

Historical and new records of
the Irrawaddy Dolphins,
Orcaella brevirostris (Gray,
1866) (Cetacea: Delphinidae)
from the East Coast of South
Sumatra, Indonesia

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
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4 Historical and new records of the Irrawaddy Dolphins, *Orcaella brevirostris* (Gray, 1866)
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20

21 **Abstract**

22 ⁵ Irrawaddy dolphin, *Orcaella brevirostris* (Gray, 1866) has been reported in the waters of
23 Berbak Sembilang National Park since 1990 - 2009. This study used interview techniques,
24 direct observations, and secondary data from the literature to show that this dolphin can be
25 observed in the east coast of South Sumatra from October until February. An Irrawaddy
26 dolphin bycatch was recorded on 26 January 2021 in a gillnet. Historical records since 1990–
27 2013 showed sightings of Irrawaddy dolphins (< 6 individuals) in the estuarine of Bogem,
28 Bungin, Ngirawan, Terusan Dalam, Betet Island, Banyuasin, Lalan, and Tanjung Carat to
29 Makarti Jaya. This study also maps the geographic distribution of the Irrawaddy dolphin in
30 south Sumatra.

31 **Keywords**

32 Berbak Sembilang National Park, bycatch, geographic distribution, sightings.

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36 Introduction

37 The Irrawaddy dolphin, *Orcaella brevirostris* (Gray, 1866) is a marine mammal found in
38 varied habitats such as estuaries, freshwater rivers, and coastal waters in the Indo-west
39 Pacific (Minton et al. 2017; Postrado et al. 2019; Chowdhury et al. 2020). In estuarine and
40 coastal waters, these dolphin populations were found in Borneo and Banten Bay of Indonesia,
41 Palawan of Philippines, Bengal Bay of India, and the Gulf of Thailand (Minton et al. 2017).
42 In freshwater rivers, their populations have been found in three large rivers such as the
43 Ayeyarwady River in Myanmar, Mahakam River in Indonesia, and the Mekong River in
44 Cambodia (Khalifa et al. 2014; Minton et al. 2017). Globally, the IUCN Red List classifies
45 the Irrawaddy dolphin as an endangered species and its mortality from gillnets in small-scale
46 fisheries is an important factor causing their population to decline (Minton et al. 2017). Based
47 on the Indonesian Government Regulation No. 106/2018 concerning Preservation of Plants
48 and Animals Species, the Irrawaddy dolphin is a protected species.

49 Information about the Irrawaddy dolphins in Indonesia has been recorded from sub-
50 populations in the Mahakam River of East Kalimantan (Dharmadi et al. 2009), Kubu Raya
51 and Kayong Utara Waters of West Kalimantan (Anggawangsa et al. 2014), Tanjung Puting
52 National Park of central Kalimantan (Rahayu et al. 2020), Banten Bay (Khalifa et al. 2014;
53 Kreb et al. 2020), Segara Anakan of southern coast of Jawa, Seribu Island, Surabaya coast of
54 east Java, eastern parts of Sumatera and Biak Coastal of Papua (Rudolph et al. 1997; Khalifa
55 et al. 2014). In the waters of south Sumatra, sightings have been recorded in coastal waters
56 around the Berbak Sembilang National Park (BSNP) in 1990, 2002, 2003, and 2004 (Iqbal
57 2003a, 2003b, 2003c, 2004), and there is a record in the Ramsar Wetland Information Sheet
58 (RIS) from Sembilang National Park 2009 -2012 version.

59 Over the last two decades, the local fishermen reported that they had not sighted the
60 Irrawaddy dolphin from BSNP. The latest published reports on their populations in Banyuasin
61 waters are given by the Wetlands International - Indonesia Programme in 2004 (Iqbal 2004).
62 However, the limited availability of research on the Irrawaddy dolphin encourages
63 continuous monitoring of its populations to find out their distribution range, habitat
64 requirements, and other information required for the conservation of remaining scattered
65 populations. Therefore, this study aimed to report the historical and recent records of the
66 Irrawaddy dolphin from the east coast of South Sumatra, Indonesia.

67 **3** **Methods**

68 **Study area.** This study was carried out on the east coast of South Sumatra, Indonesia. The
69 locations of observation stations were shown in Figure 1. These estuarine waters were
70 characterized by a diurnal tide and were highly influenced by the Musi River inflows
71 (Fauziyah et al. 2019a).

72 **Data collection.** The data collection was conducted in three stages. The first stage was a
73 literature study of all published reports of the Irrawaddy dolphin from the East Coast of South
74 Sumatra to compile all historical records. The second and third stages were interviews and
75 direct observations respectively. Interviews were conducted in 2018 at the villages of Marga
76 Sungsang, Sungsang 1, Sungsang 2, Sungsang 3, and Sungsang 4 in Banyuasin II district,
77 which is a settlement area. The Harry King method nomogram with a 90 percent confidence
78 was used to determine the sample size (King 1978). Based on an interview with the village
79 head, the total fishermen population in selected villages was 1251 in 2018, and hence a
80 minimum number of 64 respondents were required in our survey. A visual observation survey
81 was carried out along the east coast of South Sumatra in October 2020, December 2020, and
82 January - February 2021 (Fig. 1). Direct observations were conducted according to the
83 fishing operation of local fishers by using a drift gillnet (200 m length, 1.5 m height, 4-inch
84 mesh size). Observations were made on six one-day trips, each month.

85 **Identification of Irrawaddy dolphin.** The Irrawaddy dolphin was identified by its small
86 dorsal fin on the back, triangular pectoral fin, very short beak, and bulging forehead
87 (Chowdhury et al. 2020). The vital morphological features for this species identification
88 included (1) a pronounced and rounded forehead, (2) no distinct beak, (3) a flexible neck-
89 unusual among dolphin species, results in a slight depression behind the head in some
90 animals, (4) bluish or brownish-grey upper side, (5) long broad paddle-like flippers, (6) a low
91 blunt dorsal fin, which can vary a great deal in shape, (7) narrow tailstock, and (8) a light
92 underside which may appear almost white in muddy water (Fig. 2). Photographs of the
93 dolphin specimen(s) were taken for identification purposes (Fig. 2). Then the length and body
94 weight measurements of the specimen(s) were recorded.

95 **Results**

96 **Historical records.** One dolphin has been reported to have entangled in a "tuguk" fishing
97 gear (filtering device) around BSNP, especially around the Siapo Besar River (Iqbal 2003a).
98 Some fishermen claimed that the Irrawaddy dolphin sightings were found in waters around
99 BSNP of Banyuasin in the 1990-2004 year, especially in Bogem, Bungin, Ngirawan, and
100 Terusan Dalam Estuarine as well as the Betet Island (Iqbal 2003a, 2003b, 2003c, 2004).
101 According to the interview with local fishers, this sighting was seen around Banyuasin waters
102 in 2009. When the observations were conducted in 2009 (Suman et al. 2009), the Irrawaddy
103 dolphin was not found, but 1-6 individuals of the Indo-Pacific humpback dolphin (*Sousa*
104 *chinensis*) were found in the Banyuasin River. These records provide that the distribution of
105 Irrawaddy dolphins in Indonesia was also found in Banyuasin Waters, South Sumatra.
106 Historical records (Fig. 6) show sightings of Irrawaddy dolphins in the waters of the East
107 Coast of South Sumatra from 1990 – 2021.

108 **Interviews.** The East Coast of South Sumatra is the main area for capturing fisheries
109 activities in South Sumatra, Indonesia. Even in this area, there is BSNP as conservation and
110 the surrounding waters such as Banyuasin I, Banyuasin II, Tanjung Api-Api, and Makarti
111 Jaya districts as a protected forest area. In the results of interviews in 2018 (Table 1), we
112 found that 6 (4.5 percent) respondents from 132 respondents stated that they had seen
113 Irrawaddy dolphins around 2011-2013. During interviews, respondents stated that they had
114 not seen dolphin sightings since that time. Based on the information, Irrawaddy dolphins
115 were seen in the Banyuasin river, Lalan river, and Tanjung Carat to Makarti Jaya district
116 between October - February.

117 We found that 4 out of 6 respondents (67 percent) stated that they accidentally entangled
118 Irrawaddy dolphins in their gillnets as bycatch (Table 1). The effort was to bring them ashore
119 to be sold because their condition was dead. However, one respondent claimed that he re-
120 released it because the dolphin was not wholly entangled, so the condition was still alive, and
121 the other group was seen swimming not far from the one caught. Fishers already have
122 knowledge that these animals are protected, so they will release them if caught alive. At the
123 same time, 2 other respondents (33 percent) revealed that they had seen Irrawaddy dolphins
124 traveling around the Lalan River and Banyuasin river and Lalan river junction. The
125 respondent's effort was not to bother it. This contrasts to records between 1990 - 2009 that 60
126 percent of 15 dolphin individuals (Iqbal 2003a, c, 2004) were in traveling conditions, and the
127 rest of them were entangled.

128 **Direct observations.** Direct observation of Irrawaddy dolphins on the East Coast of South
129 Sumatra was carried out following the interview results. These observations were focused on
130 two target locations, namely (1) Musi Banyuasin Estuary, precisely in Makati Jaya and Carat
131 Cape, and (2) BSNP, around the Bogem river. Based on observations at 24 stations (Fig. 1),
132 no sighting dolphins were found. However, on 26 January 2021, in observation station no 3
133 (Fig. 3), Irrawaddy dolphins were found accidentally entangled in gill nets by fishermen at
134 06.00 AM as bycatch (Fig. 5).

135 Family: Delphinidae

136 Genus: *Orcaella*

137 *Orcaella brevirostris* (Gray, 1866)

138 Figure 3-5

139 Common names. Irrawaddy dolphin (English), Orcelle (French), Delfin Del Irrawaddy
140 (Spanish), Pesut and Lumba-Lumba Mahakam (Indonesian), Irravady yunusu (Turkish).

141 **New records.** INDONESIA – South Sumatra • Banyuasin coastal; 2°31'3"S, 105°03'7"E;
142 26.I.2021; local fishermen leg; entangled by gill nets; 1 ♀.

143 **Identification.** *Orcaella brevirostris* is recognized by it had rounded head, blunt, and beak is
144 indistinct. Its dorsal fin is small, triangular, blunt, and located about two-thirds of the back. It
145 had broad, long, and triangular pectoral fins (Fig. 3-4). Usually, young *O. brevirostris* is 1.0 m
146 in length and adult female and male at 2.3 m and 2.7 in length, respectively (Kumar et al.
147 2019).

148 In this study, an observed specimen had 2 m in body length and 98 kg in weight. As for those
149 seen traveling, the size is between 1-2 m (Table 1) because only the head and back are
150 visible. These sizes belong to an adult individual. The body length of an adult individual
151 varies from 1.9 m to 2.75 m (Kreb 2004). Irrawaddy dolphins are also seen in small groups of
152 3-4 only. Unlike Smith, 2009 in small groups of 2-6 individuals. The number of Irrawaddy
153 dolphin individuals seen or entangled (Table 1) and the results of observations were 12
154 individuals. The number of Irrawaddy dolphins recorded by researchers from 1990 - 2009
155 was 15 individuals.

156 Discussion

157 This study represents the first historical and new record of the Irrawaddy dolphins for the
158 East Coast of South Sumatra. This species was found closer to mangrove ecosystems and
159 some tributaries with high turbidity and muddy bottom. This area is a habitat for dolphins
160 (Iqbal 2003a; Minton et al. 2013).

161 In general, this species sighting in study location during the wet season (rainy season). In line
162 with Iqbal (2003a), a dolphin was found in February 2002 and January 2003 around BSNP
163 around the Siapo Besar River of South Sumatra. Rahayu et al. (2020) stated that the
164 appearance of dolphins in Tanjung Puting National Park, Central Kalimantan, mainly
165 occurred during the rainy season with cloudy conditions.

166 The number population in this study is not yet certain, whether the dolphin is the same or
167 different. However, this number is less than the number of Irrawaddy dolphins in other
168 locations in Indonesia, especially in Kalimantan and Banten. In February, the total population
169 in the Sungai Banyak Resort SPTN Region II Tanjung Puting National Park was 55
170 individuals (Rahayu et al. 2020), while direct and indirect observations of dolphins in the
171 Banten bay was between 31-42 individuals (Khalifa et al. 2014). We find it difficult to trace
172 the historical record for the number of dolphins seen or entangled on the east coast of South
173 Sumatra, even though the number of individuals is valuable information related to the habitat
174 conditions and the development of a population for planning management (Noor 2016).

175 Based on the study results, the entangled Irrawaddy dolphins by fishing gear were recorded.
176 The main threat to this species is entanglement in fishing gear, especially gill nets (Ryan et al.
177 2011; Whitty 2015; Minton et al. 2017; Jackson-Ricketts et al. 2020). In this case, the local
178 fishermen have tried to release this dolphin when entangled in the gillnet. However, this
179 species has died, and thus it's not released. In the Mekong River of southern Lao People's
180 Democratic Republic and northeast Cambodia (Ryan et al. 2011) and Indian coastal (Kumar
181 et al. 2019), entanglement in gillnets is the most immediate and critical threat to the
182 Irrawaddy dolphin survival. Declining the dolphin population was also reported in the
183 Mekong River (Krützen et al. 2018). The sightings and entanglement of dolphins from BSNP
184 as a conservation area to the Banyuasin, Tanjung Carat, and Makati Jaya rivers as protected
185 forest areas are historical records and evidence of the importance of this area (especially

186 BSNP) as a habitat for unique biota and endangered. These areas were also the habitat for one
187 of the protected marine biotas by the Indonesia Government, namely the horseshoe crab
188 (Fauziyah et al. 2019b).

189 The government has established the Tanjung Api Api Port in the Banyuasin estuary as one of
190 the Special Economic Zones (SEZ) industrial zones with Indonesian Regulations through PP
191 No. 51 of 2014 so that access to shipping lanes to support economic activities and
192 development is increasingly dense. Meanwhile, the dolphin has a high sensitivity to noise
193 pollution due to the sound of the ship's engine and heavy traffic. This impacts that the dolphin
194 will change direction by avoiding the area (Noor et al. 2013) or swimming further to the
195 shore to prevent ship traffic. Anthropogenic activities are also a threat to the Irrawaddy
196 dolphin population in Brunei Bay (Mahmud et al. 2018).

197 Future generations will become impossible to see the rare sightings of dolphin species when
198 critical threats to their survival are not prevented and reduced. Their populations can be saved
199 when compatible conservation measures are implemented. A strong commitment from local
200 and national governments as well as international NGOs is urgently required. Furthermore, a
201 detailed study is needed to clarify the migration of Irrawaddy dolphins around the East Coast
202 of South Sumatra, especially around BSNP as a conservation area.

203 This research that the presence of the Irrawaddy dolphin ¹ on the East Coast of South Sumatra
204 can be included in the distribution map of the Irrawaddy dolphin “Pesut Mahakam” in
205 Indonesia, and its IUCN status is critically endangered. The scarcity of individuals makes it
206 very difficult to collect data, so a push for more protection is needed without more data. For
207 this reason, an action plan is urgently required, such as (1) Continuous monitoring of dolphin
208 abundance as a conservation issue and (2) Determining mitigation locations due to the
209 accidental capture of dolphins with fishing gear as priority locations for conservation areas.

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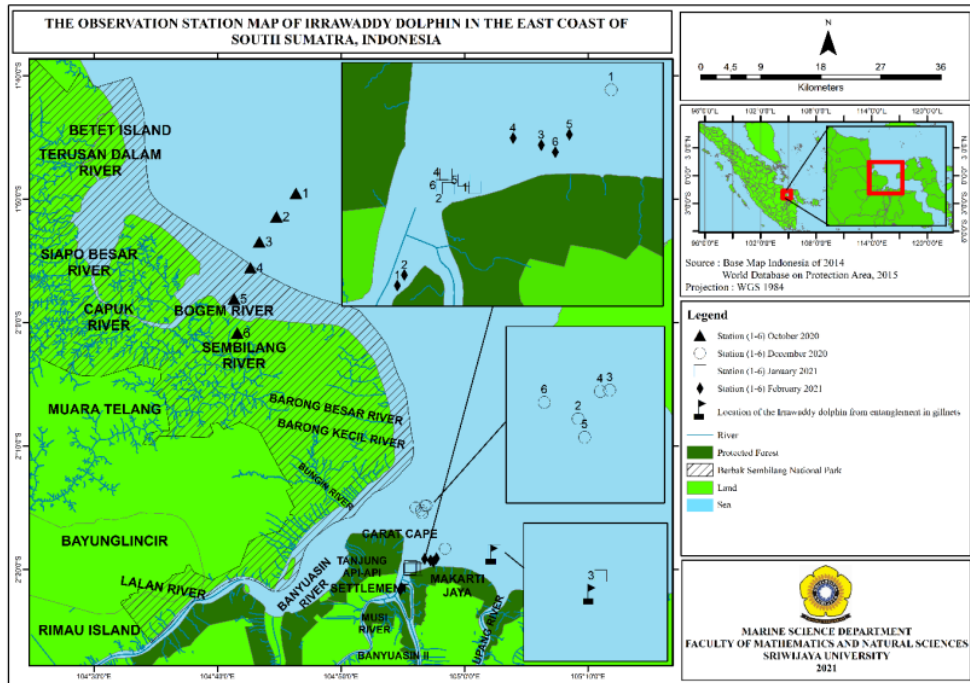
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314 **Figure Legends**

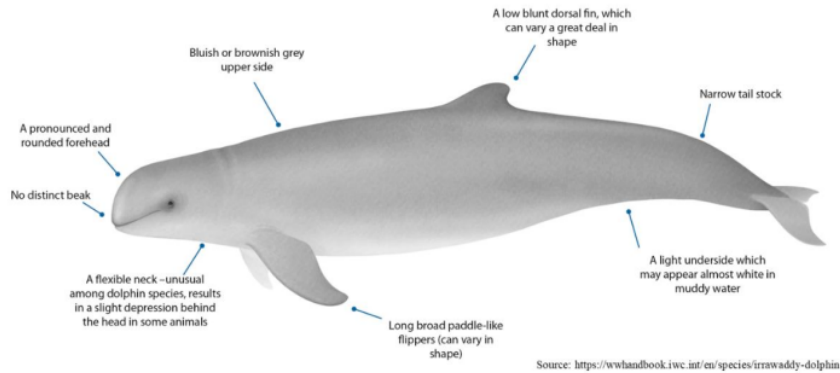


315

316 **Figure 1.** The location of the observation station Irrawaddy Dolphin in the East Coast of
317 South Sumatra, Indonesia on October 2020, December 2020, and January-February 2021.

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321 **Figure 2.** The key morphological features for identifying the Irrawaddy dolphin (Source:
 322 <https://wwhandbook.iwc.int/en/species/irrawaddy-dolphin>)

323



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325 **Figure 3.** An individual of Irrawaddy Dolphin caught with gillnets operated in the East Coast
 326 of South Sumatra (Indonesia) on 26 January 2021, 06.00 AM (Photographer: Sri Wulandari).

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330

331 **Figures 4.** Morphological characters of the Irrawaddy Dolphin from the East Coast of South
332 Sumatra, Indonesia. This Dolphin had a small dorsal fin on the back, triangular pectoral fin,
333 very short beak, and bulging forehead (Photographer: Agung).

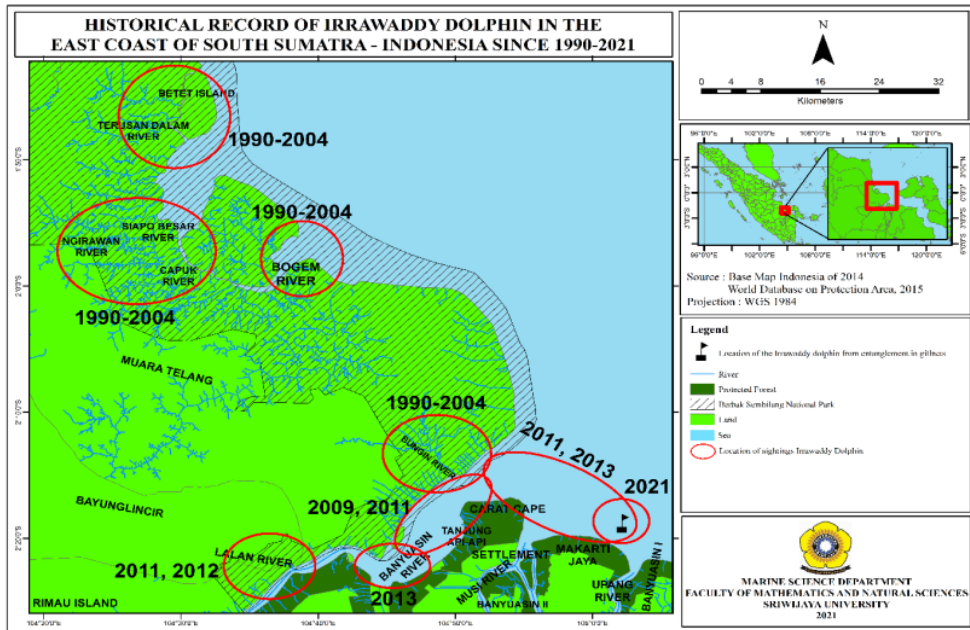
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336 **Figures 5.** Entanglement of the Irrawaddy Dolphin in January 2021 by gillnet operated in the
 337 East Coast of South Sumatra, Indonesia (Photographer: Agung)

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340 **Figure 6.** The historical record of the Irrawaddy Dolphin in the East Coast of South Sumatra,
341 Indonesia Since 1990 – 2021

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344 **Tables**

345 **Table 1.** Data from interviews in 2018 with 6 respondents from 132 respondents who stated
 346 that they had seen the Irrawaddy dolphin

347

Respondent	Year	Sighting location	Object	Behavior	Condition	Total	Month	Total length
1	2011	Banyuasin river	<i>O. brevirostris</i>	entangled in gillnet as bycatch	Release & still alive	4	October – February	1-2 m
2	2011	Carat cape until makarti Jaya district	<i>O. brevirostris</i>	entangled in gillnet as bycatch	Dead	1	Oktober – December	2 m
3	2013	Carat cape until makarti Jaya district	<i>O. brevirostris</i>	entangled in gillnet as bycatch	Dead	1	January – February	2 m
4	2012	Lalan river	<i>O. brevirostris</i>	entangled in gillnet as bycatch	Dead	1	Oktober – December	2 m
5	2011	Lalan river-	<i>O. brevirostris</i>	traveling	undisturbed	3	January – February	1-2 m
6	2013	Junction of Banyuasin river and Lalan river	<i>O. brevirostris</i>	traveling	undisturbed	1	October	1-2 m

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Historical and new records of the Irrawaddy Dolphins, *Orcaella brevirostris* (Gray, 1866) (Cetacea: Delphinidae) from the East Coast of South Sumatra, Indonesia

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