
Steller's Eider <i>Polysticta stelleri</i>	5000	
Black Scoter <i>Melanitta americana</i> (M. nigra americana)	500	
White-winged Scoter <i>Melanitta deglandi</i> (M. fusca deglandi)	5000	

Red-breasted Merganser <i>Mergus serrator</i>	500	
Common Merganser <i>Mergus merganser</i>	3000	
Slaty-backed Gull <i>Larus schistisagus</i>	3000	
Glaucous Gull <i>Larus hyperboreus</i>	50	
Mew Gull <i>Larus canus</i>	500	
Black-legged Kittiwake <i>Rissa tridactyla</i>	10 000	
Total	40 390	10 000

Thousands of oldsquaws winter on Karaginsky Island. They move from one coastal areas of the island to other ones depending on the wind direction. The total number of wintering oldsquaws ranges depending on the ice regime and sometimes reaches 10,000 birds.

TOTAL NUMBER OF BIRDS USING THE WETLAND SITE

The annual total number of breeding, moulting, migratory and wintering birds using the Ramsar wetland "Karaginsky Island" is not more than 2 million birds including >630,000 gulls; 420,000 ducks, and > 260,000 auks (Table 9).

Table 9: The total number of the birds using the "Karaginsky Island" Ramsar site

Species	Number of species groups (ind.)						
	Nesting	Postnesting	Molting	Wintering	Spring migratory	Autumn migratory	Total
Loons	620	1360	240	-	11000	12100	13700
Grebes	40	90	-	-	500	1400	1490
Shearwaters	40	50	-	-	10000	10800	10850
Cormorants	20000	22000	-	-	30000	32400	54400
Geese	19840	23660		10000	188700	384440	418100
Gallinaceous birds	18200	52800		-	-	-	52800
Waders	3600	5820	-	-	77900	127960	133780
Gulls	260240	315770	13550	-	255000	306000	635320
Auks	127700	140470	-	-	116400	125720	266190
Cuckoos	330	370		-	*	*	370
Woodpeckers	70	80		-	-	-	80
Passerines	361740	797690		-	*	*	797690
Total	812420	1360160	30390	10000	589500	1316500	2117210

Note: * - the number is unknown

PROTECTED BIRD SPECIES LISTED INTO THE RED DATA BOOK OF RUSSIA

The following birds inhabiting Karaginsky Island are listed into the Red Data Book of Russia:

- Yellow-billed Loon (White-billed Diver) is common in coastal areas during migration.
- Pacific Black Brant is a rare migratory species.
- Lesser White-fronted Goose is registered at the western coast of the island during spring migration. Its flocks are composed of about 40 birds.
- Snow Goose is an occasional bird. Several hundreds of birds were registered on the island in the spring of 1968.
- Golden eagle is a rare nesting species. There are two nesting grounds in birch forests of the Limimte and Mel'vayam river basins (southeastern coast).
- Stealer's Sea eagle nests on the island (3-5 pairs).
- Peregrine Falcon is a rare occasional bird.
- Gyrfalcon is a rare occasional bird.
- Eastern Curlew occurs on the island during migration.
- Ross's Gull (flocks of 87 birds) is registered at the island coast.
- Aleutian Tern is a common nesting species.
- Marbled Murrelet occurs in summer and autumn at the coast of the Litke Inlet (the western island side).
- Kittlitz's Murrelet occurs at the island coasts in summer and may nest.

MAMMALS

TERRESTRIAL MAMMALS

According to the zoogeographical zoning, "Karaginsky Island" wetland belongs to the Siberian-European subregion, Beringian northern taiga province and is included into the Kamchatka area. Due to specific features of natural conditions and geological history of the region studied, the fauna of terrestrial mammals is characterised by a poor species composition, distinct endemism at the subspecies level, and by the combination of forest, tundra and mountain forms of mammals.

Only 13 species of mammals inhabit Karaginsky Island. Brown and polar bears are rarely met. Sometimes they come or are brought with ice blocks. Reindeer is a domestic animal. Predators and rodents are residents (4 species in each order) on the island (Table 10).

Table 10: Terrestrial mammals of the "Karaginsky Island" Ramsar site

Species	Density Ind./sq. km	Number (ind.)
Sorex. caecutiens shrew	300-2600	582000-5044000
Alpine Hare Lepus timidus	0,68	1300

Northern Redbacked vole <i>Clethrionomys rutilus</i>	200-2800	388000-5432000
Large-toothed redback vole <i>Clethrionomys rufocanus</i>	200-2800	388000-5432000
Tundra vole <i>Microtus oeconomus</i>	200-2800	388000-5432000
Muskrat <i>Ondatra zibethicus</i>	?	100-300
Common Red Fox <i>Vulpes vulpes</i>	0,07-0,48	140-960
Brown Bear <i>Ursus arctos</i>		Rare visits
Polar Bear <i>Ursus maritimus</i>		Very rare visits (1969, 1977, 1987),
Sable <i>Martes zibellina</i>	0,03-0,05	60-100
Wolverine <i>Gulo gulo</i>	0,003-0,007	6-14
Weasel <i>Mustela erminea</i>	0,15-0,92	290-1780
Caribou <i>Rangifer tarandus</i>	2,0-3,0	400-600

Brown bears that were residents in the past were shot in the early 1930s. Later on, only single individuals were registered. The same is true for polar bears. The last visit of Polar Bear (on an ice block) was noted on the island in 1987. The rest mammals, given in Table 10, live on the island permanently.

Among shrews, *Sorex caecutiens* inhabits floodplain forests, light forests, Siberian dwarf-pine elfin woods, and boggy depressions with shrubs.

Mouse-like animals are widespread in birch forests, not so frequently in floodplain forests, and in openings grown with shrubs. The major type of habitats for *Microtus oeconomus* (tundra vole) is floodplain forests and moist shrub areas. The minimum number of all voles is in September-October.

Muskrat was brought to Karaginsky Island in 1928 and at present it lives in the Markelovskaya, Mimikinvyayam, Gnunvyayam rivers, and El'novaya lagoon. The minimum number of Muskrat is registered in April-May, maximum, in September-October.

Habitats of Alpine Hare are restricted to the forest areas - birch forests and alder elfin woods (breeding grounds) as well as to floodplain forests (feeding grounds).

Sable dwells only birch forests and river floodplains. Ermine occurs in river floodplains and shrub tundra, but it may be also met in birch forests and in elfin woods.

The major habitats for sable are birch forests and river floodplains. Ermine prefers floodplains and shrub tundra, though one may meet this animal in birch forests and elfin –woods.

The major habitats of Fox on the island are coasts.

The 3-year cycles are characteristic of the number of shrews. These cycles determine 3-4-year ones for the number of myophagous predators – Ermine, Sable, and Fox, though their cycles are shifted by 1-2 years with respect to the dynamics of shrews and voles. Alpine Hare has 6-8-year cycles of its number. There are no similar data for other mammals because of their small number and a short period of observations.

The limiting factors for Sable are small areas or the absence of high forests, shelters, sites for breeding and feeding. The major limiting parameter for Muskrat is the ice regime of water pools. The numbers confines status of other mammals.

PINNIPEDIA MAMMALS

Some representatives of pinnipeds occur in the wetland (Burkanov, 1988).

Common Seal (Larga). Major breeding grounds on the Kamchatka eastern coast are the Karaginsky and Ozernovsky inlets (see fig. 4). In the period of salmon passage large groups of seals concentrate at the northern and southern terminations of Karaginsky Island (about 2,500 and 3,500 animals, respectively).

As the intensity of salmon run decreases, the seals move from the river mouths to the eastern coast because people trouble the animals here. The number of seals is over 9,300 animals. In low tides seal-rookeries are formed on reefs of the Kalelagryvayam River (around 800 animals), at the western coast of the Golenishchev cape (300), at the Gorbatov cape (400), on Ptichii Island (500), at the Promezhutochnyi cape (600), and on reefs from western and eastern coasts of Krashennikov cape (3,000 animals).

Except the seal-rookeries mentioned, the seals concentrate in small groups on reefs at the eastern coast of the island.

Ringed Seal. Breeding grounds of this animal are throughout the Kamchatka eastern coast (the major its areas are in the southern part of the Ozernyi Bay adjacent to the Kamchatka coast and the Karaginsky Bay). The population of these animals in the Karaginsky Bay is low for the breeding period. The animals stay on large ice blocks. In spring of 1985 their number did not exceed 5,000-6,000 animals (Burkanov). As moulting stops and ice disappears, the animals are innoticable.

Bearded seal. The major habitat of Bearded Seal is the Karaginsky Bay. Breeding takes place at the northern termination of Karaginsky Island, in the Inlet of Litke and southern part of the bay that is adjacent to the Rusakovaya, Ivashka rivers and the Ozernovsky Peninsula coast. Later, with ice drift, bearded seals move from the northern part of the bay southward. In May of 1983, the number of animals was estimated at over 2,000 animals.

Ribbon Seal. In the littoral, these animals are observed only on ice, predominantly at the northeastern coast – in the zone including Karaginsky Island. At the period without ice Ribbon Seals occur occasionally. In mid-May the number of this animal increases. When the period of moulting starts, the animals go to the ice and stay there for a longer time. The ice remains only in the southern part of the Karaginsky Bay. In 1994 the number of Ribbon Seals was 15,800 animals. Later on, after ice melting, these animals transfer to the pelagic way of life, go away offshore and do not appear at the coast.

Eared seal inhabits the Kamchatka coast the year round. Animals concentrate in winter in the areas of fishery. The recent distribution of coastal breeding grounds of Eared Seal on Karaginsky Island is shown in Fig 4. Major breeding grounds are at the Krasheninnikov cape. The breeding grounds are located on two high small reefs-islands where the animals stay from May to October. In winter and autumn, the number of animals does not exceed 100; in summer, 500-700 animals. Only young animals occur on breeding grounds.

Walrus is spread at the northeast coast of Kamchatka beginning from the Karaginsky Bay. It occurs the year round, but the most numerous in late autumn-winter. In spring small groups of the animals are on ice blocks at the northern area of the island. In late May it may be observed in the Inlet of Litke and at the southern part of the Karaginsky Bay with drifted ice. Beginning from mid-May, Walrus is distributed throughout littoral along the western coast of Karaginsky Island and in the northern part of the Litke Strait. In these regions during the period without ice Walrus occurs in water by groups of 5-8 to 150-200 and more animals. At the same regions not so far from feeding grounds, Walrus forms rookeries being there from May to mid-October. The number of animals on the rookeries is about 1,000 animals.

FISH RESOURCES

One hundred and seventy-three species and subspecies of 45 families and 19 orders represent the ichthyofauna of the "Karaginsky Island" Ramsar site. Salt-water fishes are 161 taxa (93.1% of the ichthyofauna), anadromous and semianadromous ones - 11 (6.4%) and 1 (0.6%), respectively (Table a). Among anadromous and semianadromous fish, Salmonidae family (6 species, 3.5%) predominates; among salt-water ones, Cottidae (29, 16.8%), Pleuronectidae (16, 9.2%) Stichaeidae (11, 6.4%), Agonidae (10, 5.8%), Liparidae (10, 5.8%), and Zoarcidae (1 species, 4.6%).

Table 11: Checklist of fish and their residence in the Ramsar wetland "Karaginsky Island"

Taxon	Resistance and abundance
FISH	
Cephalaspidomorphi Class – Lampreys	
Petromyzontiformes order – Lampreys	
Petromyzontidae family- Lampreys	
<i>Entosphenus tridentatus</i> (Gairdner in Richardson, 1836) – ?????????? ??????	RM
<i>Lethenteron camtschaticum</i> (Tilesius, 1811) – Arctic lamprey	CM
Chondrichthyes Class - Cartilaginous fish	
Lamniformes order – Mackerel Sharks	
Lamnidae family- Mako Sharks	
<i>Lamna ditropis</i> Hubbs et Follett, 1947 - Salmon Shark	CM
Squaliformes order – Dogfish Sharks	
Squalidae family– Dogfish Sharks	
<i>Somniosus pacificus</i> Bigelow et Schroeder, 1944 Spiny dogfish	RO
<i>Squalus acanthias</i> Linnaeus, 1758 - Pacific sleeper shark	RM
Rajiformes order – Rays, Skates	
Pseudorajidae family – Rays, Skates	
<i>Bathyraja aleutica</i> (Gilbert, 1896) - Aleutian Skate	RM
<i>Rhinoraja interrupta</i> (Gill et Townsend, 1897)	CP
<i>Bathyraja maculata</i> Ishiyama et Ishihara, 1977	RM
<i>Bathyraja parmifera</i> (Bean, 1881) - Alaska Skate	CP
<i>Bathyraja violacea</i> (Suvorov, 1935) - Okhotsk Skate	CP
Osteichthyes Class – Bony Fish	
Acipenseriformes order – Sturgeons	

Acipenseridae family – Sturgeons	
<i>Acipenser medirostris</i> Ayres, 1854 Green Sturgeon	RM
Anguilliformes order	
Nemichthyidae family	
<i>Avocettina infans</i> Gunther, 1878	RM
Clupeiformes order – Herrings, Sardines	
Clupeidae family – Herrings, Sardines	
<i>Clupea pallasii</i> Valenciennes in Cuvier et Valenciennes, 1847 - Pacific Herring	AP
<i>Sardinops melanostictus</i> (Temminck et Schlegel, 1846) - Japanese Sardine	RM
Salmoniformes order – Salmonids	
Microstomatidae family – Deepsea Smelts	
<i>Bathylagus pacificus</i> Gilbert, 1890 – Slender Back Smelt	RO
<i>Leuroglossus schmidti</i> Rass, 1955 - Northern Smoothtongue	RO
<i>Lipolagus ochotensis</i> (Schmidt, 1938) - Popeye Blacksmelt	RO
<i>Pseudobathylagus milleri</i> (Jordan et Gilbert in Jordan et Evermann, 1898)- Robust Blacksmelt	RO
Opisthoproctidae family – Spookfishes	
<i>Macropinna microstoma</i> Chapman, 1939 - Shishamo Smelt	RO
Osmeridae family – Smelts	
<i>Hypomesus japonicus</i> (Brevoort, 1856) - Shishamo Smelt	RM
<i>Mallotus villosus catervarius</i> (Pennant, 1784) - Pacific Capelin	RM
<i>Osmerus mordax dentex</i> Steindachner, 1870 - Toothed Smelt	CP
Salmonidae family – Salmon	
<i>Oncorhynchus gorbuscha</i> (Walbaum, 1792) - Pink Salmon	CP
<i>Oncorhynchus keta</i> (Walbaum, 1792) - Chum Salmon	CP
<i>Oncorhynchus kisutch</i> (Walbaum, 1792) - Coho Salmon	RM

<i>Oncorhynchus nerka</i> (Walbaum, 1792 - Sockeye Salmon	RM
<i>Salvelinus leucomaenis</i> (Pallas, [1814]) - White-spotted Salmon	CP
<i>Salvelinus malma malma</i> (Walbaum, 1792) - Dolly varden	CP
Stomiiformes order	
Gonostomatidae family – Anglemouths	
<i>Cyclothone atraria</i> Gilbert, 1905 - Black Bristlemouth	RO
<i>Gonostoma gracile</i> Gunther, 1878 - Slender Fangjaw	RO
Chauliodontidae family – Viperfishes	
<i>Chauliodus macouni</i> Bean, 1890 - Pacific Viperfish	RO
Melanostomiidae family – Scaleless Dragonfishes	
<i>Tactostoma macropus</i> Bolin, 1939 – Longfin Dragonfish	RO
Aulopiformes order	
Scopelarchidae family – Paperbones	
<i>Benthalbella dentata</i> (Chapman, 1939) - Northern Pearleye	RM
Notosudidae family – Waryfishes	
<i>Scopelosaurus harryi</i> (Mead in Mead et Taylor, 1953) – Scaly Waryfish	RM
Paralepididae family – Barracudinas	
<i>Arctozenus risso</i> (Bonaparte, 1840) - White Barracudina	RM
Anotopteridae family – Daggertooths	
<i>Anotopterus nikparini</i> Kukuev, 1998 - North Pacific Daggertooth	RM
Alepisauridae family – Lancetfishes	
<i>Alepisaurus ferox</i> Lowe, 1833 - Longnose Lancetfish	RM
Myctophiformes order	
Myctophidae family - Lanternfishes	
<i>Diaphus theta</i> Eigenmann et Eigenmann, 1890 - California Headlightfish	RO
<i>Lampanyctus jordani</i> Gilbert, 1913 - Brokenline Lampfish	RO

<i>Lampanyctus regalis</i> (Gilbert, 1892) - Pinpoint Lampfish	RO
<i>Protomyctophum thompsoni</i> (Chapman, 1944) Bigeye Lanternfish	RO
<i>Stenobranchius leucopsarus</i> (Eigenmann et Eigenmann, 1890) – Northern Lampfish	RO
<i>Stenobranchius nannochir</i> (Gilbert, 1890) - Garnet Lampfish	RO
<i>Tarletonbeania taylori</i> Mead, 1953 - Taillight Lanternfish	RO
Gadiformes order – Soft-Finned Fishes	
Moridae family – Deepsea Cods	
<i>Laemonema longipes</i> Schmidt, 1935 - Longfin Codling	RM
Gadidae family – Codfishes	
<i>Eleginus gracilis</i> (Tilesius, 1810) – Saffron Cod	AP
<i>Gadus macrocephalus</i> Tilesius, 1810 – Pacific Cod	CP
<i>Theragra chalcogramma</i> (Pallas, [1814]) – Walleye Pollock	CP
Beloniformes order – Synentognaths	
Scomberesocidae – Sauries	
<i>Cololabis saira</i> (Brevoort, 1856) – Pacific Saury	RM
Beryciformes order – Berycoid Fishes	
Melamphaidae family – Bigscales	
<i>Melamphaes lugubris</i> Gilbert, 1890 - Highsnout Bigscale	RO
<i>Poromitra crassiceps</i> (Gunther, 1878) - Crested Bigscale	RO
Zeiformes order – Zeomorphs	
Oreosomatidae family – Dories	
<i>Allocyttus verrucosus</i> (Gilchrist, 1906) – Coster Dory	RM
Gasterosteiformes order- Sticklebacks	
Gasterosteidae family – Sticklebacks	
<i>Gasterosteus aculeatus</i> Linnaeus, 1758 - Three-spine Stickle	AP
<i>Pungitius pungitius pungitius</i> (Linnaeus, 1758- Nine-spine Stickle	AP

Scorpaeniformes order – Scorpion Fishes	
Sebastidae family- Rockfishes	
<i>Sebastes aleutianus</i> (Jordan et Evermann, 1898) - Rougheye Rockfish	RM
<i>Sebastes alutus</i> (Gilbert, 1890) - Pacific Ocean Perch	CM
<i>Sebastes borealis</i> Barsukov, 1970 - Shortraker Rockfish	RM
<i>Sebastes glaucus</i> Hilgendorf, 1880- Gray Rockfish	CP
<i>Sebastes polyspinis</i> (Taranetz et Moiseev in Taranetz,1933)- Northern Rockfish	RM
<i>Sebastolobus alascanus</i> Bean, 1890 - Shortspine Thornyhead	RM
Anoplopomatidae family- Sablefishes	
<i>Anoplopoma fimbria</i> (Pallas, [1814]) - Sablefish	RM
Hexagrammidae family - Greenlings	
<i>Hexagrammos lagocephalus</i> (Pallas, 1810) - Rock Greenling	CP
<i>Hexagrammos octogrammus</i> (Pallas, 1810) - Masked Greenling	AP
<i>Hexagrammos stelleri</i> Tilesius, 1810 - Whitespotted Greenling	AP
<i>Pleurogrammus monopterygius</i> (Pallas, 1810) - Atka Mackerel	CP
Cottidae family- Sculpins	
<i>Artediellus camchaticus</i> Gilbert et Burke,1912 - Clownfin Sculpin	CP
<i>Artediellus gomojunovi</i> Taranetz, 1933 - Spinyhook Sculpin	RM
<i>Artediellus miacanthus</i> Gilbert et Burke, 1912 - Smallhook Sculpin	CP
<i>Artediellus ochotensis</i> Gilbert et Burke, 1912 - Okhotsk Hookear Sculpin	RP
<i>Artediellus pacificus</i> Gilbert, 1896 - Paddled Sculpin	CP
<i>Enophrys diceraus</i> (Pallas, 1787) – Antlered Sculpin	CP
<i>Gymnacanthus detrisus</i> Gilbert et Burke, 1912 - Purplegray Sculpin	CP
<i>Gymnacanthus galeatus</i> Bean, 1881 - Armorhead Sculpin	AP
<i>Gymnacanthus pistilliger</i> (Pallas, [1814]) - Threaded Sculpin	AP
<i>Hemilepidotus gilberti</i> Jordan et Starks, 1904 - Banded Irish Lord	AP

<i>Hemilepidotus jordani</i> Bean, 1881 - Yellow Irish Lord	CP
<i>Icelus canaliculatus</i> Gilbert, 1896 - Blacknose Sculpin	RM
<i>Icelus spatula</i> Gilbert et Burke, 1912 - Spatulate Sculpin	CP
<i>Icelus spiniger</i> Gilbert, 1896 - Thorny Sculpin.	CM
<i>Icelus uncinalis</i> Gilbert et Burke, 1912- Uncinate Sculpin	RM
<i>Megalocottus platycephalus</i> (Pallas, [1814]) - Belligerent Sculpin	AP
<i>Melletes papilio</i> Bean, 1880 - Butterfly Sculpin	CP
<i>Microcottus sellaris</i> (Gilbert, 1896) - Brightbelly Sculpin	CP
<i>Myoxocephalus jaok</i> (Cuvier in Cuvier et Valenciennes, 1829) - Plain Sculpin	CP
<i>Myoxocephalus niger</i> (Bean, 1881) - Warthead Sculpin	CP
<i>Myoxocephalus polyacanthocephalus</i> (Pallas, [1814]) - Great Sculpin	AP
<i>Myoxocephalus stelleri</i> Tilesius, 1811 - Frog Sculpin	AP
<i>Myoxocephalus verrucosus</i> (Bean, 1881) - Warty Sculpin	CP
<i>Stelgistrum beringianum</i> Gilbert et Burke, 1912 - Smallplate Sculpin	RM
<i>Stelgistrum concinnum</i> Andriashev, 1935- Largeplate Sculpin	RP
<i>Triglops forficatus</i> (Gilbert, 1896) - Scissortail Sculpin	CM
<i>Triglops metopias</i> Gilbert et Burke, 1912 - Highbrow Sculpin	RP
<i>Triglops pingelii</i> Reinhardt, 1837 - Ribbed Sculpin	AP
<i>Triglops szepticus</i> Gilbert, 1896 - Spectacled Sculpin	RM
Hemitripteridae family - Sea Ravens	
<i>Blepsias bilobus</i> Cuvier in Cuvier et Valenciennes, 1829 - Crested Sculpin	CP
<i>Blepsias cirrhosus</i> (Pallas, [1814]) - Silverspotted Sculpin	CP
<i>Hemitripterus villosus</i> (Pallas, [1814]) - Shaggy Sea Raven	CP
<i>Nautichthys pribilovius</i> (Jordan et Gilbert in Jordan et Evermann, 1898) - Eyeshade Sculpin	CP
<i>Nautichthys robustus</i> Peden, 1970 - Shortmast Sculpin	RP

<i>Ulca bolini</i> (Myers, 1934) - Bigmouth Sculpin	RM
Psychrolutidae family - Soft Sculpins	
<i>Dasycottus setiger</i> Bean, 1890 - Spinyhead Sculpin	RM
<i>Eurymen gyrinus</i> Gilbert et Burke, 1912 - Smoothcheek Sculpin	RP
<i>Gilbertidia sigalutes</i> (Jordan et Starks, 1895)- Soft Sculpin	RM
<i>Malacocottus zonurus</i> Bean, 1890 - Spinycheek Blobsculpin	RM
<i>Psychrolutes paradoxus</i> Gunther, 1861 - Tadpole Sculpin	RP
Agonidae family - Sea Poachers	
<i>Aspidophoroides bartoni</i> Gilbert, 1896 - Aleutian Alligatorfish	R?
<i>Bathyagonus nigripinnis</i> Gilbert, 1890 - Blackfin Starsnout	RM
<i>Hypsagonus quadricornis</i> (Valenciennes in Cuvier et Valenciennes, 1829) - Fourhorn Poacher	CP
<i>Ocella dodecaedron</i> (Tilesius, 1813) - Bering Poacher	CP
<i>Pallasina barbata</i> (Steindachner, 1876) – Northern Tubenose Poacher	CP
<i>Percis japonica</i> (Pallas, 1769) - Dragon Poacher	RM
<i>Podothecus accipenserinus</i> (Tilesius, 1813) - Sturgeon poacher	CP
<i>Podothecus veterinus</i> Jordan et Starks, 1895 - Veteran Poacher	CP
<i>Sarritor frenatus</i> (Gilbert, 1896) - Sawback Poacher	RM
<i>Sarritor leptorhynchus</i> (Gilbert, 1896) - Longnose Poacher	CP
Cyclopteridae family- Lump suckers	
<i>Aptocyclus ventricosus</i> (Pallas, 1769) - Smooth Lump sucker	CM
<i>Eumicrotremus andriashevi</i> Perminov, 1936 - Pimpled Lump sucker	RP
<i>Eumicrotremus asperrimus</i> (Tanaka, 1912) - Siberian Lump sucker	RM
<i>Eumicrotremus orbis</i> (Gunther, 1861) - Pacific Spiny Lump sucker	CP
<i>Lethotremus muticus</i> Gilbert, 1896 - Docked Snailfish	RP
Liparidae family - Snailfishes	
<i>Careproctus furcellus</i> Gilbert et Burke, 1912	RM

<i>Careproctus rastrinus</i> Gilbert et Burke, 1912 - Salmon Snailfish	RM
<i>Crystallichthys mirabilis</i> (Jordan et Gilbert in Jordan et Evermann, 1898) - Blotched Snailfish	RM
<i>Liparis callyodon</i> (Pallas, [1814]) - Spotted Snailfish	CP
<i>Liparis cyclopus</i> Gunther, 1861 - - Ribbon Snailfish	RP
<i>Liparis gibba</i> Bean, 1881 -Variegated Snailfish	CP
<i>Liparis ochotensis</i> Schmidt, 1904 - Okhotsk Snailfish	CP
<i>Lipariscus nanus</i> Gilbert, 1915 - Pygmy Snailfish	RO
<i>Nectoliparis pelagica</i> Gilbert et Burke, 1912 - Tadpole Snailfish	RO
<i>Rhinoliparis barbulifer</i> Gilbert, 1896 - Longnose Snailfish	RO
Perciformes order - Perch-like Fishes	
Bathymasteridae family - Searchers	
<i>Bathymaster signatus</i> Cope, 1873 - Searcher	CP
Zoarcidae family - Eelpouts	
<i>Bothrocara mollis</i> Bean, 1890 - Soft Eelpout	RM
<i>Gymnelus hemifasciatus</i> Andriashev, 1937 - Halfbarred Pout	CP
<i>Gymnelus pauciporus</i> Anderson, 1982 - Poorpore Pout	RP
<i>Lycodapus derjugini</i> Andriashev, 1935	RO
<i>Lycodapus fierasfer</i> Gilbert, 1890 - Blackmouth Eelpout	RO
<i>Lycodes concolor</i> Gill et Townsend, 1897 - Ebony Eelpout	RM
<i>Lycodes palearis</i> Gilbert, 1896 - Wattled Eelpout	CP??
<i>Lycodes raridens</i> Taranetz et Andriashev in Andriashev, 1937 - Marbled Eelpout	CP
Stichaeidae family - Pricklebacks	
<i>Alectrias alectrolophus</i> (Pallas, [1814]) - Stone cockscomb	AP
<i>Anisarchus medius</i> (Reinhardt, 1837) – Stout Eelblenny	RP
<i>Ascoldia knipowitschi</i> Soldatov, 1927 - Mud Prickleback	RP
<i>Bryozoichthys lysimus</i> (Jordan et Snyder, 1902) - - Nutcracker	RP

Prickleback	
<i>Chirolophis snyderi</i> (Taranetz, 1938) - Bearded Warbonnet	RP
<i>Eumesogrammus praecisus</i> (Kroyer, 1837) - Fourline snakeblenny	RP
<i>Leptoclinus maculatus</i> diaphanocarus (Schmidt,1904)- Pacific Daubed Shanny	CP
<i>Lumpenella longirostris</i> (Evermann et Goldsborough, 1907) - Longsnout Prickleback	RM
<i>Lumpenus sagitta</i> Wilimovsky, 1956 - Snake Prickleback	CP
<i>Opisthocentrus ocellatus</i> (Tilesius, 1811) – Ocellated Bienny	CP
<i>Stichaeus punctatus</i> (Fabricius, 1780) - Arctic Shanny	CP
Pholididae family- Gunnels	
<i>Pholis fasciata</i> (Bloch et Schneider, 1801) - Banded Gunnel	CP
<i>Rhodymenichthys dolichogaster</i> (Pallas, [1814]) - Stipled Gunnel	AP
Anarhichadidae family – Wolffishes	
<i>Anarhichas orientalis</i> Pallas, [1814] - Bering Wolffish	RP
Ptilichthyidae family - Quillfishes	
<i>Ptilichthys goodei</i> Bean, 1881 – Guillfish	RP
Zaproridae family – Prowfishes	
<i>Zaprora silenus</i> Jordan, 1896 – Prowfish	RM
Trichodontidae family - Sandfishes	
<i>Trichodon trichodon</i> (Tilesius, 1813) - Pacific Sandfish	CP
Ammodytidae family - Sand Lances	
<i>Ammodytes hexapterus</i> Pallas, [1814] – Pacific Sand Lance	CP
Pleuronectiformes order - Flatfishes, Flounders	
Pleuronectidae family - Flatfishes, Flounders	
<i>Atheresthes evermanni</i> Jordan et Starks, 1904 - Kamchatka Flounder	CM
<i>Atheresthes stomias</i> Jordan et Gilbert, 1880 - Arrowtooth Flounder	RM
<i>Clidoderma asperrimum</i> (Temminck et Schlegel, 1846) - Roughskin	RM

Sole	
<i>Glyptocephalus stelleri</i> (Schmidt, 1904) - Korean Flounder	RM
<i>Glyptocephalus zachirus</i> Lockington, 1879 - Rex Sole	RM
<i>Hippoglossoides elassodon</i> Jordan et Gilbert, 1880 - Flathead Sole	CP
<i>Hippoglossoides robustus</i> Gill et Townsend, - Bering Flounder	CP
<i>Hippoglossus stenolepis</i> Schmidt, 1904 - Pacific halibut	AP
<i>Lepidopsetta cf. bilineata</i> (Ayres, 1855) - Northern RockSole	AP
<i>Limanda aspera</i> (Pallas, [1814]) Yellowfin Sole	AP
<i>Limanda sakhalinensis</i> Hubbs, 1915 Sakhalin Sole	CP
<i>Myzopsetta proboscidea</i> (Gilbert, 1896) – Longhead Sole	AP
<i>Platichthys stellatus</i> (Pallas, 1787) – Slarry Flounder	AP
<i>Pleuronectes glacialis</i> Pallas, 1776 – Arctic Flounder	AP
<i>Pleuronectes quadrituberculatus</i> Pallas, [1814] – Alaska Plaice	AP
<i>Reinhardtius hippoglossoides matsuurae</i> Jordan et Snyder, 1901 - Pacific Black Halibut	RM

Designations:

Abundance: R- rare (frequency is <10% of the total catch in the habitat);

C- common (10-50%);

A- abundant (> 50%)

Residence: M- migratory

O- occasional

P- permanent

Ninety-two taxa 92 (53.2% of the ichthyofauna) are rare; 59 (34.1%), common; and 22 taxa (12.7%) are abundant. Permanent species are 89 taxa (51.4%); anadromous species, 59 (34.1%); and occasional, 24 species (14.4% of the ichthyofauna).

The number of neritic taxa is 8 (4.6%); epipelagic - 10 (5.9%); mesopelagic- 16 (9.2%); bathypelagic – 6 (3.5%); littoral – 4 (2.3%); inner sublittoral – 21 (12.1%); outer sublittoral – 68 (39.3%), mesobenthal (36 (20.8%), and batybenthal –1 (0.6%).

From the zoogeographical viewpoint, Pacific boreal (60 taxa, 34.7%), Arctic boreal (32, 18.5%), and Asiatic boreal (40, 23.1%) taxa are widespread.

Anadromous and semianadromous fishes are 12 taxa: abundant- 2 (16.7%); common – 6 (50.0%); rare taxa are 4 (33.3%). Permanent species are 5 (41.7%), anadromous– 7 (58.3%). Anadromous epipelagic, neritic, mesopelagic, and inner sublittoral fishes taxa amount to 6 (50.0%), 3 (25.0%), and 1 (8.3%), respectively; semianadromous ones – 1 (8.3%).

ROLE OF THE WETLAND IN FISH REPRODUCTION

The "Karaginsky Island" site is a spawning area for anadromous and migratory from the sea fish (Chum Salmon, Pink Salmon, Chinook Salmon, Sockeye Salmon, Coho Salmon, Rainbow (Steel-headed) Trout, Dolly Varden, Whitespotted Char, Toothed Smelt, and Great Siberian Sturgeon). Spawning grounds are located in many rivers, streams, river branches, lakes, and in mountain river parts. The fish prefer sandy-gravel or stony-gravel bottom grounds for their nests.

New young fish stay at the wetland for some time (for 0.5 to 2.5 years dependently on fish species) and then roll down the sea.

The major rivers used for spawning are the Markelovskaya, Mamikinvyayam, Gnuvayam, and Yununvyayam.

The general phenological pattern of biological cycles in the fish is shown in the text and the Table below.

Seasonal distribution of fish within "Karaginsky Island" site

May	June	July	August	September	October	November
				Spawning migration =====	-----	
December	January	February	March	April	May	June
Wintering in river -----					Spawning +++	

VALUABLE ANADROMOUS SPECIES AND SUBSPECIES

Chum Salmon - *Oncorhynchus keta* (Walbaum). The breeding period lasts from late spring to early winter. Forty thousand individuals of this fish come for spawning to the Ramsar wetland.

Chinook (king) Salmon - *Oncorhynchus tshawytscha* (Walbaum). Spawning migration starts just after ice drift, its peaks are in June-July. Single individuals come to the rivers in September. Breeding is in July-August. A rare species in the wetland.

Sockeye Salmon - *Oncorhynchus nerka* (Walbaum). Spawning takes place in July-August. In some years it extends to October. At the wetland it is a relatively rare species, the number of which reaches 35,000 individuals with biomass about 70 tons (Table 12).

Coho Salmon - *Oncorhynchus kisutch* (Walbaum). Spawning migration starts in July and lasts to October. Mass migration starts later than in other salmon. The spawning proceeds from late August to late winter. About 2,000 fishes go to spawn to the wetland rivers.

Dolly Varden– *Salvelinus malma malma* (Walbaum) appears in the wetland to spawn in early autumn and breeds only in very cold water with fast current. It is a common species at the wetland. The number is unknown.

Table 12: Approximate number of salmon migrating for spawning to major rivers of the "Karaginsky Island" Ramsar site

River	Maximum number, ind.				
	Pink Salmon	Chum Salmon	Sockeye Salmon	Coho Salmon	TOTAL
Markelovskaya	2000000	10000	10000	2000	202000
Mimikinvayam	1000000	5000	10000	-	1015000
Gnuvayam	600000	20000	10000	-	630000
Yununvayam	400000	5000	5000	-	410000
TOTAL	4000000	40000	35000	2000	4077000

East Siberian char - *Salvelinus leucomaenis* (Pallas). Migrations to the wetland rivers last from July to September. Breeding takes place in late summer- early autumn, exclusively in flowing water, in river and deep stream channels. This fish, like Dolly Varden, goes to the sea for fattening, in autumn it out-migrates to freshwater for spawning and wintering in the wetland. Its number is low, the fish is of no commercial importance, but it is an object of sport fishing.

Toothed Smelt– *Osmerus mordax dentex Steindachner*. Spawning migration is observed in late May-June and lasts 10-14 days. Spawning takes place after ice drift, on gravel- sandy ground in fast current.

MASS NONCOMMERCIAL SPECIES AND SUBSPECIES

Arctic Lamprey – *Lethenteron camtschaticum* (*Tilesius*). Adult fish go out of the sea to rivers in late autumn. In some years they are abundant in the wetland rivers.

***Threespine stickleback** – *Gasterosteus aculeatus* *Linnaeus* is abundant species in the wetland and has several morphoecological forms. Sea form breeds in summer in the coastal zone and does not go to rivers. *Anadromous form migrates to spawn from the sea to rivers from April to September and goes upstream for a large distance. Mass spawning takes place in July.

***Ninespine stickleback** – *Pungitius pungitius* *Linnaeus*. The fish has permanent and anadromous forms. Spawning is intermittent.

Currently, the nature protection regime of wetlands has no effect on conserving the water pools and fish resources. The causes of this fact are a lack of funding and some other purposes of establishing the protected area. There is only some juridical prohibition for certain human activities that needs further improvement.

There is no data on the fish yield within the wetland water area because of poor accounts of the enterprises.

1.2.3. INVENTORY OF VALUABLE NATURAL OBJECTS

SEA COLONIAL BIRD ROOKERIES

Four species of sea colonial birds form large nesting colonies located mostly on the eastern coast of the island.

Pelagic Cormorant forms the most abundant populations of the Bering Sea composed of 7,000 - 10,000 pairs. 1,000 -1,500 pairs are on Golenishchev cape. About 1,000 pairs of cormorants nest on the rookery located between the Komarovskaya River and Rovnyi cape (Gerasimov, 1986).

Slaty-backed Gull. According to the counts of 1969, about 15,000 bird pairs inhabited Karaginsky Island (including immature birds). The greatest nesting colony of this species is on Ptichii Island. Before 1970 about 1,300-1,500 pairs nested. About 1,000 nesting pairs of gulls dwell Kekurnyi cape and 550 pairs - Yuzhnyi cape (Gerasimov, 1986).

Black-legged Kittiwake. In 1966-1973, 205,000-240,000 bird pairs nested on the island. They formed 12 isolated bird colonies. The largest colony, consisting of 200,000 birds, was registered at the rookery between the Komarovskaya River and the Yuzhnyi cape (Gerasimov, 1986).

Tufted Puffin. The number of this bird on Karaginsky Island was estimated in 1970-1973 at 3,000-5,000. The largest colony (1,500 pairs) is registered on Ptichii Island (Gerasimov, 1986).

ROOKERIES OF SEA MAMMALS

Rookeries of sea mammals on Karaginsky Island are undoubtedly one of the valuable natural objects. Their characteristics are given in section - Mammals population, see also Fig.4

OTHER RARE AND NATURAL OBJECTS IMPORTANT FOR THE WETLAND

"Ptichii Island". A large multispecies bird colony is located on the island. This island was declared a nature monument of regional importance by the Decree of the Kamchatka Executive Council of People's Deputies (N 9, January 9, 1981).

Ptichii Island is at the eastern coast of Karaginsky Island opposite the Yaklegryvayam River mouth 1 km of the seashore. Its length is 350 m, breadth – 100 m, and elevation- 7-10 m. The island is flat with soils of 30-40 cm thick. About 1,500 pairs of Tufted Puffins, 1,500 Slaty-backed Gulls, 100 pairs of Pelagic Cormorants, and several pairs of Pigeon Guillemots nest here (Gerasimov, 1974).

"Walrus rookery on Semenovskaya Spit of Karaginsky Island" (Decree of the Kamchatka Executive Council of People's Deputies N 562, December 28, 1983).

Gnuvayam mineral springs (safety zone is 2sq. km) and **Yuzhnokaraginsky mineral springs** (safety zone is 2.4 sq. km) (Fig. 1). In 1992 some areas on Karaginsky Island were declared as specially protected natural areas (SPNA) at the status of nature monuments of local importance (Resolution of the Malyi Council of Regional Council of People's Deputies). However, these nature monuments needs status of monuments of regional importance since there is no category "monuments of local importance" in the Law of RF about SPNA.

1.2.4. INVENTORY OF LAND USERS AND POPULATED AREAS AT THE SITE, WETLAND PROTECTION

STATE PROTECTION OF THE WETLAND

The protection of the wetland is within exclusive competence of the State Committee of Environmental Protection (Koryakekologia) of the Koryak Autonomous Area (KAO). In Tigil'sky

administrative rayon, where "Karaginsky Island" is located, one state inspector of Koryakekologia works in Ossora (tel. 8 – (245)-41-409).

Fish resources protection. The conservation of fish and sea mammal resources is under the jurisdiction of the Koryak Area Inspection on fish resources protection and reproduction and regulation of fishery (KOIR). Address: Palana, Cubarova ul., 14, ap.15., tel. 8-4154332267.

The staff of KOIR in Karaginsky rayon includes 17 persons: 3 ichthyologists and 8 inspectors in Ossora (1 inspector is for sea mammals' protection). The village of Tymlat has 2 inspectors and 1 ichthyologist; Il'pysky village, 2 inspectors and 1 ichthyologist; Ivashka, 2 inspectors (tel. 8-245-41-556).

Protection of game animals. The Department for protection, control and regulation of using game animals of the KAO manages game animals and protected areas (zakaznik) the wetland.

At present the Karaginsky hunter's inspection includes three persons: chief (Ossora –tel. 8-245-47-380), 1 inspector (Ivashka), 1 hunter of the "Karaginsky Island" protected area (zakaznik) and 1 hunter in "Laguna Kazarok" zakaznik.

Forest fund protection. The protection and control over utilising the forest fund at the territory of the wetland are realised by the Koryak Forestry (Ossora) of the Kamchatka Forest Department (Petropavlovsk-Kamchatsky).

At the Karaginsky forest area of the Koryak Forestry the staff consists of 10 persons: 1 forester, 1 forester assistant and 3 forest rangers in Ossora; 1 forest ranger in Tymlat and 1 forest ranger in Ivashka. The administration of the Koryak Forestry is located in Ossora and consists of 11 specialists.

SPECIAL PROTECTED AREAS

The entire Karaginsky Island is a protected *area (zakaznik) of regional importance named "Karaginsky Island"*(Fig. 4) (the term is prolonged until 2002). Bird hunting is forbidden.

The protected area (zakaznik) of regional (oblast) importance "Karaginsky Island" was organised by the Decree of the Kamchatka Regional Executive Committee for 5 years (N 284, April 12, 1974). The zakaznik was established to protect nesting grounds of sea colonial birds and to conserve all the bird species throughout Karaginsky Island, including 2-km littoral zone.

The bird hunting in the zakaznik is forbidden. The main goals of establishing the zakaznik are nature conservation and scientific research (Appendix N 3 to the Decree of the Kamchatka Regional Executive Committee, May 5, 1983, N 216).

The conservation activity of the zakaznik is within obligations of the Soviet side on implementing agreements according to the conventions for protection of migratory birds and their habitat between USSR and Japan, USSR and USA, and the Ramsar Convention. A special attention is paid to conserving sea colonial birds, geese and rare birds listed to the Red Data Book of RSFSR.

Scientific problems of the zakaznik are based on its importance as a standard natural complex (lagoons, sea spits, rocks grown with plants). The island is partially used as reindeer pastures and hayfields. Under these conditions, there are some prerequisites for elaborating recommendations that would unite nature conservation problems and wise economic managing. On "Karaginsky Island" the regular phenological observations, counts of migratory waterfowl and water-related birds have been conducted.

NATURE USERS

GAME

Since the island is separated from populated areas, hunting for mammals is absent here.

LAND USE

The major land users on Karaginsky Island are as follows:

1. Enterprise "Ossora" - an area of 258.75 hectares is used for agricultural use (haymaking, reindeer pastures) without time limit. During the last two years the lands were not used for these purposes.
2. Fishing collective farm "Udarnik" possesses 392 hectares without time limit for agricultural use (haymaking, reindeer pastures).
3. Joint-stock company "Ossora" possesses 2 hectares without time limit. Special vats are set here for fish processing.
4. Municipal unitary agricultural enterprise "Agrofirma Rassvet" has 1 hectare without time limit (Fig.4).

FISHING

There are 11 areas for fishing by stationary net (Fig.4). The fishing is carried out by organisations of Karaginsky rayon. Since the control over fishery is unsatisfactory, the number of stationary nets exceeds considerably the permissible one. Official limits for fishing accounted for 1,103 tons in 1997; 224.3 tons in 1998, and 514.6 tons in 1999. By questionnaire, the fish yield within the wetland water areas is much higher than the accepted limits (Table 13) and official statistic data (Tables 13 and 14).

Table 13: Limits for catching salmons in rivers of "Karaginsky Island" Ramsar site, tons

River	Year	Fishing object				
		Pink Salmon	Chum Salmon	Sockeye Salmon	Coho Salmon	TOTAL
Markelovskaya	1997	540	6	2	-	548
	1998	56.9	3.3	1.2	-	61.4
	1999	290.3	-	1	1.5	292.8
Mamikinvoyam	1997	270	4	2	-	276
	1998	81.3	2.2	1.2	-	84.7
	1999	145.1	-	1	-	146.1
Gnuvoyam	1997	160	4	2	-	166
	1998	40.6	2.2	1.2	-	44
	1999	86	15	1	-	102
Yununvoyam	1997	110	2	1	-	113
	1998	32.5	1.1	0.6	-	34.2
	1999	59.1	4	0.6	-	63.7
TOTAL		1871.8	43.8	14.8	1.5	1931.9

Table 14: Official data on fish catch of salmons in rivers of the Karaginsky Island Ramsar site, tons

Enterprise	River	Pink Salmon	Chum Salmon	Sockeye Salmon	Total
Nassina	Markelovskaya	200	-	-	200
	Mamikinvoyam	200	-	-	200
Farkhad &Co		680	-	-	680

For 1999 the limits for fishing areas on the island were submitted to the following enterprises: Production association (PA) "Pankara", Private enterprise (PE) "Khimenko", Joint-stock company "Udarnik", "Fish Faktori", "Yagodnoe", and Nassina".

REINDEER RAISING

Reindeer raising has fallen down in the entire Koryak Area, the number of animals continues reducing. According to official data, only the company "Rassvet" possesses deer. In 1997 their number was 809, in 1998 – 678 animals.

PERMANENT AND TEMPORARY SETTLEMENTS

The adjacent to the wetland settlements are located on Kamchatka Peninsula (Fig. 4). Their total population is 910 including 703 residents (Table 15).

Table 15: Permanent and temporary settlements and other populated areas

Settlement	Population	Native population	Unemployed persons (Data of July 1, 1999)
Ossora	3447	379	209
Ilytyrskoe	570	111	24
Ivashka	1248	165	74
Kostroma	217	17	7
Karaga	633	383	36
Tymlat	910	703	68

OTHER ANTHROPOGENIC IMPACT ON THE SITE

A great danger for the wetlands is fires. Only in 1999 in the KAO more than 50,000 hectares of agricultural lands were exposed to fire.

The highest anthropogenic effect is restricted to the summer fishing. At this time on the island coast one can meet people that stock fish and fish eggs.

INVENTORY OF POLLUTION SOURCES

According to the Koryakecologia information of 1998, there are no ecologically dangerous objects within the wetland. Only some are on the catchment basin. Pollution of water may be dangerous in the case of accidents when transporting oil products to the settlements of Karaginsky and

Olyutorsky rayons or to the northern Far East regions by the Bering Sea. Thirty-two fuels and lubricants storage of a total volume of 42,002 cubic m is known in the territory of Karaginsky and Olyutorsky rayons. The presence of this storage is not a threat for the wetland. However, the oil transportation by sea is potentially dangerous for the wetland. A feasible damage from the accidents related to the oil transportation is not estimated.

The planning oil and gas exploration of the Bering Sea shelf will exert a great negative influence on the wetland. The Decree of the RF Government on the oil exploration was cancelled. The further future is unknown.

1.2.5. State protection of the "Karaginsky Island"

Ramsar site

The protection of "Karaginsky Island" is within the exclusive competence of the State Committee on Environmental Protection of KAO –Koryakgoskomekologia (Koryakekologia) . The same organisation is responsible for protection of Rainbow (Steel-headed) Trout as a species listed to the Red Data Book of Russian Federation. Tigil'sky inspection of Koryakekologia consists of one inspector in the village of Tigil.

Protection of fish resources

The protection of fish resources and sea mammals is provided by the Koryak regional inspection of fish protection, reproduction, and fishery control (KOIR) (address: Palana, Chubarova ul., 14, ap. 15; telephone 8-41543-32267). The staff of KOIR consists of 4 persons in Ust-Khairuzovo and one inspector in Khairuzovo (tel. 8-(239)26-162). There are three vacancies for ichthyologists.

Protection of game animals

The Department of protection, control and regulation of using game animals of KAO (Palana) provides protection of game animals. Nowadays, chief of the regional game inspection works in Tigil'sky rayon (tel. 8-(237)21-475) and 2 hunters in Kovran and Ust-Khairuzovo villages.

Protection of the forest fund

The Ust-Khairuzovo division of the Tigil'sky Forestry of the Forest Department of KAO (Petropavlovsk-Kamchatsky) provides protection and control over utilising the forests within the wetland. The staff of the Ust-Khairuzovo division includes 6 persons (data of 2000): one forest

warden, one foreman, and two forest rangers in Ust-Khairuzovo and by one woodsman in Kovran and Ust-Khairuzovo.

In general, the state protection of natural objects within the Ramsar site, as in the whole territory of KAO, is unsatisfactory. Inspectors of Koryakekologia do not have transport, communication means, and other necessary equipment. The major cause of this is financial deficit.