

An Annotated List of the Marine and Brackish-Water Ichthyofauna of Aniva Bay (Sea of Okhotsk, Sakhalin Island):

2. Cyclopteridae—Molidae Families

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Abstract—The second, final part of the work contains a continuation of the annotated list of fish species found in the marine and brackish waters of Aniva Bay (southern part of the Sea of Okhotsk, southern part of Sakhalin Island): 137 species belonging to three orders (Perciformes, Pleuronectiformes, Tetraodontiformes), 31 family, and 124 genera. The general characteristics of ichthyofauna and a review of the commercial fishery of the bay fish, as well as the final systematic essay, are presented.

Keywords: ichthyofauna, annotated list, conservation status, commercial importance, marine and brackish waters, Aniva Bay, southern part of the Sea of Okhotsk, Sakhalin Island

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INTRODUCTION

The second part concludes the publication on the ichthyofauna of Aniva Bay (the southern part of the Sea of Okhotsk, Sakhalin Island). In the first part (Dyldin et al., 2018), data were presented on the history of studies of the ichthyofauna of Aniva Bay of Sakhalin Island, beginning with the works of Tilesius (1813) to the present day (up to 2017 inclusive). General characteristics of the bay are presented, including climate, hydrological conditions, etc. We considered 137 species of fish in three classes (Petromyzonti, Elasmobranchii, Actinopteri), 19 orders, 35 families, and 83 genera found in the marine and coastal brackish waters of Aniva Bay and adjacent waters. In this paper, we complete the list of species of the Scorpaeniformes order and consider fish species related to the three orders: Perciformes, Pleuronectiformes, Tetraodontiformes.

The methodology of research and the interpretation of abbreviations and conservation categories (IUCN, 2015, *Krasnaya kniga...*, 2016) are given in the first part of the work.

ANNOTATED LIST OF FISHES OF ANIVA BAY

19. ORDER SCORPAENIFORMES Bloch,
1789—Mail-cheeked fishes

36. Family CYCLOPTERIDAE Bonaparte,
1831—Lumpfishes or lumpsuckers

According to recent studies (Oku et al., 2017; Voskoboinikova et al., 2017), based on the analysis of both morphological and osteological and molecular data, the family is recognized as monophyletic; it includes three subfamilies: Liparopsinae Garman, 1892; Cyclopterinae Linnaeus, 1758; Eumicrotremi-nae Oku, Imamura et Yabe, 2017.

11. Subfamily LIPAROPSINAE Garman,
1892—Liparopsins

84. Genus *APTOCYCLUS* De la Pylaie, 1835

138. **Aptocyclus ventricosus* (Pallas, 1769)—Smooth lumpsucker. North Pacific // Not documented for Aniva Bay. Epipelagic, but can occur up to a depth of 1700 m (*FishBase...*, 2017). Marine, brackish-water, Sidimi River mouth, Peter the Great Bay,

brackish lakes of Hokkaido. Not fished on Sakhalin. Has limited commercial importance in Japan (Orlov and Tokranov, 2008).

Note. It was noted for the southwestern and southeastern coasts of Sakhalin as well as the Okhotsk Sea coast of Hokkaido (Lindberg, 1959; Ueno, 1971; Lindberg and Krasnyukova, 1987; Amaoka et al., 2011; Solomatov and Orlov, 2018). Occurrence in Aniva Bay is quite possible.

Conservation status: IUCN (Not Evaluated).

12. Subfamily **EUMICROTREMINEAE** Oku, Imamura et Yabe, 2017—Eumicrotremis

85. Genus **EUMICROTREMUS** Gill, 1862

139. *Eumicrotremus asperrimus* (Tanaka, 1912)—Siberian lumpsucker. North Pacific // Common. Elittoral. Marine. Not fished.

Note. A number of authors consider it in synonymy with *E. birulai* Popov, 1928 (Lindberg and Krasnyukova, 1987; Amaoka et al., 2011). However, recently, the validity of *E. asperrimus* has been restored, and *E. birulai* was reduced to synonymy with the former (Sheiko and Fedorov, 2000; Parin et al., 2002; Mecklenburg and Sheiko, 2003) or considered as a separate species (Nakabo, 2002; Shinohara et al., 2011, 2014). Separate mention should be made of recent studies (Kai et al., 2014; Tohkairin et al., 2015) that, based on molecular genetic analysis and data on sexual dimorphism, make it possible to treat *E. asperrimus* as a complex species, the composition of which includes *Cyclopteropsis bergi* Popov, 1929, and *C. lindbergi* Soldatov, 1930, which was not supported by domestic ichthyologists (Voskoboinikova et al., 2016, 2017). The last two species are noted for Aniva Bay.

Samples: ZIN RAN no. 33639 (as *Cyclopteropsis bergi*)—Aniva Bay; nos. 33635–33638 (all as *Cyclopteropsis lindbergi*)—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

140. ** *Eumicrotremus orbis* (Günther, 1861)—Pacific spiny lumpsucker. North Pacific and adjacent Arctic // Presence in Aniva Bay doubtful. Elittoral. Marine.

Note. Is not included in the ichthyofauna of Sakhalin Island, including Aniva Bay. In the past, this species included *E. orbis taranetzi* Perminov, 1936, and *E. orbis tartaricus* Lindberg et Legeza, 1955, which extended the range of the latter to the southern part of the Sea of Okhotsk and the Sea of Japan. At present, both these subspecies are considered as independent species (see below), as a result of which the range of *E. orbis* is confined to the more northern waters of the Arctic and Pacific.

Conservation status: IUCN (Not Evaluated).

141. *Eumicrotremus pacificus* Schmidt, 1904—Pacific lumpsucker. Northwestern Pacific // Common. Elittoral. Marine. Not fished.

Note. Described by Schmidt (1904) from Aniva Bay without designation of holotypes.

Samples: ZIN RAN nos. 12921 (lectotype), 12922, 33693, 33695—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

142. *Eumicrotremus schmidtii* Lindberg et Legeza, 1955—Schmidt's lumpsucker. Northwestern Pacific // Rare. Elittoral. Marine. Not fished.

Note. The species is confined mainly to the northern part of the Sea of Okhotsk (Lindberg and Krasnyukova, 1987; Shuntov and Bocharov, 2003; Voskoboinikova, 2015). Is noted for Aniva and Terpeniya bays (Shuntov and Bocharov, 2003), but, according to the collection materials, it is reliably known for Sakhalin waters only from the waters of the southeastern coast of Sakhalin (Tonino-Aniva Peninsula, ZIN RAN no. 34167) and its central part (Terpeniya Bay, ZIN RAN no. 33673) (Lindberg and Krasnyukova, 1987).

Conservation status: IUCN (Not Evaluated).

143. ? *Eumicrotremus taranetzi* Perminov, 1936—Taranet's lumpsucker. Northwestern Pacific // Occurrence requires clarification. Littoral. Marine. Not fished.

Note. It was previously known for the southeastern part of Sakhalin (ZIN RAN no. 55598) (Voskoboinikova, 2015). Collection specimens of UWFC and HUMZ for the first time confirm the presence of this species in Aniva Bay. Some authors (Sheiko and Fedorov, 2000; Parin et al., 2002) give it in synonymy with *E. orbis* or consider it as an independent species (Mecklenburg and Sheiko, 2003; Amaoka et al., 2011; Parin et al., 2014).

Samples: UWFC no. 42947—Aniva Bay; HUMZ nos. 102036, 102040—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

144. *Eumicrotremus tartaricus* Lindberg et Legeza, 1955—Tatar lumpsucker. Northwestern Pacific // Common. Littoral. Marine. Not fished.

Note. Is mentioned for Aniva Bay in a number of works (Velikanov and Mukhametov, 2011; Parin et al., 2014). According to the collection material (ZIN RAN no. 12916), the closest occurrence to the bay is known from the northeastern part of Sakhalin. In the past, the taxonomic status of *E. tartaricus* has been questioned (Mecklenburg and Sheiko, 2003). Is currently (Parin et al., 2014) recognized as a valid species.

Conservation status: IUCN (Not Evaluated).

37. Family **LIPARIDAE** Gill, 1861—Snailfishes86. Genus **CAREPROCTUS** Krøyer, 1862

145. * *Careproctus rastrinus* Gilbert et Burke, 1912—Salmon snailfish. Northwestern Pacific // Presence in Aniva Bay requires documentary evidence. Mesobental. Marine. Not fished.

Note. It is also known in the adjacent waters of Hokkaido with an occurrence at depths of 100 m (Amaoka et al., 2011). ZIN RAN samples (nos. 24489, 29083, 44544, 44692) extracted from depths of 120–262 m are noted for the eastern coast of Sakhalin (Lindberg and Krasnyukova, 1987). Based on its depths of dwelling from 55 m (Fedorov et al., 2003) or 100 m (Borets, 2000; Amaoka et al., 2011), the presence in the open deep-water part of Aniva Bay is possible.

Conservation status: IUCN (Not Evaluated).

146. * *Careproctus roseofuscus* Gilbert et Burke, 1912—Round snailfish. Northwestern Pacific // Presence in Aniva Bay requires documentary evidence. Mesobental. Marine. Not fished.

Note. Is known in the adjacent waters of Hokkaido with an occurrence at depths of 85 m (Amaoka et al., 2011) and in the Sea of Okhotsk from 72 m (Pitruk, 1990; Fedorov et al., 2003). This species is described by the results of the Albatross expedition in 1906 in Terpeniya Bay, the central part of eastern Sakhalin, and the holotype is in the collection of USNM (no. 73338). There is also sample no. 74524 in this collection, which was extracted by the same expedition near the southeastern tip of Sakhalin Island. Based on its depths of dwelling from 72–85 m, it is quite possible to observe in the open deep-water part of Aniva Bay.

Conservation status: IUCN (Not Evaluated).

87. Genus **CRYSTALLIAS** Jordan et Snyder, 1902

147. *Crystallias matsushimae* Jordan et Snyder, 1902—Barred snailfish. Northwestern Pacific // Rare. Mesobental. Marine. Not fished.

Note. For Aniva Bay, it was first given in the work of Lindberg (1959). It is also known from the specimen of ZIN RAN no. 41960 near Cape Aniva (Lindberg and Krasnyukova, 1987). Some authors (Kido, 1988; Sokolovskii et al., 2007) consider the *Crystallias* genus as the junior synonym of *Crystallichthys*. According to others (Lindberg and Krasnyukova, 1987; Pitruk, 1990; Parin et al., 2014), the *Crystallias* genus is valid. Is known in the adjacent waters of Hokkaido with an occurrence at depths of 60 m (Amaoka et al., 2011) and in the Sea of Okhotsk from 35 m (Pitruk, 1990).

Conservation status: IUCN (Not Evaluated).

88. Genus **LIPARIS** Scopoli, 1777

148. ? *Liparis agassizii* Putnam, 1874—Agassiz's snailfish. Northwestern Pacific // Occurrence requires clarification. Littoral. Marine, brackish-water, observed near river mouths of southeastern Sakhalin (HUMZ nos. 187941, 187944, 187945). Not fished.

Note. For Aniva Bay, it was first given in the work of Tanaka (1908), but Schmidt (1950) later attributed this description to another species—*L. ochotensis*. It is very common for the southeastern part of Sakhalin (HUMZ nos. 186958, 187939, 187941, 187944, 187945, 187947).

Conservation status: IUCN (Not Evaluated).

149. *Liparis dubius* Soldatov, 1930—Whitespotted snailfish. Northwestern Pacific // Rare. Littoral. Marine, brackish-water, observed near river mouths. Not fished.

Note. For Aniva Bay, it was first given in the work of Lindberg (1959). Was mentioned in the past (Kido, 1988; Parin et al., 2002) in synonymy with *L. ochotensis* Schmidt, 1904. Is currently (Parin et al., 2014; Dylidin and Orlov, 2017a) considered as a valid species.

Conservation status: IUCN (Not Evaluated).

150. *Liparis eos* Krasnyukova, 1984—Eastern Sakhalin snailfish. Northwestern Pacific // Rare. Elittoral. Marine. Not fished.

Note. For the southern part of Sakhalin, including Aniva Bay and the Pacific coast of Iturup Island, only a name was given first without description and identifying signs that would allow it to be identified as nom. nud. *Liparis eos* Schmidt, sp. n. (Lindberg, 1959). It was later described by Krasnyukova (1984). In the recent past (Kido, 1988; Sheiko and Fedorov, 2000; Parin et al., 2002), it was given in synonymy with *L. latifrons* Schmidt, 1950. Currently (Parin et al., 2014; *Catalog of Fishes...*, 2017) is considered as a valid species.

Conservation status: IUCN (Not Evaluated).

151. *Liparis frenatus* (Gilbert et Burke, 1912)—Bridled snailfish. Northwestern Pacific // Rare. Elittoral. Marine. Not fished.

Note. For Aniva Bay, it was first given in the work of Lindberg (1959). By the specimen of HUMZ no. 187948, it is known for the southeast coast of Sakhalin. Is observed in the adjacent waters of Hokkaido (Amaoka et al., 2011).

Conservation status: IUCN (Not Evaluated).

152. * *Liparis kusnetzovi* Taranetz, 1936—Kuznetsov's snailfish. Northwestern Pacific // Not documented for Aniva Bay. Sublittoral. Marine, brackish-water. Not fished.

Note. It is observed both along the southeastern (HUMZ nos. 186998, 187092, 187093) and the western coast of Sakhalin (Ueno, 1971; Dyldin and Orlov, 2017a), and findings in Aniva Bay are quite possible.

Conservation status: IUCN (Not Evaluated).

153. *Liparis latifrons* Schmidt, 1950—Broad-head snailfish. Northwestern Pacific // Rare. Elittoral. Marine. Not fished.

Note. Described by Schmidt (1950) from the northwestern part of the Sea of Okhotsk. To clarify the current distribution limits of *L. latifrons*, additional studies are required, since several synonyms (*L. eos*, *L. lindbergi*, *L. meridionalis*, and *L. rotundirostris* Krasnyukova, 1984) have often been included in the past in its composition, which expanded the distribution limits of *L. latifrons* in a southerly direction to the northern part of Japan (Hokkaido) and the Peter the Great Bay (Sea of Japan) and in the northerly direction to the southeastern part of the Kamchatka Peninsula (Kido, 1988; Sheiko and Fedorov, 2000; Chernova et al., 2004). It was not previously mentioned anywhere for the waters of Aniva Bay, but a sample from the HUMZ collection allows it to be included in the list of ichthyofauna of the bay.

Samples: HUMZ no. 103306—off Aniva Bay.

Conservation status: IUCN (Not Evaluated).

154. * *Liparis meridionalis* Schmidt, 1950—Meridional snailfish. Northwestern Pacific // Presence in Aniva Bay requires documentary evidence. Elittoral. Marine. Not fished.

Note. There is no documentary information about the capture in Aniva Bay. This species based on Schmidt's samples (1904) ZIN RAN nos. 12435, 12436 (under the name *L. pulchellus*) was first given for Aniva Bay in the work of Lindberg and Krasnyukova (1987), in which they redefined these specimens as *L. meridionalis*. Subsequently (Kido, 1988; Chernova et al., 2004), these specimens were assigned to another species—*L. tessellatus*. Some authors (Kido, 1988; Sheiko and Fedorov, 2000; Chernova et al., 2004) give this species in synonymy with *L. ochotensis* Schmidt, 1904, or *L. latifrons* Schmidt, 1950; others (Parin et al., 2014, *Catalog of Fishes...*, 2017) recognize it as an independent species.

Conservation status: IUCN (Not Evaluated).

155. *Liparis ochotensis* Schmidt, 1904—Okhotsk snailfish. Northwestern Pacific?, Bering Sea and adjacent Arctic // Occurrence requires clarification. Elittoral. Marine, brackish-water, including Amur Liman. Not fished.

Note. Schmidt (1904) believed that this species is distributed from the Amur Liman and the Okha district to Terpeniya Bay in the Sea of Okhotsk and subsequently included Aniva Bay in its range

(Schmidt, 1950). Gilbert and Burke (1912) first indicated this species for Aniva Bay on the basis of documented findings by the Albatross expedition in 1906. At present, the distribution boundaries of *L. ochotensis* require further study, since a number of authors (Kido, 1988; Sheiko and Fedorov, 2000; Mecklenburg et al., 2002; Chernova et al., 2004; Amaoka et al., 2011) include *L. dubius* Soldatov, 1930, *L. ingens* Gilbert et Burke, 1912, *L. meridionalis* Schmidt, 1950 (according to original description, *L. latifrons meridionalis* Schmidt, 1950), *L. niger* Soldatov and Lindberg, 1930, and *L. rhodosoma* Burke, 1930, in the synonymy for this species. However, all the synonyms listed are recognized at present as valid (*Catalog of Fishes...*, 2017).

Samples: ZIN RAN no. 42384—Aniva Bay; USNM nos. 74683, 74688—off Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

156. *Liparis rhodosoma* Burke, 1930—Pinkbody snailfish. Northwestern Pacific // Abundance requires clarification. Elittoral. Marine. Not fished.

Note. For Aniva Bay, it was first given in the work of Lindberg and Krasnyukova (1987). A number of authors (Sheiko and Fedorov, 2000; Kido, 1988; Parin et al., 2002) indicate *L. rhodosoma* in synonymy with *L. ochotensis* Schmidt, 1904. Nevertheless, according to Lindberg and Krasnyukova (1987), this species is close to *L. ochotensis*, but it differs from the latter by the development of the lateral line and the deep hollow of the pectoral fin.

Samples: ZIN RAN no. 42390—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

157. *Liparis takashimensis* Nojima, 1936—Takashima snailfish. Northwestern Pacific // Abundance requires clarification since it is currently known only by neotype. Marine. Not fished.

Note. The typical habitat, according to the neotype (Chernova, 2008), is Aniva Bay, although the region of capture was indicated “off Takashima near Otaru, western coast of Hokkaido, Japan” in the original description (*Catalog of Fishes...*, 2017).

Samples: ZIN RAN no. 42386 (neotype)—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

158. *Liparis tessellatus* (Gilbert et Burke, 1912)—Cubed snailfish. Northwestern Pacific // Abundance requires clarification. Elittoral. Marine, brackish-water, brackish lakes of Hokkaido. Not fished.

Note. In the past, some authors (Schmidt, 1904; Quast and Hall, 1972) gave another species, *L. pulchellus* Ayres, 1855, for Aniva Bay (Sea of Okhotsk) and Peter the Great Bay (Sea of Japan). It was subsequently (Kido, 1988; Chernova et al., 2004) established that the samples were misidentified, and these

findings should be attributed to another species, *L. tessellatus* (Gilbert et Burke, 1912).

Samples: ZIN RAN nos. 12435, 12436 (both indicated by Schmidt (1904) as *L. pulchellus*)—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

20. ORDER **PERCIFORMES** Rafinesque, 1810—Perches

38. Family **LATEOLABRACIDAE** Springer et Raasch, 1995—Asian sea perches

89. Genus **LATEOLABRAX** Bleeker, 1855

159. *Lateolabrax japonicus* (Cuvier, 1828)—Japanese sea perch. Northwestern Pacific // Rare. Neritic. Marine, brackish-water, freshwater, enters lower reaches of rivers.

Note. Was first noted by one specimen in summer 2014 in the Lyutoga River 30 km upstream from the place of confluence into Aniva Bay (Velikanov et al., 2016). The specimen was not kept.

Conservation status: IUCN (Not Evaluated).

39. Family **PRIACANTHIDAE** Günther, 1859—Bigeyes

90. Genus **COOKEOLUS** Fowler, 1928

160. * *Cookeolus japonicus* (Cuvier, 1829)—Long-finned bigeye or bulleye. Circumglobally in warm waters // Not documented for Aniva Bay. Marine.

Note. The closest occurrence to the island is observed along the Okhotsk Sea coast of Hokkaido and in the Sea of Japan (Amaoka et al., 2011; Shinohara et al., 2012, 2014), which does not exclude the presence of this species in the warm season in Aniva Bay as well.

Conservation status: IUCN (Not Evaluated).

40. Family **SCOMBROPIDAE** Gill, 1862—Gnomefishes

91. Genus **SCOMBROPS** Temminck et Schlegel, 1845

161. * *Scombrops boops* (Houttuyn, 1782)—Gnomefish or Japanese bluefish. Northwestern Pacific // Not documented for Aniva Bay. Bottom, littoral. Marine.

Note. The closest occurrence to the island is observed along the Okhotsk Sea coast of Hokkaido and in the Sea of Japan (Shinohara et al., 2012, 2014), which does not exclude the presence of this species in the warm season in Aniva Bay as well.

Conservation status: IUCN (Not Evaluated).

41. Family **CARANGIDAE** Rafinesque, 1815—Amberjacks, jacks, pompanos or trevallies

92. Genus **SERIOLA** Cuvier, 1816

162. *Seriola aureovittata* Temminck et Schlegel, 1845—Yellow tail amberjack. Northwestern Pacific // Can be quite common in warm season (our data). Pelagic, neritic. Marine, brackish-water. Object of amateur fishing.

Note. Comments on the current taxonomic status and distribution of this species in the waters of the Northwestern Pacific were published earlier (Dyldin and Orlov, 2017a).

Conservation status: IUCN (Not Evaluated).

93. Genus **TRACHURUS** Rafinesque, 1810

163. * *Trachurus japonicus* (Temminck et Schlegel, 1844)—Japanese horse mackerel. Northwestern Pacific // Not documented for Aniva Bay. Pelagic, neritic. Marine, brackish-water, river mouths and brackish lakes.

Note. The closest occurrence to the southern part of Sakhalin Island is in the Pacific waters of the Southern Kurils, off the coast of Hokkaido and Primorsky Krai (Lindberg and Krasnyukova, 1969; Ueno, 1971; Parin, 2003; Sokolovskii et al., 2007, 2011; Amaoka et al., 2011). In the warm season, with the warming up of waters, findings of this species in Aniva Bay are quite possible.

Conservation status: IUCN (Not Evaluated).

42. Family **CORYPHAENIDAE** Rafinesque, 1815—Dolphinfishes

94. Genus **CORYPHAENA** Linnaeus, 1758

164. *Coryphaena hippurus* Linnaeus, 1758—Common dolphinfish. Circumglobally // According to our observations, can be a common species in Aniva Bay in summer time. Epipelagic. Marine. Object of amateur fishing.

Conservation status: IUCN (Least Concern).

43. Family **BRAMIDAE** Bonaparte, 1831—Pomfrets

95. Genus **BRAMA** Bloch et Schneider, 1801

165. *Brama japonica* Hilgendorf, 1878—Pacific pomfret. Mainly in North Pacific // According to our findings and survey data (specimens were not kept), found in Aniva Bay. Marine.

Note. In addition to Aniva Bay, close to Sakhalin it is observed near the coasts of Hokkaido and Primorsky krai and in the southeastern part of the Sea of Okhotsk (Parin, 2003; Sokolovskii et al., 2007, 2011; Amaoka et al., 2011); is quite common in the South

Kurils region (Parin, 2003). Lindberg and Krasnyukova (1969) gave *B. japonica* in synonymy with *B. raii* (Bloch, 1791).

Conservation status: IUCN (Not Evaluated).

44. Family **LOBOTIDAE** Gill, 1861—Tripletails

96. Genus **LOBOTES** Cuvier, 1829

166. **Lobotes surinamensis* (Bloch, 1790)—Atlantic or dusky tripletail. Circumglobally in tropical and subtropical waters. Replaced by a close species, *L. pacificus* Gilbert, 1898, in northeastern part of Pacific Ocean // Not documented for Aniva Bay. Bottom, coastal, sublittoral. Marine, brackish-water.

Note. The closest occurrence to Aniva Bay is in the Southern Kurils, in the Okhotsk Sea waters of Hokkaido and in Primorye (Fedorov and Parin, 1998; Savinykh, 1998; Parin, 2003; Sokolovskii et al., 2007, 2011; Kharin et al., 2009; Amaoka et al., 2011; Shinohara et al., 2012). Findings in Aniva Bay are quite possible.

Conservation status: IUCN (Not Evaluated).

45. Family **SPARIDAE** Rafinesque, 1818—Porgies or sea breams

97. Genus **PAGRUS** Cuvier, 1816

167. **Pagrus major* (Temminck et Schlegel, 1843)—Japanese red sea bream. Northwestern Pacific // Not documented for Aniva Bay. Bottom, coastal, sublittoral. Marine, brackish-water, brackish lakes of Hokkaido.

Note. The closest occurrence to Aniva Bay is in Peter the Great Bay and in the Okhotsk Sea waters of Hokkaido (Lindberg and Krasnyukova, 1969; Ueno, 1971; Parin, 2003; Sokolovsky et al., 2007, 2011; Amaoka et al., 2011). Findings in Aniva Bay are possible.

Conservation status: IUCN (Least Concern).

46. Family **OPLEGNATHIDAE** Bleeker, 1853—Knifejaws

98. Genus **OPLEGNATHUS** Richardson, 1840

168. **Oplegnathus fasciatus* (Temminck et Schlegel, 1844)—Barred knifejaw. Pacific // Not documented for Aniva Bay. Bottom, coastal, sublittoral. Marine, brackish-water, brackish lakes of Hokkaido.

Note. It is noted in the southwestern part of Sakhalin Island as well as along the Okhotsk Sea coast of Hokkaido (Ueno, 1971; Sokolovsky et al., 2007; Amaoka et al., 2011; Shinohara et al., 2012). Findings in Aniva Bay are quite possible. In the waters of Hokkaido and the coast of Primorye, another closely related species, *O. punctatus* (Temminck et Schlegel,

1844) (Amaoka et al., 2011; Zvyagintsev et al., 2011), is noted.

Conservation status: IUCN (Not Evaluated).

47. Family **MUGILIDAE** Jarocki, 1822—Mulletts

99. Genus **MUGIL** Linnaeus, 1758

169. *Mugil cephalus* Linnaeus, 1758—Flathead mullet. Circumglobally, in tropics and subtropics to warm waters of temperate zone. Common. Neritic. Marine, brackish-water, enters lower reaches of rivers. Commercial, also fished as by-catch.

Conservation status: IUCN (Least Concern).

48. Family **EMBIOTOCIDAE** Agassiz, 1853—Surfperches

100. Genus **DITREMA** Temminck et Schlegel, 1844

170. *Ditrema temminckii* Bleeker, 1853—Temminck's surfperch. Northwestern Pacific // Rare. Bottom, coastal, sublittoral. Marine, brackish-water, brackish lakes of Hokkaido.

Note. It was first given for Aniva Bay in the work of Schmidt (1950) by a specimen kept in the ZIN RAN collection. There is apparently no information about other findings in Aniva Bay. In the past, this species included *D. temmincki* var. *jordani* Franz, 1910 (Lindberg and Krasnyukova, 1969). At the present time, the latter is allocated as an independent species, *D. jordani*, with distribution in the Pacific waters of southern Japan (Katafuchi and Nakabo, 2007; Katafuchi et al., 2011).

Samples: ZIN RAN no. 13107—off Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

49. Family **ZOARCIDAE** Swainson, 1839—Eelpouts

13. Subfamily **GYMNELINAE** Gill, 1863—Naked eelpouts

101. Genus **BILABRIA** Schmidt, 1936

171. *Bilabria ornata* (Soldatov, 1922)—Ornate eelpout. Northwestern Pacific // Rare. Elittoral. Marine.

Note. It was first given for Aniva Bay in the work of Schmidt (1904) by a specimen from the ZIN RAN collection (no. 13089, as *Lycenchelys brachyrhynchus*). It was later (Lindberg and Krasnyukova, 1975; Balushkin et al., 2011) indicated as *B. ornata*.

Samples: ZIN RAN nos. 13089, 43977, 46781—Aniva Bay; CAS no. 61023 Aniva Bay.

Conservation status: IUCN (Not Evaluated).

102. Genus *DAVIDIJORDANIA* Popov, 1931

172. *Davidijordania brachyrhyncha* (Schmidt, 1904)—Shortbilled eelpout. Northwestern Pacific // Occurrence requires clarification. Sublittoral. Marine, brackish-water.

Note. In the description of this species, Schmidt (1904) also included samples (syntype) from Aniva Bay.

Samples: ZIN RAN nos. 13091 (syntype), 43456—Aniva Bay; no. 42276—off Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

173. * *Davidijordania poecilimon* (Jordan et Fowler, 1902)—Matsushima Bay eelpout. Northwestern Pacific // Not documented for Aniva Bay. Sublittoral. Marine.

Note. The closest occurrence to Aniva Bay is near the Pacific coast of northern Japan, in the Sea of Okhotsk, NSMT no. 53324, off Oumu (Sea of Okhotsk) and in the Sea of Okhotsk, HUMZ nos. 98054, 98120, off Esashi (Sea of Okhotsk) (Lindberg and Krasnyukova, 1975; Anderson and Fedorov, 2004; Shinohara et al., 2009, 2011, 2014; Amaoka et al., 2011; Sokolovskii et al., 2011). Findings in Aniva Bay are possible.

Conservation status: IUCN (Not Evaluated).

103. Genus *GYMNELOPSIS* Soldatov, 1922

174. * *Gymnelopsis brashnikov* Soldatov, 1922—Brashnikov's eelpout. Northwestern Pacific // Not documented for Aniva Bay. Elittoral. Marine.

Note. Is known from the Okhotsk Sea waters of eastern Sakhalin from depths of 78–102 m (ZIN RAN nos. 13029, 44728, 44729).

Conservation status: IUCN (Not Evaluated).

175. * *Gymnelopsis brevifenestrata* Anderson, 1982—Shelf eelpout. Northwestern Pacific // Not documented for Aniva Bay. Elittoral. Marine.

Note. It is noted near the southeastern part of Aniva Bay (ZIN RAN no. 48107—Sea of Okhotsk, near the Tonino-Aniva Peninsula, 48°00' N 144°01' E, depths of 76–80 m).

Conservation status: IUCN (Not Evaluated).

176. *Gymnelopsis japonica* (Katayama, 1943)—Toyama Bay eelpout. Northwestern Pacific // Occurrence requires clarification. Elittoral. Marine.

Note. Is not mentioned for Aniva Bay in the literature sources under this name, except for the southeastern part of Sakhalin (Parin et al., 2014), however, collection specimens of HUMZ allow it to be included in the ichthyofauna of Aniva Bay. Some authors (Anderson and Fedorov, 2004) give *G. japonica* in syn-

onymy with *G. ochotensis*. According to other authors (Lindberg and Krasnyukova, 1975, Toyoshima, 1981; Nakabo, 2002; Balushkin et al., 2011), the taxon in question is valid. A number of researchers (Toyoshima, 1981; Nakabo, 2002; Balushkin et al., 2011) give *G. japonica* and *G. ochotensis* in the *Derjuginia* genus. Schmidt (1950) in that regard believed that the *Derjuginia* genus is undoubtedly close to the *Gymnelopsis* and *Gymnelis* genera but differs from the latter in the development of the scaly cover, with a more developed lateral line and other features. However, *Derjuginia* is reduced at the present time to synonymy with the *Gymnelopsis* genus (Anderson and Fedorov, 2004; Parin et al., 2014).

Samples: HUMZ nos. 103303, 103307–103309, 103337—off Aniva Bay.

Conservation status: IUCN (Not Evaluated).

177. * *Gymnelopsis ochotensis* (Popov, 1931)—Okhotsk blackspot eelpout. Northwestern Pacific // Not documented for Aniva Bay. Elittoral. Marine.

Note. The closest occurrence to Aniva Bay is noted by specimens obtained in the southern part of the Sea of Okhotsk near Hokkaido (FAKU nos. 200393, 201443) (Tohkairin et al., 2015). Given the known depth from 85 m (Parin et al., 2014), findings in the open part of Aniva Bay are quite possible.

Conservation status: IUCN (Not Evaluated).

14. Subfamily *LYCODINAE* Gill, 1861—Wolf eelpouts104. Genus *LYCODES* Reinhardt, 1831

178. *Lycodes brevicaudus* Taranetz et Andriashev, 1935—Short-tail eelpout. Northwestern Pacific // Occurrence requires clarification. Elittoral. Marine.

Note. It was indicated in the past in the synonymy of *L. tanakae* Jordan et Thompson, 1914, (Toyoshima, 1985; Anderson and Fedorov, 2004) or as a subspecies *L. schmidti brevicauda* (Schmidt, 1950). It is currently (*Catalog of Fishes...*, 2017) considered an independent species. This species was earlier given only for the eastern part of Sakhalin Island (Schmidt, 1950). Samples of ZIN RAN (Balushkin et al., 2011) allow it to be included in the list of ichthyofauna of Aniva Bay.

Samples: ZIN RAN nos. 42283, 54523—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

179. *Lycodes fasciatus* (Schmidt, 1904)—Banded eelpout. Northwestern Pacific // Common. Elittoral. Marine.

Note. Is described by Schmidt (1904) by samples from Aniva Bay. It is considered in some works (Lindberg, 1959; Lindberg and Krasnyukova, 1975; Shinohara et al., 2014) as an *L. palearis fasciatus* subspecies. A number of authors (Sheiko and Fedorov, 2000;

Mecklenburg et al., 2002; Anderson and Fedorov, 2004) include in this species *L. palearis multifasciatus* Schmidt, 1950, a part of *L. brashnikovi* Soldatov, 1918, and *L. schmidti* Gratzianov, 1907. In accordance with recent publications (Balushkin et al., 2011; Nazarkin et al., 2014), the subspecies *L. p. multifasciatus* is considered in synonymy with *L. brashnikovi* Soldatov, 1918, while *L. brashnikovi* and *L. schmidti* as independent species (the latter as *Petroschmidtia schmidti*).

S a m p l e s: ZIN RAN nos. 13092, 13093 (syn-types)—Aniva Bay; nos. 34875, 41621, 41622, 41625—Aniva Bay.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

180. * *Lycodes raridens* Taranetz et Andriashev, 1937—Marbled eelpout. Arctic and North Pacific // Not documented for Aniva Bay. Elittoral. Marine.

N o t e. Is noted on both coasts of Sakhalin (Schmidt, 1950; Lindberg, 1959; Lindberg and Krasnyukova, 1975; Balushkin et al., 2011). Taking into account that the minimum depth of occurrence of this species is 10–25 m (Parin et al., 2014; *FishBase*..., 2017), findings in Aniva Bay are quite probable.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

181. ? *Lycodes sigmatoides* Lindberg et Krasnyukova, 1975—S-shaped eelpout. Northwestern Pacific // ? Common. Mesobental. Marine.

N o t e. For Aniva Bay, it was first given in the work of Lindberg (1959) as *L. tanakae* (Lindberg and Krasnyukova, 1975). The name *L. sigmatoides* is a replacement for *L. schmidti* Soldatov, 1918, since the latter was previously used for another species by another author (*L. schmidti* Gratzianov, 1907). According to some authors (Balushkin et al., 2011; Savel'ev, 2011), this species is synonymous with *L. tanakae*. According to other data (Lindberg and Krasnyukova, 1975; Toyoshima, 1985; Anderson and Fedorov, 2004; Shinohara et al., 2011, 2014), it is considered as an independent species.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

182. *Lycodes tanakae* Jordan et Thompson, 1914—Tanaka's eelpout. Northwestern Pacific // Common. Mesobental. Marine.

N o t e. It was given in the past (Lindberg, 1959, in part), without specifying the samples, for Aniva Bay, and was later (Lindberg and Krasnyukova, 1975) given for the southeastern part of Sakhalin Island with specification of specimens kept in the ZIN RAN. Samples from the collections of HUMZ and USNM confirm its presence in Aniva Bay.

S a m p l e s: USNM nos. 117972, 117944, 149622, 161496, 161437—off Korsakov, Aniva Bay; HUMZ nos. 102041, 103342, 103356—Aniva Bay.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

183. *Lycodes uschakovi* Popov, 1931—Uschakov's eelpout. Northwestern Pacific // Occurrence requires clarification. Elittoral. Marine.

N o t e. For Aniva Bay, it was first given in the work of Lindberg (1947). In the open part of the bay, it can pretty much be observed, starting from the depths of its dwelling from 50 m (Parin et al., 2014). According to the collection materials (ZIN RAN no. 41638), it is known from the waters adjacent to Aniva Cape (Balushkin et al., 2011).

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

15. Subfamily **ZOARCINAE** Andriashev, 1939—Eelpouts

105. Genus **ZOARCES** Cuvier, 1829

184. *Zoarces elongatus* Kner, 1868—Eastern eelpout. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water, including mouth of rivers and Amur Liman. Fished as by-catch.

N o t e. For Aniva Bay, it was first given by Schmidt (1904), by a specimen obtained by V.K. Brazhnikov in 1899 and transferred to ZIN RAN (no. 13008).

S a m p l e s: ZIN RAN no. 12397—off Korsakov, Aniva Bay; no. 13008—Aniva Bay; no. 28014—Busse Bay, Aniva Bay; USNM no. 143425—off Korsakov, Sakhalin Island; UWFC no. 46138—east of Korsakov, Aniva Bay.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

16. Subfamily **NEOZOARCINAE** Jordan et Snyder, 1902—Neozoarcins

106. Genus **NEOZOARCES** Steindachner, 1880

185. *Neozoarces pulcher* Steindachner, 1881—Beautiful eelpout. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water, brackish lakes of Hokkaido. Not fished.

N o t e. For Aniva Bay, it was first given in the work of Schmidt (1904) by a specimen he had obtained in 1901 (ZIN RAN no. 12398).

S a m p l e s: ZIN RAN no. 12398—Busse Bay, Aniva Bay; nos. 12399, 12401, 31625—31630, 31733, 42266—Aniva Bay; no. 43296—Busse Lagoon, Aniva Bay; HUMZ nos. 179417, 185261, 185265—Korsakov, Aniva Bay.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

186. ? *Neozoarces steindachneri* Jordan et Snyder, 1902—Steindachner's eelpout. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water.

N o t e. For the waters of Aniva Bay (Busse Lagoon), it was first given in the work of Tanaka (1908), and the presence of this species in the bay was confirmed by other authors (Lindberg, 1959; Lindberg

and Krasnyukova, 1975). Perhaps *N. steindachneri* is the junior synonym of *N. pulcher* Steindachner, 1881 (Mecklenburg and Sheiko, 2004). According to Markevich and Gnyubkina (2008), *N. pulcher* has a well-defined sexual dimorphism, and these authors consider *N. steindachneri* as females of *N. pulcher*.

S a m p l e s: ZIN RAN no. 37668—Aniva Bay.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

50. Family **STICHAEIDAE** Gill,
1864—Pricklebacks, shannies

17. Subfamily **STICHAEINAE** Gill,
1864—Pricklebacks

107. Genus **ERNOGRAMMUS** Jordan
et Evermann, 1898

187. *Ernogrammus hexagrammus* (Schlegel, 1845)—Six-lined prickleback. Northwestern Pacific // Occurrence requires clarification. Sublittoral. Marine, brackish-water.

N o t e. In the literature, information about the occurrence of this species in Aniva Bay is absent. It was earlier noted only at the western coast of Sakhalin (Lindberg and Krasnyukova, 1975). Samples from HUMZ allow this species to be included in the ichthyofauna of the bay.

S a m p l e s: HUMZ no. 179571—western part of Aniva Bay, no. 183706—Korsakov, Aniva Bay.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

108. Genus **STICHAEOPSIS** Kner, 1870

188. *Stichaeopsis nana* Kner, 1870—Network prickleback. Northwestern Pacific // Rare. Littoral. Marine, brackish-water, including river mouths and Amur Liman.

N o t e. It was previously known near the western and eastern coasts of Sakhalin Island (Schmidt, 1904; Lindberg, 1959; Lindberg and Krasnyukova, 1975; Parin et al., 2014). Aniva Bay is not indicated in the literature, but a sample from HUMZ allows it to be included in the ichthyofauna of the bay.

S a m p l e s: HUMZ no. 179570—western part of Aniva Bay.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

109. Genus **STICHAEUS** Reinhardt, 1836

189. *Stichaeus fuscus* Miki et Maruyama, 1986—Dark prickleback. Northwestern Pacific // Rare. Sublittoral. Marine.

N o t e. This species, due to the similarity of external features, is often identified as *S. nozawae* Jordan et Snyder, 1902 (Pitruk et al., 2011).

S a m p l e s: ZIN RAN no. 39790—Aniva Bay. This specimen was mentioned in the work of Lindberg and Krasnyukova (1975) under the name *S. nozawae* (Lavrova, 1990).

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

190. *Stichaeus grigorjewi* Herzenstein, 1890—Grigorjew's prickleback. Northwestern Pacific // ? Common. Elittoral. Marine, brackish-water, observed near river mouths of Sakhalin. Fished as by-catch. Familiar in local fishery in adjacent waters of Primorsky Krai (Sokolovskii et al., 2007, 2011).

N o t e. For Aniva Bay, it is mentioned in the works of Kim Sen Tok (2004, 2005).

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

191. *Stichaeus nozawae* Jordan et Snyder, 1902—Nozawa's prickleback. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water, brackish lakes of Hokkaido. Fished as by-catch.

N o t e. For Aniva Bay, it was first given in the work of Lindberg (1959). Due to external similarity, this species can be confused with *S. fuscus* Miki et Maruyama, 1986 (Pitruk et al., 2011).

S a m p l e s: ZIN RAN nos. 39793, 39795, 39797, 39805, 39809, 39810; HUMZ nos. 103336, 103349—Aniva Bay.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

192. *Stichaeus ochriamkini* Taranetz, 1935—Ochriamkin's prickleback. Northwestern Pacific // Occurrence requires clarification. Littoral. Marine.

N o t e. Original description includes samples from Aniva Bay.

S a m p l e s: ZIN RAN nos. 12443 (Schmidt (1904) indicated it under the name *S. punctatus*), 29482, 31675, 39824–39826, 40307—Aniva Bay; HUMZ no. 188407—Korsakov, Aniva Bay.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

193. *Stichaeus punctatus* (Fabricius, 1780)—Arctic prickleback. North Pacific, Arctic and Northwestern Atlantic // Common. Sublittoral. Marine.

N o t e. In the Sea of Okhotsk and the northern part of the Sea of Japan, including the waters of southern Sakhalin to Terpeniya Bay, a *S. punctatus pulcherrimus* Taranetz, 1935, subspecies is allocated (Andriashev, 1954; Lindberg, 1959; Lindberg and Krasnyukova, 1975). In the case of allocating *S. pulcherrimus* Taranetz, 1935, and *S. rothroeki* Bean, 1881, (now in synonymy with *S. punctatus*) as separate species, the range *S. punctatus* will be limited to a type locality, namely, the northwestern Atlantic and the adjacent Arctic.

C o n s e r v a t i o n s t a t u s: IUCN (Not Evaluated).

18. Subfamily **OPISTHOCENTRINAE** Jordan et Evermann, 1898—Opisthocentrins

110. Genus **ASKOLDIA** Pavlenko, 1910

194. *Askoldia variegata* Pavlenko, 1910—Mud prickleback. Northwestern Pacific // Abundance requires clarification. Elittoral. Marine.

Note. For the waters of Aniva Bay, it was first given in the work of Lindberg (1959). In the past, two subspecies were distinguished: nominative *A. variegata variegata* Pavlenko, 1910, and *A. variegata knipowitschi* Soldatov, 1927 (Lindberg and Krasnyukova, 1975; Amaoka et al., 1977, 1989). The latter was subsequently considered as an independent *A. knipowitschi* species (Sheiko and Fedorov, 2000). According to other data (Mecklenburg and Sheiko, 2004; Sokolovsky et al., 2011), *A. knipowitschi* is in synonymy with *A. variegata*.

Samples: ZIN RAN nos. 40361, 40362—Salmon Bay, Aniva Bay; no. 41614—Cape Aniva, Sea of Okhotsk.

Conservation status: IUCN (Not Evaluated).

111. Genus **OPISTHOCENTRUS** Kner, 1868

195. *Opisthocentrus ocellatus* (Tilesius, 1811)—Ocellated prickleback. Northwestern Pacific and Bering Sea // Common. Sublittoral. Marine, brackish-water, river mouths, Amur Liman, lagoons, brackish lakes of Hokkaido.

Note. For Aniva Bay, first it was given by Schmidt (1904) based on his own collections in 1901.

Samples: ZIN RAN nos. 12411, 40382—Busse Bay, Aniva Bay; nos. 13103, 13104—Korsakov, Aniva Bay; nos. 31389, 31586—31589—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

196. *Opisthocentrus zonope* Jordan et Snyder, 1902—Muronan prickleback. Northwestern Pacific // Rare. Sublittoral. Marine, brackish-water, brackish lakes of Hokkaido.

Note. For Aniva Bay, it is mentioned only in the work of Lindberg (1959). There is another representative of the genus *O. tenuis* Bean et Bean, 1897—Slender prickleback (Shiogaki, 1981, 1984; Amaoka et al., 1989, 2011; Mecklenburg and Sheiko, 2004; Sokolovsky et al., 2007, 2011; Shinohara et al., 2012)—dwelling in the adjacent Okhotsk Sea waters of Hokkaido, as well as in the Southern Kurils and in the Sea of Japan, which very well may be observed in Aniva Bay.

Conservation status: IUCN (Not Evaluated).

112. Genus **PHOLIDAPUS** Bean et Bean, 1897

197. *Pholidapus dybowskii* (Steindachner, 1880)—Dybowski's prickleback. Northwestern Pacific // Common. Sublittoral. Marine, including river mouths and lagoons of Sakhalin and brackish lakes of Hokkaido.

Note. For Aniva Bay, it was first given in the work of Schmidt (1904) based on his own collections in 1901. *Opisthocentrus azumae* (Jordan et Snyder, 1902) is now considered in synonymy with *P. dybowskii* (Lindberg and Krasnyukova, 1975; Parin et al., 2014).

Samples: ZIN RAN no. 12391—Korsakov, Aniva Bay; no. 12385—near the Shishkevich River, Busse Bay, Aniva Bay; no. 13079—Shishkevich River, Busse Bay, Aniva Bay; nos. 12395, 12396—Aniva Bay; nos. 12385, 12386—Busse Bay, Aniva Bay; no. 40562, 40563—Busse Lagoon, Aniva Bay; HUMZ no. 179554—Aniva Bay; USNM no. 135611 (as *Abryois azumae*)—Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

19. Subfamily **LUMPENINAE** Jordan et Evermann, 1898—Lumpenins

113. Genus **ACANTHOLUMPENUS** Makushok, 1958

198. *Acantholumpenus mackayi* (Gilbert, 1896)—Pighead prickleback or McKay's prickleback. North Pacific and adjacent Arctic // Common. Sublittoral. Marine, brackish-water, Amur Liman, river mouths of Primorsky Krai, brackish lakes of Hokkaido.

Note. Schmidt (1904) indicated *Lumpenus fowleri* Jordan et Snyder, 1902, which later (Lindberg and Krasnyukova, 1975; Parin et al., 2014) began to be considered in synonymy with *A. mackayi*, for Aniva Bay.

Samples: ZIN RAN no. 12412—Korsakov, Aniva Bay; nos. 40195, 40196—Aniva Bay; USNM no. 134955 (as *Lumpenus fowleri*)—Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

114. Genus **ANISARCHUS** Gill, 1864

199. ? *Anisarchus medius* (Reinhardt, 1837)—Stout prickleback. Arctic (circumpolarly), North Pacific and North Atlantic // Common. Elittoral. Marine.

Note. In the waters of Japan (including Hokkaido), another closely related species is found, *A. macrops* (Matsubara and Ochiai, 1952) (Amaoka et al., 2011), which is probably replaced by *A. medius* in Aniva Bay.

Samples: ZIN RAN nos. 12412, 13014, 33910—Aniva Bay; nos. 40268, 40274—Cape Aniva, Sea of Okhotsk; nos. 40271, 40272—Busse Lagoon, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

115. Genus *LEPTOCLINUS* Gill, 1861

200. ? *Leptoclinus maculatus* (Fries, 1837)—Daubed prickleback. Arctic (circumpolarly), North Pacific and North Atlantic // Common. Elittoral. Marine, brackish-water.

Note. In the North Pacific, a separate subspecies, *L. maculatus diaphanocarus* (Schmidt, 1904) was isolated with the distribution in Bering, Okhotsk (from Hokkaido, Japan) and the Sea of Japan (Andriyashov, 1954; Lindberg, 1959; Lindberg and Krasnyukova, 1975; Miyahara et al., 2005; Sokolovskii et al., 2007, 2011). According to other authors, based on molecular analysis (Mecklenburg et al., 2011), the isolation of the subspecies is not justified.

Samples: ZIN RAN no. 40203—Cape Aniva, Aniva Bay; HUMZ nos. 103338, 103339—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

116. Genus *LEPTOSTICHAEUS* Miki, 1985

201. * *Leptostichaeus pumilus* Miki, 1985—Pigmy prickleback. Northwestern Pacific // Not documented for Aniva Bay. Littoral. Marine.

Note. The closest occurrence to Aniva Bay is in the Okhotsk Sea waters of Hokkaido and in the Tatar Strait (Miki, 1985; Mecklenburg and Sheiko, 2004; Shinohara and Yabe, 2009; Zemnukhov and Saveliev, 2011; Shinohara et al., 2012), in which connection findings are quite possible in Aniva Bay as well. According to Zemnukhov (2012), this species should be considered within the framework of a possible restored Azygopterinae subfamily in the Stichaeidae family, which was supported by Eschmeyer and Fong (2017). According to other molecular genetic studies (Radchenko et al., 2012), pigmy prickleback differs significantly from members of the Stichaeidae family and is genetically closest to the Zoarcidae, Neozoarcidae and Anarhichadidae families.

Conservation status: IUCN (Not Evaluated).

117. Genus *LUMPENUS* Reinhardt, 1836

202. * *Lumpenus fabricii* Reinhardt, 1836—Slender prickleback. The Arctic (probably circumpolarly), North Pacific and adjacent North Atlantic // Not documented for Aniva Bay. Sublittoral. Marine, brackish-water, Amur Liman.

Note. Is indicated under this name for the waters of southeastern Sakhalin and along the west coast of the island to the Amur Liman (Schmidt, 1950; Ueno, 1971; Lindberg and Krasnyukova, 1975; Balushkin et al., 2012), which does not exclude its findings in

Aniva Bay. However, this species is most likely confused with a close *L. sagitta* species.

Conservation status: IUCN (Not Evaluated).

203. *Lumpenus sagitta* Wilimovsky, 1956—Arrow prickleback. North Pacific // Common. Sublittoral. Marine, brackish-water, observed in Amur Liman, near river mouths of Peter the Great Bay and in brackish lakes of Hokkaido.

Samples: ZIN RAN no. 40315—Aniva Bay; no. 40322—Busse Lagoon, Aniva Bay; nos. 40325, 40329—Salmon Bay, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

20. Subfamily **CHIROLOPHINAE** Jordan et Evermann, 1898—Chirolophins

118. Genus *BRYOZOICHTHYS* Whitley, 1931

204. ? * *Bryozoichthys lysimus* (Jordan et Snyder, 1902)—Nutcracker prickleback. North Pacific // Rare. Mesobental. Marine.

Note. It was first determined for Aniva Bay by Schmidt (1904) as *Bryostemma polyactocephalum* (Pallas, 1814) based on his own collections in 1901 (ZIN RAN no. 12438). In the work of Lindbergh and Krasnyukova (1975), it was shown that Schmidt's specimen (no. 12438) belongs to another species, *B. lysimus*. Later (Balushkin et al., 2012), the same sample was indicated as *Chirolophis snyderi*. In case of confirmation that the considered specimen still belongs to *Ch. snyderi*, there will be no reliable documentary information about the occurrence of *B. lysimus* in Aniva Bay.

Samples: ZIN RAN no. 12438—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

119. Genus *CHIROLOPHIS* Swainson, 1839

205. *Chirolophis snyderi* (Tarantetz, 1938)—Bearded prickleback. North Pacific and adjacent Arctic // Occurrence requires clarification. Sublittoral. Marine.

Note. Schmidt (1904) identified a specimen caught by him in 1901 (ZIN RAN no. 12438) as *Bryostemma polyactocephalum* (the modern name is *Soldatovia polyactcephala*). At the moment, this sample is given under the name *Ch. snyderi* (Balushkin et al., 2012).

Samples: ZIN RAN no. 12439—Aniva Bay, Busse Bay.

Conservation status: IUCN (Data Deficient).

120. Genus *SOLDATOVI* Taranetz, 1937

206. *Soldatovia polyactocephala* (Pallas, 1814)—Northern fringed prickleback. Northwestern Pacific // Rare. Sublittoral. Marine.

Note. The samples of ZIN RAN nos. 12438, 12439 (Lindberg and Krasnyukova, 1975; Balushkin et al., 2012), which Schmidt (1904) has indicated for Aniva Bay, are redefined as another species—*B. lysi-mus* and *Ch. snyderi* (see above).

Samples: ZIN RAN no. 26241—Cape Aniva, Sea of Okhotsk.

Conservation status: IUCN (Not Evaluated).

21. Subfamily XIPHISTERINAE Jordan, 1880—Xiphisterins

121. Genus *ALECTRIAS* Jordan et Evermann, 1898

207. *Alectrias alectrolophus* (Pallas, 1814)—Stone cockscomb. North Pacific and adjacent Arctic // Occurrence in Aniva Bay requires clarification. Littoral. Marine.

Note. It was first given for Aniva Bay in the work of Schmidt (1950) as *Alectridium aurantiacum* (Gilbert et Burke, 1912) and later also directly for Aniva Bay by a specimen of ZIN RAN no. 31699 (Lindberg and Krasnyukova, 1975; Balushkin et al., 2012). Collection specimens of HUMZ also confirm the presence of this species in Aniva Bay.

Samples: ZIN RAN no. 31699—near the village of Tobuti, Aniva Bay; HUMZ nos. 179575, 183725—western part of Aniva Bay.

Conservation status: IUCN (Not Evaluated).

208. ? *Alectrias benjamini* Jordan et Snyder, 1902—Green-belly cockscomb. Northwestern Pacific // Rare. Littoral. Marine.

Note. It was first given in the work of Tanaka (1908) for Aniva Bay based on collections Prof. of Ijima in the south of Sakhalin in May–September 1906. Later, with reference to this author and others who cited him, it is indicated by a number of authors (Okada and Matsubara, 1938; Schmidt, 1950; Lindberg, 1959; Lindberg and Krasnyukova, 1975; Lavrov, 1990; Parin et al., 2014). Thus, there is probably no reliable information about the capture of *A. benjamini* in the waters of Aniva Bay in the years since Tanaka (1908). It was reliably observed for Sakhalin waters (ZIN RAN no. 34340) off the western coast (Lindberg and Krasnyukova, 1975; Balushkin et al., 2012). In the past (Schmidt, 1950; Lindberg, 1959; Lindberg and Krasnyukova, 1975), it was indicated as an *A. alectrolophus benjamini* subspecies. At present, the latter is recognized as an independent species (*Catalog of Fishes...*, 2017).

Conservation status: IUCN (Not Evaluated).

51. Family CRYPTACANTHODIDAE Gill, 1861—Wrymouths

122. Genus *CRYPTACANTHODES* Storer, 1839

209. *Cryptacanthodes bergi* (Lindberg, 1930)—Berg's wrymouth. Northwestern Pacific // Common. Littoral. Marine, brackish-water, river mouths.

Note. It was first indicated for Aniva Bay in the work of Lindberg (1959); the presence in the bay was later confirmed by collection materials (Lindberg and Krasnyukova, 1975).

Samples: ZIN RAN nos. 31831, 31832—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

52. Family PHOLIDAE Gill, 1893—Gunnels

123. Genus *PHOLIS* Scopoli, 1777

210. * *Pholis crassisipina* (Temminck et Schlegel, 1845)—Mottled gunnel. Northwestern Pacific // Not documented for Aniva Bay. Sublittoral. Marine, brackish-water.

Note. The closest occurrence to Aniva Bay is noted in the waters of Kunashir Island (Southern Kurils), Hokkaido Island, and the continental coast of the northern part of the Sea of Japan (Yatsu, 1980; Chereshevnev and Nazarkin, 2008; Amaoka et al., 2011; Shinohara et al., 2012).

Conservation status: IUCN (Not Evaluated).

211. *Pholis fasciata* (Bloch et Schneider, 1801)—Banded gunnel. Arctic, North Pacific and Northwestern Atlantic // Occurrence requires clarification. Sublittoral. Marine, brackish-water, river mouths and brackish lagoons of Sakhalin.

Note. It is known in Aniva Bay by one specimen from ZIN RAN (Lindberg and Krasnyukova, 1975; Balushkin et al., 2012).

Samples: ZIN RAN no. 41662—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

212. *Pholis nea* Peden et Hughes, 1984—Hokkaido gunnel. Northwestern Pacific // Occurrence requires clarification. Sublittoral. Marine, brackish-water, river mouths, Amur Liman, also observed in fresh water.

Note. This species is often erroneously identified as *P. ornata* (Girard, 1854) (Dyldin and Orlov, 2017b). The first assumptions about its possible presence in the waters of Aniva Bay are expressed in the work of Dyldin and Orlov (2017b); this was later confirmed by the collection materials of HUMZ, which allows for supplementing a list of ichthyofauna of Aniva Bay with this species.

Samples: HUMZ no. 187996—western part of Aniva Bay.

Conservation status: IUCN (Not Evaluated).

213. * *Pholis nebulosa* (Temminck et Schlegel, 1845)—Tidepool gunnel. Northwestern Pacific // There is no documentary information about its captures in Aniva Bay. Sublittoral. Marine, brackish-water, in the river mouths and brackish lakes of Hokkaido.

Note. It is indicated for the southern part of Sakhalin and the adjacent Okhotsk Sea waters of Hokkaido (Ueno, 1971; Lindberg and Krasnyukova, 1975; Sokolovsky et al., 2011). Findings are possible in Aniva Bay as well.

Conservation status: IUCN (Least Concern).

214. *Pholis picta* (Kner, 1868)—Painted gunnel. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water, Amur Liman, river mouths, brackish lagoons of Sakhalin.

Note. For Aniva Bay, it is given by Schmidt (1904) based on his own collections in 1901, the collections of V.K. Brazhnikov in 1899, etc.

Samples: ZIN RAN nos. 12405, 13098—Aniva Bay; no. 12408—Busse Bay, Aniva Bay; nos. 31607—31609—Rakuma Lagoon, Aniva Bay; HUMZ no. 179556—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

124. Genus ***RHODYMENICHTHYS*** Jordan et Evermann, 1896

215. *Rhodymenichthys dolichogaster* (Pallas, 1814)—Stippled gunnel. Northwestern Pacific and the Bering Sea // Common. Littoral. Marine, brackish-water, brackish lagoons, river estuaries.

Note. It was considered in the *Pholis* genus in the past (Schmidt, 1950; Lindberg, 1959; Ueno, 1971; Lindberg and Krasnyukova, 1975). It was later shown that the *Rhodymenichthys* genus is valid (Yatsu, 1981). It was not known in the past for Aniva Bay. Balushkin et al. (2012) mistakenly give three specimens for Aniva Bay from the collection of ZIN RAN—nos. 31661, 31662, 31722—which were obtained from the waters adjacent to the village of Antonovo (Rakuma) and the Rakuma Lagoon located in the Kholmsk district, the southwestern Sakhalin, the Sea of Japan. A specimen of HUMZ allows including this species in the list of ichthyofauna of the bay.

Samples: HUMZ no. 179555—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

53. Family **ANARHICHADIDAE** Bonaparte, 1835—Wolffishes

125. Genus ***ANARHICHAS*** Linnaeus, 1758

216. *Anarhichas orientalis* Pallas, 1814—Bering wolfish. North Pacific and the adjacent Arctic // Common. Sublittoral. Marine, brackish-water. No specialized fishing, caught as by-catch in coastal fishery.

Note. It was first given for Aniva Bay (Salmon Bay) in the work of Tanaka (1908) as *A. lepturus* Bean, 1879. It was later shown that *A. lepturus* is a synonym of *A. orientalis* (Parin et al., 2014).

Conservation status: IUCN (Not Evaluated).

54. Family **PTILICHTHYIDAE** Jordan et Gilbert, 1883—Quillfishes

126. Genus ***PTILICHTHYS*** Bean, 1881

217. *Ptilichthys goodei* Bean, 1881—Quillfish. North Pacific // Common. Elittoral. Marine. Not fished.

Note. The presence of this species in Aniva Bay is confirmed by a number of modern works (Faizulin and Shubin, 2011; Velikanov and Mukhametov, 2011).

Conservation status: IUCN (Not Evaluated).

55. Family **TRICHODONTIDAE** Bleeker, 1859—Sandfishes

127. Genus ***ARCTOSCOPIUS*** Jordan et Evermann, 1896

218. *Arctoscopus japonicus* (Steindachner, 1881)—Sailfin sandfish. North Pacific // Common, numerous. Elittoral. Marine, brackish-water, including the Amur estuary, river estuaries and brackish lakes of Hokkaido. Can be promising for fishing.

Note. It was first given for Aniva Bay in the work of Schmidt (1904) based on his own collections in 1901 and the collections of V.K. Brazhnikov in 1899

Samples: ZIN RAN no. 12440—Korsakov, Aniva Bay; no. 12995—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

56. Family **AMMODYTIDAE** Bonaparte, 1835—Sand lances

128. Genus ***AMMODYTES*** Linnaeus, 1758

219. * *Ammodytes heian* Orr, Wildes et Kai, 2015—Peaceful sand lance. Northwestern Pacific // Not documented for Aniva Bay. Sublittoral. Marine.

Note. In connection with the recent original description, the occurrence in Aniva Bay and the neighboring water areas requires clarification. The closest reliable occurrence to the bay was noted in the southern part of the Sea of Okhotsk (Orr et al., 2015).

Conservation status: IUCN (Not Evaluated).

220. *Ammodytes hexapterus* Pallas, 1814—Arctic sand lance. Arctic, Northwestern Pacific and Bering Sea // Common, numerous. Sublittoral. Marine, brackish-water. Commercial.

Conservation status: IUCN (Not Evaluated).

221. *Ammodytes japonicus* Duncker et Mohr, 1939—Western sand lance. Northwestern Pacific // Occurrence in Aniva Bay requires clarification. Sublittoral. Marine, brackish-water, brackish lakes of Hokkaido.

Note. This species has long been considered in synonymy with *A. hexapterus*, but the validity of *A. japonicus* has recently (Orr et al., 2015) been restored with distribution in the Sea of Japan and the southern part of the Sea of Okhotsk. It should also be noted that the range of *A. personatus* Girard, 1856, previously indicated for the Sea of Okhotsk and the Sea of Japan (Ueno, 1971), is currently limited to the northeastern Pacific and the southern Bering Sea (Orr et al., 2015).

Conservation status: IUCN (Not Evaluated).

57. Family **GOBIIDAE** Cuvier, 1816—Gobies

22. Subfamily **GOBIONELLINAE** Bleeker, 1874—Gobionellins

129. Genus **ACANTHOGOBIUS** Gill, 1859

222. ? *Acanthogobius lactipes* (Hilgendorf, 1879)—Whitelimbed goby. East Asia // Not documented (with preservation of samples) for Aniva Bay. Amphidromic.

Note. It is common in a limited area of Tunaicha Lake and its basin belonging to the southeastern coast of Sakhalin (Dyldin and Orlov, 2017b).

Conservation status: IUCN (Not Evaluated).

130. Genus **GYMNOGOBIUS** Gill, 1863

223. *Gymnogobius breunigii* (Steindachner, 1879)—Breuning's goby. East Asia // Common. Amphidromic.

Note. It was given in the past for the waters of Sakhalin under the name *Chaenogobius annularis* or *Ch. castaneus* (Dyldin and Orlov, 2017b). Samples of UWFC validly allow the inclusion of *G. breunigii* in the composition of the ichthyofauna of Sakhalin Island, including Aniva Bay.

Samples: UWFC nos. 46161, 46310, 46312—east of Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

224. *Gymnogobius castaneus* (O'Shaughnessy, 1875)—Castaneous goby. East Asia // Common. Amphidromic.

Note. Currently considered as a complex species (Dyldin and Orlov, 2017b).

Samples: ZIN RAN no. 23174—Busse Bay, Aniva Bay; UWFC nos. 46200, 46223—to the north of Kirillovo, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

225.? *Gymnogobius macronathos* (Bleeker, 1860)—Bigmouth goby. East Asia // Not documented for Aniva Bay. Brackish-water, including river estuaries.

Note. It was indicated in the past (Tanaka, 1908) for Aniva Bay, but it is probably replaced by other species in the waters of southern Sakhalin, including Aniva Bay, in the light of new data (Dyldin and Orlov, 2017b).

Conservation status: IUCN (Not Evaluated).

226. * *Gymnogobius mororanus* (Jordan et Snyder, 1901)—Mororan goby. East Asia // Not documented for Aniva Bay. Marine, brackish-water.

Note. The presence in the southwestern part of Sakhalin and Aniva Bay requires documentary evidence (Dyldin and Orlov, 2017b). Under this name, some authors (Nakabo, 2002, Sokolovsky et al., 2007, 2011) give it for the southern Sakhalin without documentary evidence.

Conservation status: IUCN (Not Evaluated).

227. *Gymnogobius opperiens* Stevenson, 2002—Waiting goby. East Asia // Occurrence requires clarification. Amphidromic.

Note. Samples of UWFC validly allow including this species in the ichthyofauna of Aniva Bay.

Samples: UWFC nos. 46201, 46205—to the north of Kirillovo, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

228. * *Gymnogobius petschiliensis* (Rendahl, 1924)—Chinese goby. East Asia // Not documented for Aniva Bay. Brackish-water, freshwater.

Note. It is noted in the southwestern part of Sakhalin Island to north of Nevelsk (Dyldin and Orlov, 2017b). The occurrence of this species in Aniva Bay is assumed in the work of Stevenson (2002).

Conservation status: IUCN (Not Evaluated).

229. *Gymnogobius urotaenia* (Hilgendorf, 1879)—Far Eastern goby. East Asia // Common. Amphidromic. Can serve as an object of amateur fishing.

Samples: ZIN RAN nos. 13106, 13133—? Chepisan and Tunaichi Lakes, near Aniva Bay, southern Sakhalin Island, River Arzakul', Aniva Bay; UWFC nos. 46219, 46221—east of Korsakov, Aniva Bay; no. 46162—channel between Bolshoe and Maloe

Chibisanskoe lakes, Aniva Bay basin; no. 46206—near the Mereya River mouth, east of Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

131. Genus *LUCIOGOBIUS* Gill, 1859

230. *Luciogobius guttatus* Gill, 1859—Spotted goby. Northwestern Pacific // Common. Amphidromic.

Note. It remains practically unstudied within Sakhalin Island. In the waters of Sakhalin, this species is represented by two forms, one of which, perhaps, is a new species for science (Dyldin and Orlov, 2017b).

Conservation status: IUCN (Not Evaluated).

132. Genus *TRIDENTIGER* Gill, 1859

231. *Tridentiger brevispinis* Katsuyama, Arai et Nakamura, 1972—Shortfin tripletooth goby. Northwestern Pacific // Common. Amphidromic. Can serve as an object of amateur fishing.

Note. It was first found in the waters of Sakhalin in the stomach of a kundscha *Salvelinus leucomaenis* in the Vavaiskie lakes (Klyuchareva, 1964) and is still poorly studied. Samples of UWFC allow including this species in the ichthyofauna of Aniva Bay.

Samples: UWFC nos. 46218, 46309, 46311—east of Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

23. Subfamily *GOBIINAE* Cuvier, 1816—Gobies

133. Genus *RHINOGOBIUS* Gill, 1859

232.? * *Rhinogobius brunneus* (Temminck et Schlegel, 1845)—Brown goby. East Asia. // Presence in the waters of Sakhalin requires clarification. Freshwater, brackish-water.

Note. The boundaries of the range require clarification, which is probably limited to the southern waters, and, therefore, it is included in the ichthyofauna of Russia (Dyldin and Orlov, 2017b). It is currently considered as a complex view (Dyldin and Orlov, 2017b).

Conservation status: IUCN (Data Deficient).

58. Family *TRICHIURIDAE* Rafinesque, 1810—Cutlassfishes

24. Subfamily *TRICHIURINAE* Rafinesque, 1810—Cutlassfishes

134. Genus *TRICHIURUS* Linnaeus, 1758

233. * ? *Trichiurus japonicus* Temminck et Schlegel, 1844—Japanese cutlassfish. Northwestern Pacific // Not

documented for Aniva Bay. Bottom-pelagic (shelf and continental slope). Marine, brackish-water.

Note. The closest occurrence to the waters of Aniva Bay is noted in the southern part of the Sea of

Okhotsk off Hokkaido and in the northern Primorye (Solomatov, 2004; Amaoka et al., 2011, Uchida, 2017); thus, it quite possibly can be observed in Aniva Bay as well with the warming of the waters in summer. Some authors (Lindberg and Krasnyukova, 1975; Parin, 2003; Sokolovsky et al, 2007, 2011) give *T. japonicus* in synonymy with *T. lepturus* Linnaeus, 1758 (largehead hairtail), while others (Nakabo, 2002; Shinohara et al., 2009, 2011, Parin et al., 2014) consider it as an independent species.

Conservation status: IUCN (Not Evaluated).

59. Family *SCOMBRIDAE* Rafinesque, 1815—Mackerels or tunas

25. Subfamily *SCOMBRINAE* Rafinesque, 1815—Scombrins

135. Genus *AUXIS* Cuvier, 1829

234. ? *Auxis thazard* (La Cepède, 1800)—Frigate tuna. Circumglobally in all warm waters, with the exception of the eastern part of the Pacific Ocean, where it is replaced by another close species: *A. brachydorax* Collette et Aadland, 1996 // Not documented for waters of Aniva Bay. Marine.

Note. It is indicated by Isii (1940) for the waters of southern Sakhalin, where it appears in the warm season, as *A. tapeinosoma* Bleeker, 1854, which is currently (*Catalog of Fishes...*, 2017) considered in synonymy with *A. thazard*. In addition, it was observed in the southern part of the Sea of Okhotsk off Hokkaido and in the Sea of Japan, including the coast of Primorye (Parin, 2003, as *A. rochei*; Amaoka et al., 2011; Zemnukhov and Epur, 2011; Shinohara et al., 2012, as *A. rochei*). Therefore, the findings in Aniva Bay are possible. In the past, only *A. rochei* (Risso, 1810) (Collette and Aadland, 1996; Parin, 2003) was observed in the Sea of Japan, which is explained by the synonymics of *A. rochei*, which included *A. hira* Kishinouye, 1915, and *A. maru* Kishinouye, 1915. We support the view (Lindberg and Krasnyukova, 1975), according to which *A. hira* and *A. maru* are the junior synonyms of *A. thazard*; therefore, *A. rochei* is excluded from the composition of the ichthyofauna, at least, of the Russian Far East waters. Nevertheless, two clearly distinct forms are listed in the work of Amaoka et al. (2011. P. 375) in the photographs under the names *A. rochei* and *A. thazard*, in which regard further revision of representatives of the considered genus in the Northwestern Pacific is required.

Conservation status: IUCN (Least Concern).

136. Genus *SCOMBER* Linnaeus, 1758

235. *Scomber japonicus* Houttuyn, 1782—Chub mackerel. Indo-Pacific // Common. Neritic. Marine, brackish-water, brackish lakes of Okhotsk Sea side of Hokkaido. Object of commercial fishing in years of high numbers.

Note. Apparently, it was first mentioned for Aniva Bay in the work of Tanaka (1908, as *S. colias* Gmelin, 1789). In the present period of high numbers, it can form elevated concentrations in Aniva Bay in the warm time (Velikanov, 2006). For example, in 2000 in Aniva Bay, mackerel was observed in trawl catches, where it had not been seen for a long time (Velikanov and Stominok, 2004).

Conservation status: IUCN (Least Concern).

137. Genus *THUNNUS* South, 1845

236. *Thunnus orientalis* (Temminck et Schlegel, 1844)—Pacific bluefin tuna. North Pacific // Rare, appears in Aniva Bay in separate warm years, where it can penetrate both from the Sea of Japan through the La Perouse Strait and from the Pacific Ocean through the straits of the Kuril Islands. Epipelagic. Marine. Obtained as by-catch. Small fishery in adjoining waters of the South Kurils (Sakhalin.info, 2017).

Note. In Aniva Bay, captures of this species have been recorded in seagoing seines off the coast (Sokolovsky et al., 2011), in fishing traps off the Novikovo coast in Aniva Bay (Sakhalin and the Kuriles, 2014), and in the southern part of the Sea of Okhotsk off the village of Vzmorie, southeastern Sakhalin (Sakhalin and the Kuriles, 2016). For the southern part of the Sea of Okhotsk, it is also given in other publications (Lindberg and Krasnyukova, 1975; Borets, 2000; Fadeev, 2005; Sokolovskii et al., 2007; Parin et al., 2014). Some authors (Lindberg and Krasnyukova, 1975; Sheiko and Fedorov, 2000; Parin, 2003; Amaoka et al., 2011) consider *Th. orientalis* as a *Th. thynnus orientalis* subspecies or in synonymy with *Th. thynnus* (Linnaeus, 1758), while others (Sokolovskii et al., 2007; Tanaka et al., 2007; Collette et al., 2014) consider it as a valid species.

Conservation status: IUCN (Vulnerable).

60. Family *XIPHIIDAE* Rafinesque, 1815—Swordfishes138. Genus *XIPHIAS* Linnaeus, 1758

237. * *Xiphias gladius* Linnaeus, 1758—Swordfish. Circumglobally in tropical seas to temperate waters // Not documented for Aniva Bay. Epipelagic. Marine.

Note. This species is known by individual specimens from the southern part of the Sea of Okhotsk (Parin, 2003; Sokolovsky et al., 2007, 2011; Ivanov and Sukhanov, 2010; Parin et al., 2014), which does not exclude its findings in Aniva Bay.

Conservation status: IUCN (Least Concern).

61. Family *CENTROLOPHIDAE* Bonaparte, 1846—Medusafishes139. Genus *HYPEROGLYPHE* Günther, 1859

238. * *Hyperoglyphe japonica* (Döderlein, 1884)—Japanese medusafish. Northwestern Pacific // Not documented for Aniva Bay. Mesopelagic. Marine. In adjoining waters of South Kurils used as by-catch. It is recommended to develop its fishery in waters of Southern Kurils, where approximately 700 t comes for the summer feeding in recent years (private message of A.Ch. Kim, SakhNIRO).

Note. Only young individuals can be observed in Aniva Bay, since adults live at depths of more than 100 m. In the waters of southern Sakhalin, it is observed along both the western and eastern coasts (Velikanov, 2004, 2006).

Conservation status: IUCN (Not Evaluated).

62. Family *STROMATEIDAE* Rafinesque, 1810—Butterfishes140. Genus *PAMPUS* Bonaparte, 1834

239. * *Pampus echinogaster* (Basilewsky, 1855)—Korean pomfret. Northwestern Pacific // Not reliably observed in Aniva Bay. Nerito-pelagic. Marine.

Note. Registered in the waters of the northwestern and eastern parts of Sakhalin, including Terpeniya Bay (Dolganov et al., 2007; Poltev and Zakharov, 2012), as well as off Hokkaido (Amaoka et al., 2011), which does not exclude its findings in Aniva Bay.

Conservation status: IUCN (Not Evaluated).

240. *Pampus punctatissimus* (Temminck et Schlegel, 1884)—Speckled pomfret. Northwestern Pacific // Rare. Nerito-pelagic. Marine.

Note. We discovered it in the Kholmsk Museum for the first time in 2017. It was previously known for the Sakhalin waters only by the finding at the northwest coast (Ivanov and Ivanova, 2001, as *P. argenteus*). In the opinion of several authors (Lindberg and Krasnyukova, 1975; Parin, 2003), *P. punctatissimus* should be considered in synonymy with *P. argenteus* (Euphrasen, 1788) but it is now recognized as an independent species (Nakabo, 2002; Dolganov et al., 2007; Sokolovskii et al., 2007, 2011; Liu and Li, 2013).

Samples: KhMSF no. KP-234. P-161—Aniva Bay (species identification by S.S. Makeev).

Conservation status: IUCN (Not Evaluated).

21. ORDER **PLEURONECTIFORMES** Bleeker,
1859—Flatfishes

63. Family **PARALICHTHYIDAE** Regan,
1910—Sand flounders

141. Genus **PARALICHTHYS** Girard, 1858

241. *Paralichthys olivaceus* (Temminck et Schlegel, 1846)—Bastard halibut. Northwestern Pacific // Rare. Bottom, elittoral. Marine, brackish-water, noted for river system of southern Hokkaido as well as brackish lakes of Okhotsk Sea side of Hokkaido.

Note. It was first given for the waters of Aniva Bay in the work of Druzhinin (1954).

Conservation status: IUCN (Not Evaluated).

64. Family **PLEURONECTIDAE** Rafinesque,
1815—Righteye flounders or soles

26. Subfamily **PLEURONECTINAE** Rafinesque,
1815—Pleuronectins

142. Genus **ACANTHOPSETTA** Schmidt, 1904

242. *Acanthopsetta nadeshnyi* Schmidt, 1904—Scale-eye plaice. Northwestern Pacific and Bering Sea // Common. Elittoral. Marine, brackish-water, mouths of river of western coast of Sakhalin and Amur Liman. Obtained as by-catch.

Note. Description of this species includes samples (syntypes) from Aniva Bay.

Samples: ZIN RAN nos. 12346 (syntypes), 47029, 47032, 47033—Aniva Bay; USNM no. 77123—off Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

143. Genus **ATHERESTHES** Jordan et Gilbert, 1880

243. *Atheresthes evermanni* Jordan et Starks, 1904—Kamchatka flounder or Evermann's flounder. North Pacific // Occurrence requires clarification. In southern part of Sea of Okhotsk, including Aniva Bay, only juveniles are noted to the depths of 100 m (Russ et al, 1955). Mesobental. Marine. Has no commercial importance in Aniva Bay.

Conservation status: IUCN (Not Evaluated).

144. Genus **CLEISTHENES** Jordan et Starks, 1904

244. *Cleisthenes herzensteini* (Schmidt, 1904)—Herzenstein's flounder. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water. Obtained as by-catch.

Note. It was first given for the waters of Aniva Bay in the work of Tanaka (1908).

Samples: ZIN RAN no. 45589—Aniva Bay; no. 31704—Rakuma Lagoon, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

245. * *Cleisthenes pinetorum* Jordan et Starks, 1904—Pointhead flounder. Northwestern Pacific // Not documented for Aniva Bay. Elittoral. Marine.

Note. It is observed in the southern part of Sakhalin (Tominaga et al., 2000) and in the waters of the adjoining southern part of the Sea of Okhotsk off Hokkaido (Tohkairin et al., 2015). Taking into account the depth of dwelling from 50 m (Froese and Pauly, 2017) and the samples obtained in the adjacent southern part of the Sea of Okhotsk from Hokkaido (FAKU nos. 200684, 200685, 200721, 200722, 200803, 200825, as *Hippoglossoides pinetorum*) (Tohkairin et al. 2015), findings in Aniva Bay are quite possible.

Conservation status: IUCN (Not Evaluated).

145. Genus **GLYPTOCEPHALUS** Gottsche, 1835

246. *Glyptocephalus stelleri* (Schmidt, 1904)—Blackfin flounder. Northwestern Pacific // Common, numerous. Elittoral. Marine brackish-water, mouth of Amur and rivers of western Sakhalin. Commercial.

Note. The original description of this species includes a sample (syntype) from Aniva Bay.

Samples: ZIN RAN nos. 13070 (syntype), 47012, 47016—Aniva Bay; USNM no. 77021—off Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

146. Genus **HIPPOGLOSSOIDES** Gottsche, 1835

247. *Hippoglossoides dubius* Schmidt, 1904—Flathead flounder. Northwestern Pacific // Common. Elittoral. Marine. Object of fishery, also obtained as by-catch.

Note. Original description of this species includes a sample (syntype) from Aniva Bay (ZIN RAN no. 12367), which was later redefined as *H. elassodon* Jordan et Gilbert, 1880 (Voronina and Volkova, 2003).

Samples: ZIN RAN no. 48221—Aniva Bay; no. 45179—Busse Bay, Aniva Bay; USNM nos. 77032, 77033—off Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

248. *Hippoglossoides elassodon* Jordan et Gilbert, 1880—Flathead sole. North Pacific and adjacent Arctic // Common. Elittoral. Marine, perhaps, brackish-water. Object of fishery, also obtained as by-catch.

Samples: ZIN RAN nos. 12348, 12367—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

249. *Hippoglossoides robustus* Gill et Townsend, 1897—Bering flounder. North Pacific and Arctic // Common. Elittoral. Marine. Obtained as by-catch.

Note. *H. propinquus* Hubbs, 1915, described from Aniva Bay (Hubbs, 1915), like other taxa listed in the Samples section, is currently being considered (*Catalog of Fishes...*, 2017) in synonymy with *H. robustus*.

Samples: ZIN RAN nos. 48211, 48212, 48213, 48216, 48217, 48230, 48232, 48273, 48285—Aniva Bay; USNM no. 77064 (as *H. hamiltoni*)—off Korsakov, Aniva Bay; no. 75667 (holotype of *H. propinquus*)—off Korsakov, Aniva Bay; CAS-SU no. 68688 (as *H. propinquus*)—off Korsakov, Aniva Bay; nos. 13833, 22562 (as *H. hamiltoni*)—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

147. Genus **HIPPOGLOSSUS** Cuvier, 1816

250. *Hippoglossus stenolepis* Schmidt, 1904—Pacific halibut. North Pacific and the adjacent Arctic // Common. Elittoral. Marine. Obtained as by-catch.

Note. This species is described by the sample from Aniva Bay. In the past, some authors (Schmidt, 1950; Andriyashev, 1954; Rass et al., 1955; Lindberg, 1959; Lindberg and Fedorov, 1993) considered the Far Eastern halibut as a subspecies of the Atlantic halibut *H. hippoglossus* (Linnaeus, 1758)—*H. h. stenolepis*.

Samples: ZIN RAN nos. 12588 (holotype), 14499—off Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

148. Genus **KAREIUS** Jordan et Snyder, 1900

251. *Kareius bicoloratus* (Basilewsky, 1855)—Stone flounder. Northwestern Pacific // Common. Elittoral. Marine, brackish-water, river mouths, brackish lakes. Obtained as by-catch.

Conservation status: IUCN (Not Evaluated).

149. Genus **LEPIDOPSETTA** Gill, 1862

252. *Lepidopsetta mochigarei* Snyder, 1911—Dusky sole. Northwestern Pacific // Common. Elittoral. Marine, brackish-water. Obtained mainly as by-catch, specialized fishery in certain years.

Samples: USNM nos. 77127, 77128—off Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

253. * *Lepidopsetta polyxystra* Orr et Matarese, 2000—Northern rock sole. North Pacific // Not documented for Aniva Bay. Elittoral. Marine.

Note. It is assumed (Orr and Matarese, 2000) that this species can be observed off the eastern coast of

Sakhalin. In addition, it is registered in the Okhotsk Sea waters of Hokkaido and along the Kuril Islands (Orr and Matarese, 2000; Biryukov, 2008; Poltev et al., 2008), which does not exclude findings in Aniva Bay.

Conservation status: IUCN (Not Evaluated).

150. Genus **LIMANDA** Gottsche, 1835

254. *Limanda aspera* (Pallas, 1814)—Yellowfin sole. North Pacific and the adjacent Arctic // Common. Elittoral. Marine, brackish-water, including estuaries of some rivers (for example, Lyutoga) and brackish lakes of Hokkaido. Commercial.

Note. The *L. asprella* Hubbs, 1915, species is described from Aniva Bay by specimens purchased in the Korsakov market, later reduced to synonymy with *L. aspera* (*Catalog of Fishes...*, 2017).

Samples: ZIN RAN no. 12357—Lyutoga River mouth, Aniva Bay; nos. 13058, 41268, 46888, 46891, 47000, 47003, 47058—Aniva Bay; no. 31659—Rakuma Lagoon, Aniva Bay; USNM no. 75668 (holotype of *L. asprella*)—Korsakov market, Sakhalin Island.

Conservation status: IUCN (Not Evaluated).

255. *Limanda proboscidea* Gilbert, 1896—Long-head dab. North Pacific and the adjacent Arctic // Occurrence requires clarification but probably rare. Elittoral. Marine, brackish-water, river mouths and brackish lakes and lagoons.

Note. According to some data (Lindberg and Fedorov, 1993; Parin et al., 2014), the range of this species is limited to more northern waters; the southernmost area of its habitat is the water area of the northern part of the Sea of Okhotsk. However, the collection specimen of CAS-SU, caught from Aniva Bay, extends the range of *L. proboscidea* up to the southern part of the Sea of Okhotsk.

Samples: ZIN RAN no. 12353—Lyutoga River mouth (Schmidt (1904) identified this specimen as *L. proboscidea*; Lindberg and Fedorov (1993) later specified it as *L. punctatissima*); CAS-SU no. 13835—Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

256. *Limanda punctatissima* (Steindachner, 1879)—Sand flounder. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water, freshwater. Noted in lower reaches of some rivers, for example, Lyutoga River, as well as in brackish lakes of Hokkaido. Obtained as by-catch.

Samples: ZIN RAN nos. 45638, 45641—Aniva Bay; nos. 31654–31658—Rakuma Lagoon, Aniva Bay; no. 51822—Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

257. *Limanda sakhalinensis* Hubbs, 1915—Sakhalin sole. Northwestern Pacific and adjacent Arctic // Common, numerous. Elittoral. Marine, brackish-water. Object of local fishing, also fished as by-catch.

Note. This species and *L. korigarei* are described by Hubbs (1915) according to the samples delivered from Aniva Bay by the Albatross expedition in 1906. The latter is now considered (*Catalog of Fishes...*, 2017) in synonymy with *L. sakhalinensis*.

Samples: ZIN RAN nos. 47002, 47021—Aniva Bay; USNM no. 75669 (holotype of *L. korigarei*)—off Korsakov, Aniva Bay; no. 76674 (holotype of *L. sakhalinensis*)—Korsakov, Aniva Bay; HUMZ nos. 103301, 103302, 103348—Aniva Bay; CAS-SU no. 23842—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

151. Genus *LIOPSETTA* Gill, 1864

258. *Liopsetta pinnifasciata* (Kner, 1870)—Far Eastern smooth flounder. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water, freshwater (enters lower reaches of rivers, for example, Lyutoga River, as well as Amur Liman, brackish lakes of Hokkaido). Object of by-catch and local fishery.

Samples: ZIN RAN no. 13074—Lyutoga River mouth, Aniva Bay; no. 12373a—Aniva Bay, near the village of Korsakov; no. 12373b—near the Shishkevich River, Busse Bay, Aniva Bay; nos. 31674, 43742, 45201, 45647, 45648—Aniva Bay, no. 43741—Busse Bay, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

152. Genus *MICROSTOMUS* Gottsche, 1835

259. *Microstomus achne* (Jordan et Starks, 1904)—Slime flounder. Northwestern Pacific // Abundance requires clarification. Elittoral. Marine. Object of by-catch.

Conservation status: IUCN (Not Evaluated).

153. Genus *PLATICHTHYS* Girard, 1854

260. *Platichthys stellatus* (Pallas, 1787)—Starry flounder. North Pacific and Arctic // Common. Sublittoral. Marine brackish, freshwater, brackish lakes of Hokkaido, enters lower reaches of rivers. By-catch and local fishery target.

Samples: ZIN RAN no. 12376b—Lyutoga River mouth, Aniva Bay (indicated in the work of Schmidt (1904), possibly lost); USNM no. 77173—Korsakov, Aniva Bay.

Conservation status: IUCN (Least Concern).

154. Genus *PLEURONECTES* Linnaeus, 1758

261. *Pleuronectes quadrituberculatus* Pallas, 1814—Alaska plaice. North Pacific and adjacent Arctic // Common. Elittoral. Marine, brackish-water, mouth of rivers, brackish lakes of Hokkaido.

Samples: ZIN RAN no. 13068—Lyutoga River mouth, Aniva Bay (indicated in the work of Schmidt (1904), possibly lost); no. 45570—Aniva Bay.

Conservation status: IUCN (Least Concern).

155. Genus *PSEUDOPLEURONECTES* Bleeker, 1862

262. *Pseudopleuronectes herzensteini* (Jordan et Snyder, 1901)—Littlemouth flounder. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water, brackish lakes of Hokkaido and Sakhalin. Commercial.

Conservation status: IUCN (Not Evaluated).

263. *Pseudopleuronectes obscurus* (Herzenstein, 1890)—Northern black flounder. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water, river mouths, brackish lakes. Object of local fishing and by-catch.

Samples: ZIN RAN nos. 31670, 31671–31673, 47071, 47085, 48083—Aniva Bay; USNM no. 77140—Korsakov, Aniva Bay; CAS-SU no. 22557—Korsakov, Aniva Bay.

Conservation status: IUCN (Not Evaluated).

264. ? *Pseudopleuronectes schrenki* (Schmidt, 1904)—Cresthead flounder or Schrenk's flounder. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water, Amur Liman and brackish lakes of Hokkaido. Commercial.

Note. Original description includes samples (syn-types) from Aniva Bay. The taxonomic status of this species remains controversial since it probably represents only the form of *P. yokohamae* (Günther, 1877; Dyldin and Orlov, 2017b).

Samples: ZIN RAN no. 12377a (syntypes)—Korsakov, Aniva Bay; nos. 47071, 47080, 47085, 48083—Aniva Bay; HUMZ no. 179551—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

156. Genus *REINHARDTIUS* Gill, 1861

265. *Reinhardtius matsuurae* Jordan et Snyder, 1901—Matsuura's or Pacific flounder, Pacific black halibut. North Pacific // Common. Mesobenthal. Marine. Commercial.

Note. Some authors (Rass et al., 1955; Lindberg and Fedorov, 1993; Sheiko and Fedorov, 2000) isolate two subspecies: nominative *R. hippoglossoides hippoglossoides* (Walbaum, 1792) from the North Atlantic and the adjacent Arctic and *R. h. matsuurae* Jordan et Snyder, 1901, from the North Pacific. Others (Mecklenburg et al., 2002; Evseenko, 2004) consider *R. matsuurae* as a junior synonym of *R. hippoglossoides* and do not isolate subspecies. At the present time, according to the molecular genetic analysis (Orlova et al., 2017), a high level of divergence has been established between the Atlantic and Pacific groupings, which, together with the results of the study of morphology (Vernidub and Panin, 1937; Hubbs and Willimovsky, 1964; Lindberg and Fedorov, 1993), early ontogenesis (Tsukamoto et al., 1995), and protein markers (Fairbairn, 1981) allow us to increase the taxonomic status of Pacific flounder to an independent species, the earliest suitable name for which, according to ICZN (2017), is *R. matsuurae*, described by Jordan and Snyder (1901) from Sagami Bay (the Pacific waters of central Japan).

Samples: ZIN RAN no. 47053 (as *R. hippoglossoides matsuurae*)—Aniva Bay

Conservation status: IUCN (Not Evaluated).

157. Genus *VERASPER* Jordan et Gilbert, 1898

266. *Verasper moseri* Jordan et Gilbert, 1898—Barfin flounder. Northwestern Pacific // Common. Sublittoral. Marine, brackish-water, river mouths, brackish lagoons and lakes. Object of by-catch.

Conservation status: IUCN (Not Evaluated).

22. ORDER TETRAODONTIFORMES Berg, 1937—Plectognaths

65. Family MONACANTHIDAE Nardo, 1843—Filefishes

158. Genus *STEPHANOLEPIS* Gill, 1861

267. * *Stephanolepis cirrhifer* (Temminck et Schlegel, 1850)—Thread-sail filefish. Western Pacific // Not documented for Aniva Bay. Neritic. Marine.

Note. This species is known from the southern part of the Sea of Okhotsk (Ivanov and Sukhanov, 2010) and in Hokkaido (Amaoka et al., 2011). In addition, Isii (1940) noted it in summer for the southwestern part of Sakhalin Island, which does not exclude its findings in Aniva Bay as well.

Conservation status: IUCN (Not Evaluated).

159. Genus *THAMNACONUS* Smith, 1949

268. *Thamnaconus modestus* (Günther, 1877)—Modest filefish. Northwestern Pacific // Rare.

Observed in Aniva Bay in 2005 and 2011 (our data). Neritic-pelagic. Marine, brackish-water, including river estuaries and brackish lakes of Hokkaido.

Note. It was first given for Aniva Bay in the work of Dyldin and Orlov (2017b).

Conservation status: IUCN (Not Evaluated).

66. Family TETRAODONTIDAE Bonaparte, 1831—Puffers

160. Genus *TAKIFUGU* Abe, 1949

269. *Takifugu flavipterus* Matsuura, 2017—Fine patterned puffer. Northwestern Pacific // Rare. Neritic. Marine, brackish-water.

Note. A recently described species; comments on its taxonomic status were published earlier (Dyldin et al., 2017, Matsuura, 2017).

Samples: ZIN RAN nos. 31566, 31567 (as *T. niphobles* (Jordan et Snyder, 1901))—Aniva Bay.

Conservation status: IUCN (Not Evaluated).

270. *Takifugu porphyreus* (Temminck et Schlegel, 1850)—Purple puffer. Northwestern Pacific // Common in Aniva Bay with warming up of waters (our data). Neritic. Marine, brackish-water.

Conservation status: IUCN (Least Concern).

271. *Takifugu rubripes* (Temminck et Schlegel, 1850)—Japanese puffer. Northwestern Pacific // Rare. Neritic. Marine brackish-water, enters rivers.

Samples: SRM no. KP 9095-1—Lytoga River estuary, Aniva Bay.

Conservation status: IUCN (Near Threatened).

272. * *Takifugu stictonotus* (Temminck et Schlegel, 1850)—Spottyback puffer. Northwestern Pacific // Not reliably marked for Aniva Bay. Neritic. Marine, brackish-water.

Note. It is indicated as an extremely rare species for the southern part of Sakhalin (the coast of Kholmsk) (Isii, 1940), and is also given for Hokkaido (Amaoka et al., 2011), which does not exclude its findings in Aniva Bay as well.

Conservation status: IUCN (Least Concern).

273. *Takifugu xanthopterus* (Temminck et Schlegel, 1850)—Yellowfin puffer. Northwestern Pacific // Rare. Neritic. Marine, brackish-water, including river mouths.

Note. It was first noted for Sakhalin in August 2015 near the Lytoga River mouth, Aniva Bay (Dyldin et al., 2016).

Samples: SRM no. KP 9095-2—near the Lytoga River mouth, Aniva Bay.

Conservation status: IUCN (Least Concern).

67. Family **MOLIDAE** Bonaparte, 1835—Molas or sunfishes

161. Genus **MOLA** Koelreuter, 1766

274. * *Mola mola* (Linnaeus, 1758)—Ocean sunfish. In all warm and temperate seas // Not reliably marked for Aniva Bay. Marine.

Note. According to unconfirmed reports, in summer, specimens of this species were caught by fishermen in Aniva Bay in 1991, and also in 2010 (Velikanov, 2011). This is quite likely since ocean sunfish is often noted in the Okhotsk Sea waters of Hokkaido and the South Kurils (Lindberg et al. 1997; Uchida, 2017; our data). In 2017, a neotype from the Adriatic Sea was designated for this species (Sawai et al., 2018). In addition, a new species, *M. tecta* Nyegaard, Sawai, Gemmell, Gillum, Loneragan, Yamanoue et Stewart, 2017 (Nyegaard et al., 2017), was described in this genus, and *M. ramsayi* (Giglioli, 1883), previously designated as valid, was synonymized with a restored *M. alexandri* (Ranzani, 1839) species (Sawai et al., 2018).

Conservation status: IUCN (Vulnerable).

GENERAL CHARACTERISTICS OF THE ICHTHYOFAUNA OF ANIVA BAY

Aniva Bay is a place of permanent or temporary dwelling of a large number of fish species. Peculiarities of the geographical position and oceanological conditions have a significant effect on the formation of the marine ichthyofauna of the bay, which is characterized by a rich species diversity compared with the northern areas of the Sakhalin shelf zone, as evidenced by the published data (Lindberg, 1959; Safronov and Khudya, 1981; Borets, 1997, 2002).

As in other marine areas of Sakhalin, the fish population of Aniva Bay is mainly formed by the northern boreal (Pacific herring *Clupea pallasii*, pollock *Theragra chalcogramma*, yellowfin sole *Limanda aspera*, etc.), southern boreal (cherry salmon *Oncorhynchus masou*, Okhotsk atka mackerel *Pleurogrammus azonus*), and periodically migrating species of subtropical and tropical complexes (Far Eastern sardine *Sardinops melanostictus*, Japanese anchovy *Engraulis japonicus*, Japanese puffer *Takifugu rubripes*, common dolphinfish *Coryphaena hippurus*, etc.). Due to the geographic and oceanographic features of the area under consideration, the vast majority of species are representatives of the northern boreal group. In connection with this, reproduction, development of early stages, feeding, and—in many fishes—wintering at different stages of ontogeny occur precisely in the waters of the bay. However, based on the number of different species, the southern boreal species (for example, cherry salmon, Okhotsk atka mackerel) and even sub-

tropical migrants (Far Eastern sardine, Japanese anchovy) can play a significant role in fish communities, at least in certain seasons.

As shown by the presented materials, a significant part of the fish species from the general list is characterized by a low or even rare occurrence due to their small number. It should be emphasized that there is such a rare but valuable anadromous species as Sakhalin taimen *Parahucho perryi* among this large group of species in Aniva Bay.

There are no more than 20 species (pollock, Far East capelin *Mallotus villosus*, herring, pink salmon *Oncorhynchus gorbusha*, etc.) that can be attributed to the category of numerous, and 126 (Asian fowl-fox *Osmerus dentex*, Okhotsk atka mackerel, Far Eastern navaga *Eleginus gracilis*, yellowfin sole, etc.) to common ones. Despite this, the commercial part of the fish population of the research area is represented by a fairly wide species spectrum, 39 species (pink salmon, chum, delta smelt, capelin, and once, herring, yellowfin sole, etc.), which constitute 14% of the total list of species. In general, the ichthyofauna of Aniva Bay is formed by fish of various ecological (anadromous, bottom, demersal, pelagic) and zoogeographical groups (northern and southern boreal, subtropical) as well as species that perform both minor and long horizontal migrations (transboundary species: Far Eastern sardine, Japanese anchovy, Japanese amberjack *Seriola aureovittata*, etc.). Perhaps one of the most important characteristics of the ichthyofauna of the studied area is the constant temporal variability of its species composition, including seasonal, interannual, and long-term aspects, which is due to seasonal migrations of fish, the features of displacements and distribution of various species in the interannual plan, the dynamics of the number of fluctuating subtropical species (sardine, anchovy, Japanese mackerel) as well as interannual and long-term variability of oceanological conditions. All of the above applies to the commercial fish of this bay. It can be said that the fauna of fishes in Aniva Bay is constantly in the process of active changes due to the periodic variability of the composition and structure of fish communities. The most important dynamic factors probably affecting this complex biological process are the oceanological regime and the dynamics of the number and migration of fish.

CHARACTERISTICS OF COMMERCIAL FISHING OF ANIVA BAY FISHES

On the scale of Sakhalin, Aniva Bay and the adjacent waters of the La Perouse Strait are an area of intense coastal fishing. Commercial fishing here has a long history and began to develop in the late 19th—early 20th centuries with the development of raw resources of herring and salmon (Schmidt, 1905). Pacific salmon (mainly pink salmon) formed the basis of the resource base in the bay until recently. In the

1920s–1930s, a great amount of herrings was fished here, while a lot of flounders (Pleuronectidae) and pigfishes (Cottidae) were caught in the 1950s–1970s. In the 1970s, expeditionary fishing of Arctic sand lance *Ammodytes hexapterus* was carried out, while that of Far Eastern sardine was carried out in some years of the next decade (Probatov, 1951; Rumyantsev, 1958; Fadeev, 1971; Velikanov, 1979; Khudya, 1994; Zhigalin and Belyaev, 1999; Kaev et al. 2004). Since the early 1990s, the fishing of the coastal complex (navaga, smelts of the Osmeridae family, redfins of the *Tribolodon* genus, kundscha *Salvelinus leucomaenis*), and also capelin in recent years (Velikanov et al., 2003; Velikanov and Stominok, 2004) has become more active.

The commercial part of the ichthyofauna of Aniva Bay compared with the general list is represented by a small number of species (39), which is 14% of the total list. However, we did not include potentially commercial fish, such as *Lamna ditropis*, *Squalus suckleyi*, *Sebastes minor*, *Percis japonica*, *Arctoscopus japonicus*, which are caught in fishing gear as by-catch. In general, the commercial ichthyofauna of the bay is represented by all the main groups: anadromous, bottom, and pelagic fish, including subtropical migrants. According to commercial statistics and sample surveys, the most numerous in different periods of years are pelagic species, which are characterized by significant fluctuations in abundance. Previously, it was shown that the composition and quantity of fish dominant in biomass in the west and east coasts of Sakhalin periodically varied significantly in the 20th century. This is a characteristic feature of the production and functioning of marine ecosystems in Sakhalin (Velikanov, 2002). This characteristic is fully applicable to the commercial ichthyofauna of Aniva Bay (Velikanov and Stominok, 2004).

It should be borne in mind that Aniva Bay has an important function of the growing reservoir for fish juveniles of various ecological groups. Among them are anadromous fishes, breeding in rivers (Pacific salmon, Asiatic smelt, etc.); marine fishes, spawning in the coastal zone (Pacific herring, capelin, Far Eastern navaga, Schrenk's flounder *Pseudopleuronectes schrenki*) and breeding in the open waters of the bay (Alaska pollock, yellowfin sole, Arctic sand lance), etc. Juvenile fish also reproduce here, not in the Gulf of Aniva, but in other areas adjacent to it (Okhotsk atka mackerel, Japanese anchovy). In certain years and seasons, the accumulation of juveniles of certain fish species in the water area of the bay is very numerous (Velikanov and Stominok, 2004; Velikanov and Mukhametov, 2011).

At the same time, the anthropogenic impact on the state of Aniva Bay is not limited only to the fishing industry. In connection with the development of projects to develop offshore oil and gas fields on the north-eastern Sakhalin shelf, production of liquefied natural

gas (LNG), as well as transportation of this product by special tankers to consumer countries (Japan, etc.), has been carried out for approximately 10 years at a plant built on the Aniva Bay shore near the village of Prigorodnoe. Periodically ongoing hydrodevelopment works on the projects of this production and the direct operation of the LNG plant undoubtedly have a certain negative impact on the state of water and soil in the bay and indirectly on the reproduction and feeding of the various fish species inhabiting this water body and, thereafter, on the formation of its ichthyofauna as a whole.

CONCLUDING TAXONOMIC ESSAY

According to our data, including the information on fish specimens caught in Aniva Bay for more than 100 years and kept in various scientific institutions of the world, the most comprehensive revision list of the ichthyofauna of this region has been compiled. It should be noted that only scientific names (130 species and subspecies) were presented in the previous list of the ichthyofauna of Aniva Bay, dated 1959 (Lindberg, 1959). Most of them, due to changes in the nomenclature and taxonomy of fish have undergone a number of changes. For example, in the aforementioned list, Pacific lamprey appears under the name *Lampetra japonica* (Martens, 1868), while it is now reduced to synonymy with *Lethenteron camtschaticum* (Tilesius, 1811); Far Eastern spiny dogfish is referred to as *Squalus acanthias acanthias* L., 1758; however, this species is not found in the Far Eastern waters but is replaced by another close species, *S. suckleyi* (Girard, 1855); delta smelt *Osmerus eperlanus dentex* Steindachner, 1870, is currently not a subspecies of European smelt but is considered as an independent species: *O. dentex* Steindachner et Kner, 1870; et cetera.

According to generalized data and our own materials, it was found that the composition of higher taxa includes three classes, 22 orders, 67 families, ten subfamilies, and 161 genera. The total number of species is 274, 25 of which remain controversial both in taxonomic terms and in terms of confirming their findings in Aniva Bay. Interest is caused by a number of fish species caught in Aniva Bay, whose samples are kept in various collections of the world and have never been mentioned in the literature, and, therefore, were not included in the composition of the ichthyofauna of Aniva Bay. These include, for example, *Liparis latifrons*, *Gymnelopsis japonica*, *Lycodes brevicaudus*, *Ernogrammus hexagrammus*, *Stichaeopsis nana*, and a number of others listed in the first (Dyldin et al., 2018) and in the present part of the work. Thus, over the period from the middle of the last century to the present day (approximately 60 years), we have increased the list of ichthyofauna of Aniva Bay by more than two times. At the same time, it should be noted that the Aniva Bay across the La Perouse Strait is bordered by the Sea of Japan, the ichthyofauna of which is rep-

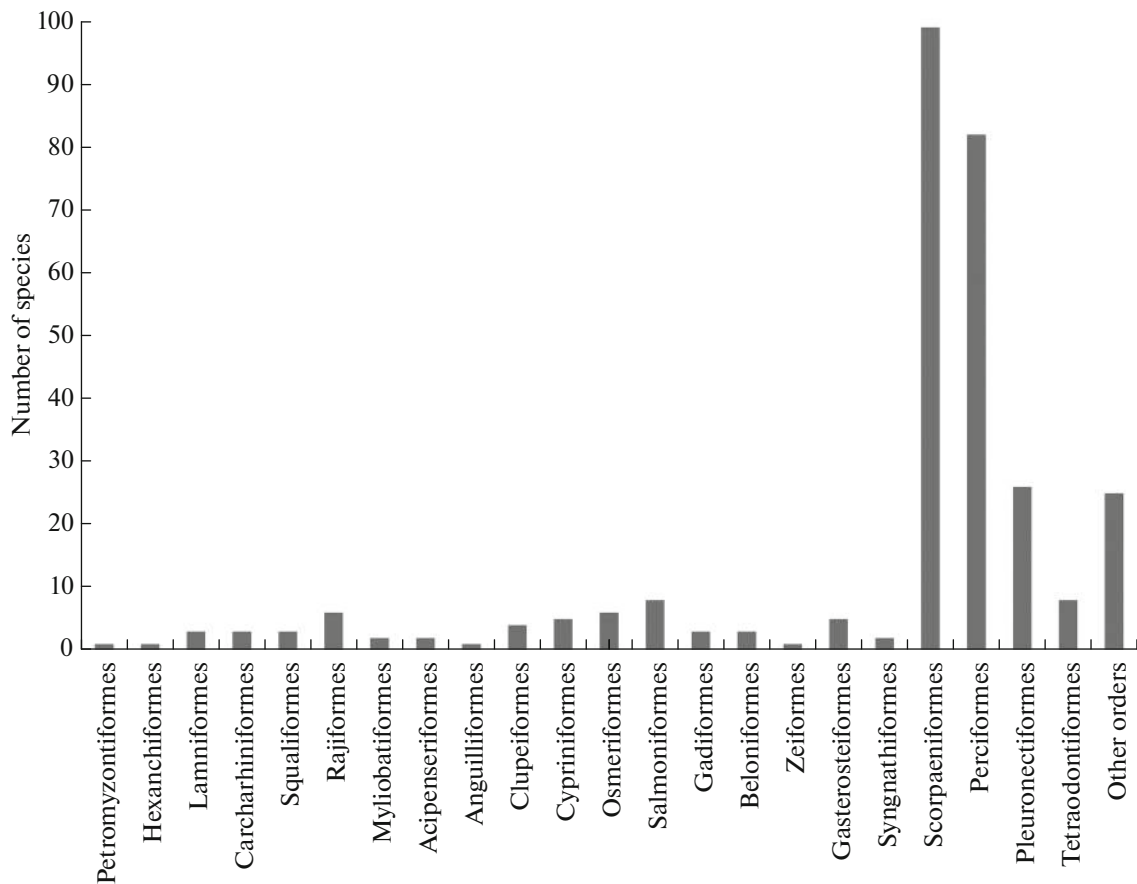


Fig. 1. Taxonomic composition of the orders forming the ichthyofauna of Aniva Bay.

represented by 330 species within the Russian waters, and has an open outlet to the Sea of Okhotsk, which has 463 fish species (Parin et al., 2014). It should also be taken into account that pelagic migrants are also noted in Aniva Bay, which can penetrate into it through the straits of the Kuril Islands. In connection with this, the expansion of the list of ichthyofauna of Aniva Bay by such a significant number of species is not accidental but quite natural. Along with the data of past periods—82 (Schmidt, 1904) and 130 species (Lindberg, 1959)—the presented work reflects only the next modern stage in the study of the taxonomic diversity of the ichthyofauna of the bay.

The diversity of the ichthyofauna of Aniva Bay within the whole Russian ichthyofauna is comparable only to the number of fishes in the Peter the Great Bay, the Sea of Japan, in which there are over 300 species (Sokolovsky et al., 2011). The ichthyofauna of Aniva Bay is almost 20% in comparison with the whole marine and brackish-water ichthyofauna of Russia, totaling up to 1404 species (Parin et al., 2014).

In the modern ichthyofauna of the bay, representatives of the Actinopteri class (255) predominate, the second and third positions are occupied by representatives of the Elasmobranchii (18) and Petromyzonti (1)

classes. Of 22 orders, the most representative in the number of species are Scorpaeniformes (99), Perciformes (82), Pleuronectiformes (26), Salmoniformes (8), Tetraodontiformes (8), Rajiformes (6), Osmeriformes (6), Cypriniformes (5), Gasterosteiformes (5), Clupeiformes (4), the remaining orders are represented by 1–3 species. Thus, the ichthyofauna of Aniva Bay is formed by three large orders—Scorpaeniformes, Perciformes and Pleuronectiformes, which account for 207 species or 75.5%. The Salmoniformes, Tetraodontiformes, Rajiformes, Osmeriformes, Cypriniformes, Gasterosteiformes, and Clupeiformes orders are represented by 42 species and form 15.3% of the total number of species, while the remaining 12 orders account for only 25 species (9.2%) (Fig. 1).

Of 67 families, eight have the greatest number of species (152 species or 55.5%): Cottidae (37), Pleuronectidae (25), Stichaeidae (22), Agonidae (16), Zoarcidae (16), Liparidae (14), Sebastidae (11) and Gobiidae (11). The Salmonidae (8), Cyclopteridae (7), Hexagrammidae (6), Pholidae (6), Cyprinidae (5), Osmeridae (5), Tetraodontidae (5), Arhynchobatidae (4), Gasterosteidae (4), Hemitripterae (4) families accumulate 54 species (19.7%). The Clupeidae, Gadidae, Psychrolutidae, Ammodytidae, and Scombridae

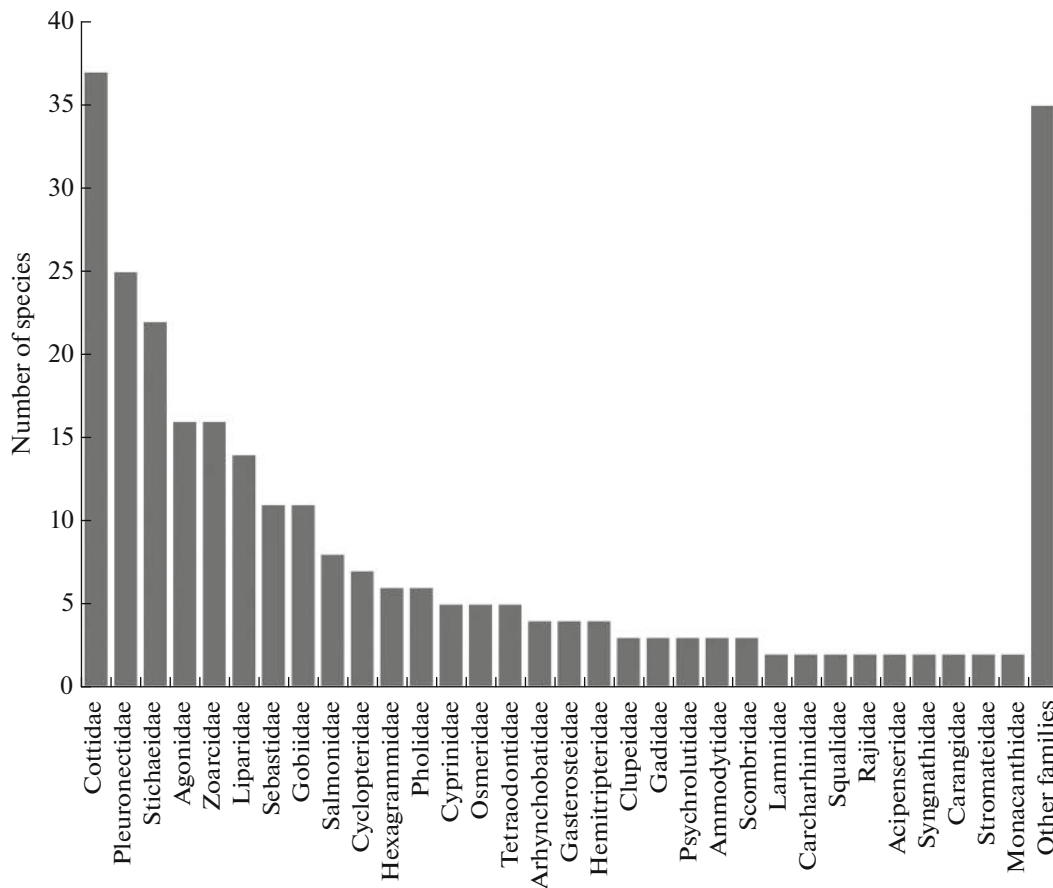


Fig. 2. Taxonomic composition of the families forming the ichthyofauna of Aniva Bay.

families include three species each (15 species, 5.5%); the Lamnidae, Carcharhinidae, Squalidae, Rajidae, Acipenseridae, Syngnathidae, Carangidae, Stromateidae, and Monacanthidae families include two species each (18 species, 6.6%). The remaining 35 families account for one species each (35 species, 12.7%) (Fig. 2).

Among the fish species considered, 49 have the IUCN conservation status (less than 18% of the total list); 28 are assigned to the Least Concern category, ten to Data Deficient, six to Vulnerable, two to Near Threatened, and three to Critically Endangered. There are 225 unvalued species without any environmental status (Not Evaluated) (more than 82% of the total list). This situation raises some concerns and requires the participation of specialists in the environmental assessment of a number of Far Eastern species prevalent in the North Pacific region.

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