



## A REVIEW OF THE MARINE CRAB FISHERIES IN THE TURKISH SEAS

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### ABSTRACT

The paper presents a review of the distribution of marine crabs (Brachyura) along the Turkish coast and the amount of economically important marine crabs harvested between 1967 and 2016. Previous records reported that Turkey had 102 brachyuran crab species, only five of them being economically important, but this review identifies two more species, *Inachus phalangium* and *Ashtoret lunaris*. The Aegean Sea has more crab species than the Mediterranean, the Black Sea and the Sea of Marmara. The most harvested species are *Callinectes sapidus*, *Maja squinado*, *Eriphia verrucosa*, *Carcinus aestuarii* and *Portunus segnis*, respectively. This review shows that there have been fluctuations in the harvest of marine crabs between years, the lowest being 5 tonnes in 2015 and the highest, 2116 tonnes in 1984. The information provided in this review provides a basis for potential profitable development of conservation and management strategies of marine crabs in Turkey.

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## INTRODUCTION

Crustaceans contribute an important element of world fisheries production and crabs make up a significant part of this World Crustacean production in 2011, comprised of shrimp 58%, crabs 27% and lobsters 5% (Karadurmu and Aydın, 2016). Both marine and freshwater crabs are edible and used in many industrial fields, e.g. medicine, pharmacy, cosmetics, feed industry, agriculture and food industry (Ayas and Ozogul, 2011; Moghal et al., 2015).

There is a wide variety of true crabs (Class: Crustacea, Order: Decapoda, Infraorder: Brachyura) of more than 5000 species belonging to 700 genera (Moghal et al., 2015). In early records, 102 brachyuran crabs were reported from the Turkish coasts (Kocataş and Katağan, 2003; Ateş et al., 2010). This was supplemented: in 2013, Duris et al. reported *Inachus phalangium* in the Aegean, and in 2015, Turan et al. reported *Ashtoret lunaris* in the Mediterranean. The distribution of marine crabs in the Turkish seas is presented in Table 1.

**Table 1.** Brachyuran crabs distribution in the Turkish seas (adapted from Kocataş & Katağan, 2003; Ateş et al., 2010; Duris et al., 2013; Bakır et al., 2014; Ateş et al., 2017). BS: Black Sea, SM: Sea of Marmara, AS: Aegean Sea and M: Mediterranean Sea, (+); present, (-); not present

Marine Crab Species		BS	SM	AS	M
<b>Brachyura</b>					
1	<i>Acanthonyx lunulatus</i> (Risso, 1816)	-	+	+	+
2	<i>Achaeus cranchii</i> Leach, 1817	-	+	+	+
3	<i>Achaeus gracilis</i> O.G. Costa, 1839	-	+	+	+
4	<i>Atelecyclus rotundatus</i> (Olivi, 1792)	-	+	+	-
5	<i>Atergatis roseus</i> (Rüppell, 1830)	-	-	+	+
6	<i>Bathynectes longipes</i> (Risso, 1816)	-	+	-	-
7	<i>Bathynectes maravigna</i> (Prestandrea, 1839)	-	-	+	+
8	<i>Brachynotus foresti</i> (Zariquiey Alvarez, 1968)	-	-	+	+
9	<i>Brachynotus gemmellari</i> (Rizza, 1839)	-	-	+	+
10	<i>Brachynotus sexdentatus</i> (Risso, 1827)	+	+	+	+
11	<i>Calappa granulata</i> (Linnaeus, 1758)	-	+	+	+
12	<i>Calappa hepatica</i> (Linnaeus, 1758)	-	-	-	+
13	<i>Callinectes sapidus</i> (Rathbun, 1896)	+	+	+	+
14	<i>Carcinus aestuarii</i> (Nardo, 1847)	+	+	+	+
15	<i>Carupa tenuipes</i> Dana, 1851	-	-	+	+
16	<i>Charybdis hellerii</i> (A. Milne-Edwards, 1867)	-	-	+	+
17	<i>Charybdis longicollis</i> Leene, 1938	-	-	+	+
18	<i>Daira perlata</i> (Herbst, 1790)	-	-	-	+
19	<i>Dorhynchus thomsoni</i> (Thomson, 1873)	-	-	+	-
20	<i>Dromia personata</i> (Linnaeus, 1758)	-	+	+	+
21	<i>Ebalia cranchii</i> (Leach, 1817)	-	+	+	-
22	<i>Ebalia deshayesi</i> (Lucas, 1846)	-	-	+	+
23	<i>Ebalia edwardsii</i> (Costa, 1838)	-	-	+	-
24	<i>Ebalia granulosa</i> (H.Milne-Edwards, 1837)	-	-	+	-
25	<i>Ebalia nux</i> (A.Milne-Edwards, 1883)	-	-	+	-
26	<i>Ebalia tuberosa</i> (Pennant, 1777)	-	+	+	+
27	<i>Ebalia tumefacta</i> (Montagu, 1808)	-	-	+	-
28	<i>Eriphia verrucosa</i> (Forskål, 1775)	+	+	+	+
29	<i>Ethusa mascarone</i> (Herbst, 1785)	-	-	+	+
30	<i>Eucrate crenata</i> (De Haan, 1835)	-	-	-	+
31	<i>Eurynome aspera</i> (Pennant, 1777)	-	+	+	+
32	<i>Geryon longipes</i> (A.Milne-Edwards, 1882)	-	+	+	+
33	<i>Goneplax rhomboides</i> (Linnaeus, 1758)	-	+	+	+
34	<i>Herbstia condyliata</i> (Fabricius, 1787)	-	+	-	-
35	<i>Homola barbata</i> (Fabricius, 1793)	-	-	+	+
36	<i>Inachus aguiarii</i> (De Brito Capello, 1876)	-	-	+	-
37	<i>Inachus communissimus</i> (Rizza, 1839)	-	-	+	+
38	<i>Inachus dorsettensis</i> (Pennant, 1777)	-	+	+	+
39	<i>Inachus leptochirus</i> (Leach, 1817)	-	+	+	+

40	<i>Inachus parvirostris</i> (Risso, 1816)	-	-	+	-
41	<i>Inachus thoracicus</i> (Roux, 1830)	-	+	+	-
42	<i>Inachus phalangium</i> (Fabricius, 1775)	-	-	+	-
43	<i>Ixa monodi</i> Holthuis & Göttlieb, 1956	-	-	+	+
44	<i>Latreillia elegans elegans</i> (Roux, 1830)	-	-	+	-
45	<i>Coleusia signata</i> Paulson, 1875	-	+	-	+
46	<i>Liocarcinus corrugatus</i> (Pennant, 1777)	-	+	+	+
47	<i>Liocarcinus depurator</i> (Linnaeus, 1758)	+	+	+	+
48	<i>Liocarcinus maculatus</i> (Risso, 1827)	-	-	+	+
49	<i>Liocarcinus marmoreus</i> (Leach, 1918)	+	+	+	+
50	<i>Liocarcinus navigator</i> (Risso, 1816)	+	+	+	+
51	<i>Liocarcinus pusillus</i> (Leach, 1815)	-	+	+	+
52	<i>Liocarcinus vernalis</i> (Risso, 1816)	+	+	+	+
53	<i>Liocarcinus zariquieyi</i> (Gordon, 1968)	-	-	-	+
54	<i>Lissa chiragra</i> (Fabricius, 1775)	-	-	+	-
55	<i>Macrophthalmus graeffei</i> A.Milne-Edwards, 1873	-	-	+	+
56	<i>Macropipus tuberculatus</i> (Roux, 1830)	-	-	+	-
57	<i>Macropodia czernjawska</i> (Brandt, 1880)	-	-	+	-
58	<i>Macropodia linaresi</i> (Forest & Zariquiey-Alvarez 1964)	-	-	+	+
59	<i>Macropodia longipes</i> (A.Milne-Edwards Bouvier, 1899)	-	-	+	+
60	<i>Macropodia longirostris</i> (Fabricius, 1775)	+	+	+	+
61	<i>Macropodia rostrata</i> (Linnaeus, 1761)	+	+	+	+
62	<i>Macropodia tenuirostris</i> (Leach, 1814)	-	-	+	+
63	<i>Maja crispata</i> (Risso, 1827)	-	+	+	+
64	<i>Maja goltziana</i> d'Oliveira, 1888	-	-	+	+
65	<i>Maja squinado</i> (Herbst, 1788)	-	+	+	+
66	<i>Medorippe lanata</i> (Linnaeus, 1767)	-	+	+	+
67	<i>Micippa thalia</i> (Herbst, 1803)	-	-	+	+
68	<i>Microcassiope minor</i> (Dana, 1852)	-	-	+	+
69	<i>Monodaeus couchii</i> (Couch, 1851)	-	+	+	-
70	<i>Myra subgralunata</i> Kossmann, 1877	-	-	-	+
71	<i>Nepinnotheres pinnotheres</i> (Linnaeus, 1758)	-	+	+	-
72	<i>Ocypode cursor</i> (Linnaeus, 1758)	-	-	+	+
73	<i>Pachygrapsus marmoratus</i> (J.C. Fabricius, 1787)	+	+	+	+
74	<i>Pachygrapsus maurus</i> (Lucas, 1846)	-	-	-	+
75	<i>Pachygrapsus transversus</i> (Gibbes, 1850)	-	-	-	+
76	<i>Palicus caronii</i> (Roux, 1830)	-	-	+	-
77	<i>Paractea monodi</i> (Guinot, 1969)	-	-	-	+
78	<i>Parthenope angulifrons</i> (Latreille, 1825)	+	+	+	+
79	<i>Parthenope macrochelos</i> (Herbst, 1790)	-	+	+	+
80	<i>Parthenope massena</i> (P.Roux, 1830)	-	+	+	+
81	<i>Percnon gibbesi</i> (H. Milne Edwards, 1853)	-	-	-	+
82	<i>Pilumnopus vauquelini</i> (Audouin, 1826)	-	-	-	+
83	<i>Pilumnus hirsutus</i> (Stimpson, 1858)	+	-	+	+

84	<i>Pilumnus hirtellus</i> (Linnaeus, 1761)	+	+	+	+
85	<i>Pilumnus spinifer</i> (H.Milne-Edwards, 1834)	-	+	+	+
86	<i>Pinnotheres pisum</i> (Linnaeus, 1767)	-	+	+	-
87	<i>Pirimela denticulata</i> (Montagu, 1808)	-	+	+	+
88	<i>Pisa armata</i> (Latreille, 1803)	-	+	+	+
89	<i>Pisa hirticornis</i> (Herbst, 1904)	-	+	-	-
90	<i>Pisa muscosa</i> (Linnaeus, 1758)	-	+	+	+
91	<i>Pisa nodipes</i> (Leach, 1815)	-	+	+	+
92	<i>Pisa tetraodon</i> (Pennant, 1777)	-	+	+	+
93	<i>Portumnus latipes</i> (Pennant, 1777)	+	+	+	+
94	<i>Portumnus lysianassa</i> (Herbst, 1796)	-	-	+	-
95	<i>Portunus hastatus</i> (Linnaeus, 1767)	-	-	+	+
96	<i>Portunus segnis</i> (Linnaeus, 1758)	-	-	+	+
97	<i>Sirpus zariquieyi</i> Gordon, 1953	+	+	+	+
98	<i>Thalamita poissonii</i> (Audouin, 1826)	-	-	+	+
99	<i>Xaiva biguttata</i> (Risso, 1816)	-	-	-	+
100	<i>Xantho hydrophilus</i> (Herbst, 1790)	-	+	+	+
101	<i>Xantho pilipes</i> A.Milne-Edwards, 1867	-	+	+	+
102	<i>Xantho poressa</i> (Olivi, 1792)	+	+	+	+
103	<i>Ashtoret lunaris</i> (Forskål, 1775)	-	+	+	+
104	<i>Matuta victor</i> (Fabricius, 1781)	-	-	-	+

However, only few of the 104 marine crab species in Turkish waters are economically important: *Eriphia verrucosa* (Forskål, 1775), *Callinectes sapidus* (Rathbun, 1896), *Portunus segnis*, (Linnaeus, 1758), *Maja squinado* (Herbst, 1788) and *Carcinus aestuarii* (Nardo, 1847) (Ayдын et al., 2013). Their status and distribution is as follows:

### *Callinectes sapidus* (Rathbun, 1896)

Blue crab *Callinectes sapidus* has the broadest latitudinal distribution in the world, having been introduced from the West Atlantic coast into Europe, California, Hawaii and Japan (Williams, 2007). This invasive species has been widely recorded in the Mediterranean, especially in the eastern parts, including the Adriatic and Aegean Seas (Holthuis, 1991; Atar and Secer, 2003; Onofri et al., 2008; Tuncer and Bilgin, 2008; Dulcic et al., 2010). It is a coastal species inhabiting a wide variety of substrates in shallow and saline continental waters (Enzenross and Enzenross, 1990). The largest catches of *C. sapidus* are made in the USA, the Atlantic northwest recording 60,329 tonnes and the Atlantic Western Central, 31,459 tonnes. In 2014, global capture production of *C. sapidus* was 74,357 tonnes. Global aquaculture production of this species reached a maximum of 501,000 tonnes in 2001.

Worldwide, the importance of the commercial and recreational fishing of *C. sapidus* is increasing but due to

its invasive nature, its distribution and ecological impact is concerning, especially along the Mediterranean coast of Turkey (Atar and Secer, 2003). The Turkish catch in contrast to worldwide trends has been decreasing; it was at its maximum in 1974 (1.622 tonnes), but it has dramatically declined to 2 tonnes in 2016 (Anonymous, 1967-2016).

### *Portunus segnis* (Forskål, 1775)

Portunid crab *Portunus segnis* is an Indio-Pacific species which extended its distribution to Mediterranean waters after the opening (1869) of the Suez Canal. *P. segnis* is commonly distributed in the northeastern Mediterranean coastal waters of Turkey. *P. segnis* is one of the marine crab species of economic importance caught by a wide range of fishing gear, e.g. artisanal traps, trawls, beach seines, cylindrical wire traps, folding traps, pots, hop nets, drop nets and crab gill nets. The largest catches to date are from China (52,577 tonnes) and Philippines (34,076 tonnes) where it is sold in local markets (frozen or fresh) and to the crabmeat canning industry. The maximum global capture for *P. segnis* reached 212,571 tonnes in 2014. In Turkey, the *P. segnis* harvest reached a maximum of 111 tonnes in 1990 but according to the Fishstat plus report, declined to 35 tonnes in 2006. *Portunus segnis* is also a cultured species albeit on a very small scale. Its global aquaculture started in 2005 (3 tonnes) and reached a maximum of 41 tonnes in 2014 (FAO, 2018a).

### *Eriphia verrucosa* (Forskål, 1775)

Warty crab or yellow crab *Eriphia verrucosa* occurs in the Black Sea, Mediterranean, Eastern Atlantic Ocean from Brittany to Mauritania and the Azores (Manning & Holthuis, 1981; Bakir et al., 2014). This species occurs among stones and seaweeds along rocky coastlines in shallow waters to depths of 15 m (Rossi and Parisi, 1973). It migrates to shallower waters of less than 1 m to reproduce in May or June (Dumitrache and Konsulova, 2009) and feeds primarily on bivalves, gastropods, hermit crabs, molluscs and polychaetes (Rossi and Parisi, 1973). In the Black Sea, *E. verrucosa* is known to be the only native species capable of breaking the shells of an invasive snail *Rapana venosa* (Valenciennes, 1846), but it is unlikely that it will present an effective biological control for the invader (Micu & Todorova, 2007) because it is threatened by eutrophication and pollution (Dumitrache and Konsulova, 2009). The *E. verrucosa* fishery in Turkey reached the maximum amount of 232 tonnes in 1989, but in recent decades it has decreased, e.g. only 6 tonnes in 2016 (Anonymous, 1967-2016). Unlike the inhabitants of other Mediterranean countries, Turkish people do not view *E. verrucosa* as a food item and is rarely eaten (Doğan et al., 2007; Kaya et al., 2009).

### *Maja squinado* (Herbst, 1788)

The north-eastern Atlantic and the Mediterranean are the geographical range of *Maja squinado* (European spider crab, spiny spider crab or spinous spider crab). It is exploited by a number of countries; in the north-eastern Atlantic, intensive spider crab fisheries are operated in the United Kingdom, Ireland, France, the Channel Islands, Spain, Portugal, Morocco, and in the Mediterranean, Turkey (Brosnan, 1981; Kergariou, 1984; Le Foll, 1993). It is also exploited in the Adriatic Sea by Italy and the former Yugoslavia (Brosnan, 1981). According to FAO statistics, the total annual catches of *M. squinado* (2000 to 2011) ranged from a maximum of 6982 tonnes (in 2006) to 5168 tonnes (in 2005). In 2011, the total catch of *M. squinado* in the world was 5572 tonnes (FAO, 2018b). The main producer countries are France, the United Kingdom, Spain, Ireland and the Channel Islands (FAO, 2018b). France contributed to more than 67% (3758) of the total catches in 2011. In Turkey, the highest catches of *M. squinado* were in 1984 (1661 tonnes) and 1986 (1253 tonnes) but in 2006 only 5 tonnes were caught.

### *Carcinus aestuarii* (Nardo, 1847)

The Mediterranean green crab *Carcinus aestuarii* is one of the two species of the genus *Carcinus* Leach, 1814 which until the end of the 20th century was only known to inhabit the estuarine and lagoon waters of the Mediterranean and Black Seas (Yamada and Hauck, 2001). However there have

been some recent records of this species from the coast of Japan (Sakai, 1986; Furota et al., 1999; Acar and Ateş, 2016). The presence of *C. aestuarii* in the seas of Turkey was reviewed by Kocataş and Katağan (2003). It was reported in the Turkish straits system by Balkis (2003), in the Gallipoli Peninsula by Yurdabak (2004), on the coast of Sinop by Bilgin and Çelik (2004), in İzmir Bay by Çınar et al. (2006), along the Turkish Mediterranean coast by Özcan (2007), and in the Dardanelles by Çelik et al. (2007).

This species has little economic value in Turkey, but it is used as an additional fish food for sea bream (*Sparus aurata* Linnaeus, 1758) pools in the Homa Lagoon (Kocak et al., 2011). In 2006, the capture of *C. aestuarii* in Turkey was 49 tonnes.

## STATUS OF MARINE CRAB HARVEST IN TURKEY

The harvest of marine crab species in Turkey has been recorded since 1967 for *E. verrucosa*, *C. sapidus*, *P. segnis*, *M. squinado* and *C. aestuarii*. Although, there have been fluctuations between years in the harvest of marine crabs in Turkey, a gradual decline has occurred from its zenith of 2116 tonnes in 1984 to 8 tonnes in 2016. The statistics also show that the yearly harvest values of *C. sapidus*, with the exception of 1973 and 1990, were significantly higher than those of *E. verrucosa* until 2012, but then the emphasis changed and the *E. verrucosa* harvest was higher than of *C. sapidus* for the remainder of the records until 2016, as shown in Table 2.

The stats show that fishermen did not specify the catch data for *M. squinado*, *C. aestuarii* and *P. segnis* after 2006. Moreover, the harvest of *E. verrucosa* and *C. sapidus* also has been reduced dramatically in recent years. For example, the harvest of *E. verrucosa* was 36 tonnes in 2006, but it was reduced to 6 tonnes in 2016. The harvest of *C. sapidus* was 77 tonnes in 2009, but it was decreased to 2 tonnes in 2016.

## STATUS OF MARINE CRAB EXPORT IN TURKEY

Turkey exports marine crabs to more than 21 countries, the main buyers being South Korea, the United Arab Emirates, Bahrain, Singapore and Italy. The exports include frozen *P. camtschaticus*, *C. sapidus* and *Chionoecetes* spp, other edible crabs (not listed above) – frozen and canned edible crabs. Most of the export products were frozen and unprocessed products. The highest amount exported was in 2013 (113,741 kg with a value of US \$309,304) but exports have declined since to 33,670 kg (US\$ 89,509) in 2014, to 29,885 kg (US\$ 117,372) in 2015 and to 50,216 kg (US\$ 150,725) in 2016. The value and the amount of export products to other countries between 2010 and 2016 are presented in Table 3 (Anonymous, 2010-2016).

**Table 2.** Marine crab harvest (tonnes) in Turkey between 1967 and 2016 (note: for the year 1967, values represent caught individual numbers, not tonnes; \*Data not specified by fishermen) (Anonymous, 1967-2016).

	<i>E. verrucosa</i>	<i>P. segnis</i>	<i>C. aestuarii</i>	<i>C. sapidus</i>	<i>M. squinado</i>	Total
1967	313306	1825595	1222325	665182	15929	4042337
1968	115	71	127	290	15	618
1969	141	60	132	289	1	623
1970	119	79	121	287	*	606
1971	57	63	54	171	*	344
1972	50	55	47	160	*	312
1973	22	4	4	7	4	41
1974	6	7	47	2	*	62
1975	2	37	64	14	1	118
1976	3	5	15	67	*	90
1977	15	46	24	30	2	117
1978	13	20	33	25	2	93
1979	3	8	17	154	*	182
1980	2	24	16	120	3	165
1981	31	11	38	225	5	310
1982	10	1	1	136	*	148
1983	6	4	*	195	125	330
1984	23	7	10	425	1661	2116
1985	14	*	11	222	580	827
1986	10	90	12	270	1253	1635
1987	6	1	1	272	766	1046
1988	32	1	1	147	150	331
1989	232	1	1	354	50	638
1990	204	111	13	190	*	518
1991	5	*	*	31	*	36
1992	4	*	2	10	*	16
1993	2	1	4	84	1	92
1994	9	2	6	63	5	85
1995	10	23	4	98	5	140
1996	10	11	5	287	3	316
1997	25	20	40	250	3	338
1998	20	10	20	200	3	253
1999	5	1	1	167	6	180
2000	6	5	6	174	1	192
2001	10	4	30	230	3	277
2002	11	5	5	198	1	220
2003	10	8	2	160	1	181
2004	11	5	10	145	2	173
2005	21	5	32	106	1	165
2006	36	35	49	59	5	184
2007	4	*	*	22	*	26
2008	8	*	*	17	*	25
2009	7	*	*	77	*	84
2010	3	*	*	46	*	49
2011	8.7	*	*	10.7	*	19
2012	21.6	*	*	2.1	*	24
2013	7.3	*	*	0.6	*	8
2014	4.5	*	*	1.5	*	6
2015	4.9	*	*	0.6	*	5
2016	6	*	*	2	*	8

**Table 3.** The value (US \$) and amount (kg) of marine crab export products of Turkey to other countries between 2010 and 2016 (Anonymous, 2010-2016).

Country	Year	Value (US \$)	Amount (kg)
Bahrain	2014	38500	17500
	2015	15862	7210
Belgium	2016	2	2
United Arab Emirates	2015	350	100
	2016	58940	21000
South Africa	2016	22686	8000
	2012	66027	32570
South Korea	2013	193621	66033
	2015	309	9500
	2016	100	20
	2013	107	5
Netherlands	2014	2708	235
	2015	11009	4000
	2016	18653	7210
Hong Kong	2013	41322	18390
	2010	65770	7820
Italy	2011	26667	2723
	2012	50316	6150
	2013	28351	3025
	2014	23105	2450
Canada	2015	57474	7875
	2016	34041	4641
	2016	224	16
Kuwait	2016	13490	6300
Malaysia	2012	23265	9900
	2013	10884	7040
Singapore	2013	25578	17620
	2014	6210	4810
Thailand	2015	350	100
New Zealand	2014	11075	6500
	2010	3510	540
	2011	3453	740
	2012	2241	600
Northern Cyprus	2013	3554	730
	2014	6437	1469
	2015	278	520
	2016	9	14
Lebanon	2014	1060	650
	2015	580	570
Georgia	2016	2558	3010
	2016	22	3
Iraq	2013	3637	458
	2010	3776	380
	2011	4409	460
	2012	7513	1100
Turkmenistan	2013	2250	440
	2014	414	56
	2015	594	10



	2010	3510	540
	2011	3453	740
	2012	2241	600
Northern Cyprus	2013	3554	730
	2014	6437	1469
	2015	278	520
	2016	9	14
Lebanon	2014	1060	650
	2015	580	570
	2016	2558	3010
Georgia	2016	22	3
Iraq	2013	3637	458
	2010	3776	380
	2011	4409	460
Turkmenistan	2012	7513	1100
	2013	2250	440
	2014	414	56
	2015	594	10
France	2010	3491	430
<b>Total</b>	<b>2010</b>	<b>76548</b>	<b>9170</b>
<b>Total</b>	<b>2011</b>	<b>34528</b>	<b>3923</b>
<b>Total</b>	<b>2012</b>	<b>149362</b>	<b>50320</b>
<b>Total</b>	<b>2013</b>	<b>309304</b>	<b>113741</b>
<b>Total</b>	<b>2014</b>	<b>89509</b>	<b>33,670</b>
<b>Total</b>	<b>2015</b>	<b>117372</b>	<b>29885</b>
<b>Total</b>	<b>2016</b>	<b>150725</b>	<b>50216</b>

## CONCLUSIONS

Since 1967 the Turkish Statistical Institute has compiled statistics on the marine fishery (including marine crab catch data) annually by surveys conducted in January and May. For the years 1967 – 1969, the method used was complete enumeration (by conducting individual interviews with all fishermen at their addresses) but this system was replaced by sampling surveys for the years 1970 and 1971. Following this from 1972 through 1980, the method of complete enumeration was used again. Since 1980, large scale fishermen (using boats longer than 12 m) have been surveyed by complete enumeration and small scale fishermen (boats shorter than 12 m) have been surveyed by sampling methods. Cognizant of the fact that three sides of Turkey are surrounded by seas, it is accepted that the crab stocks have not yet been sufficiently evaluated. By defining and implementing protection and management strategies, it is thought that the crab production of the country could be increased and foreign exchange receipts could be realized by exporting. Thus, benefiting from the abundant amount of crabs in the seas, Turkey could provide employment opportunities and improve the country's economy.

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## SAŽETAK

### PREGLED RIBOLOVA MORSKIH RAKOVA U TURSKIM MORIMA

U radu je prikazana distribucija morskih kratkorepih rakova (*Brachyura*) uzduž turske obale ulovljenih između 1967. i 2016. te količina i vrijednost ekonomski značajnih vrsta rakova. Prethodni podaci ukazuju da je u Turskoj bilo prisutno 102 vrste kratkorepih rakova, od kojih je pet bilo ekonomski značajno, ali ovaj pregled identificira dodatne dvije vrste, *Inachus phalangium* i *Ashtoret lunaris*. U Egejskom moru ulovljeno je više vrsta rakova nego u Mediteranskom, Crnom i Mramornom moru. Najviše lovljene vrste su *Callinectes sapidus*, *Maja squinado*, *Eriphia verrucosa*, *Carcinus aestuarii* i *Portunus segnis*. Tijekom godina postojale su oscilacije u količini ulova kratkorepih rakova te je najniža s ulovom bila



2015.g. s 5 tona, a najviša 1984. g. s 2116 tona. Informacije navedene u radu pružaju temelj mogućem profitabilnom razvoju strategije očuvanja i upravljanja morskim rakovima u Turskoj.

**Ključne riječi:** Decapoda, Brachyura, distribucija, ribarstvo, ekonomija, Turska

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