

## BREEDING SPECIES OF WATERBIRDS ON 10 ISLANDS OF PERSIAN GULF IN 2009

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**Abstract:** The Persian Gulf is situated in south of Iran and has 34 relatively small islands at Iranian Coasts, differing in size, habitat structure and the degree of isolation. Among 34 islands, 10 islands were selected for this study. Research was carried out since January 2009 to December 2009. 11 breeding species of waterbirds were identified on 10 islands of Persian Gulf. On 5 islands large area were occupied by Tern colonies, occasionally colonies of Bridled Tern, *Sterna anaethetus*. Maximum breeding population was belonged to this species on Bani-Faror (32340 pairs). Minimum breeding population was belonged to Saunders's Little Tern *Sterna saundersi* (three pairs on Nakhilo). 92 pairs of Western Reef Heron *Egretta gularis* were bred on Nakhilo and 108 pairs on other 7 islands. 6 pairs of Dalmatian Pelican *Pelecanus crispus* on Tiff, 982 pairs White cheeked Tern *Sterna repressa*, 29785 pairs Lesser Crested Tern *Thalasseus bengalensis*, 66015 pairs Bridled Tern *Sterna anaethetus*, 1948 pairs Swift Tern *Thalasseus bergii*, 2940 pairs Crab plover *Dromas ardeola*, 91 pairs Caspian Tern *Sterna caspia*, 5 pairs Gull-billed Tern *Sterna nilotica* and 3 pairs Saunders's Little Tern *Sterna saundersi* had been bred in Persian Gulf islands. 7 species of waterbirds has been reported as breeders in Persian Gulf islands during 1970s, but they did not breed in 2009. Breeding of the Dalmatian Pelican *Pelecanus crispus* is first record for Persian Gulf Islands.

**Keywords:** Breeding population, Islands, Persian Gul, Water birds.

## INTRODUCTION

The Persian Gulf is a staying and wintering area of considerable importance on a major Eurasian-African flyway for shorebirds and some other groups of waterfowl (Scott, 1995). The many small and uninhabited islands in the Persian Gulf and Strait of Hormoz provide ideal breeding grounds for large colonies of seabirds (Evans 1994). The aim of this study is to provide a complete picture of the present population of the colonial Breeding waterbirds in 10 islands of Persian Gulf in Iranian borders. Terns, Herons, Gulls and Waders form important animal group heavily dependent on the coral islands for their continued existence (Scott, 1995). There are many species of these seabirds in the Persian Gulf, (Evans, 1994), but these islands are an important breeding sites for Terns, three in particular nest in vast number on the islands, these are the Lesser Crested Tern *Thalasseus bengalensis*, Swift Tern *Thalasseus bergii* and Bridled Tern *Sterna anaethetus*, also Herons notably Western Reef Heron *Egretta gularis* and Little Egret *Egretta garzetta* and some wader species especially Crab Plover *Dromas ardeola* are breeding on these islands (Scott, 1995, 2008, Evans, 1994, Behrouzi-Rad, 2008, 2009). There are 34 islands in Persian Gulf (from Hormoz Strait to Khore Mosa). 10 of the islands are uninhabitant and suitable habitat for breeding for various waterbirds. To monitor a group of birds implies that there is a need for information on the population status or health that can only be met by collecting data, because every species has a range of conditions under which it thrives. Remove any component of those conditions and the species disappears or no longer successfully reproduces (Wetland International 2003). Thus the continued presence of a species is an indication that the environmental conditions which it requires remain. By choosing to monitor a set of species that require high quality environments, specialized habitats, or conditions that a manager may want to promote a sense of the region's environmental health can be made. Since environmental or habitat health is often difficult for us to measure directly, due to the many factors (often unknown or ephemeral) that contribute to the conditions, it is often easier to measure the status of the breeding species that require them to develop an assessment. It is widely accepted that the number of waterbirds using a site is a good indicator or

that site's biological importance (Wetland International 2003), and they are also important indicators of the ecological condition of their habitats. On the other hands, migratory waterbirds are one of the most remarkable components of global biodiversity. Their long migration and tendency to concentrate in large number at particular wetlands make them both visible and charismatic. They are important indicators of the ecological condition and productivity of wetland ecosystem, and their presence is widely valued by numerous stakeholders, including local human populations, tourists, associated enterprises, hunters, (both sports and subsistence) and research biologist throughout the world. The conservation of migratory waterbirds through the principle of wise use of both the birds and habitat will therefore be seen as an investment (Scott 1980). For these reason and identifying the sensitive habitats of waterbirds of Persian Gulf, I counted the breeding population of breeding species on islands of Persian Gulf in Iranian Borders.

## MATERIALS AND METHODOLOGY

**Study Area:** The Persian Gulf has three important features. It is, in the first place, an extremely shallow sea, with an average depth of only 35 m and a maximum reaching only 100m (Basson et al., 1977). Secondly, the land masses surrounding the Persian Gulf are very arid. Rainfall is low through the region. High salinity is one of the most important environmental factors controlling and limiting the occurrence and distribution of marine life in the Persian Gulf. Thirdly, the Persian Gulf is connected with the Indian Ocean only by a narrow passage at the strait of Hormuz, and has a so-called Mediterranean circulation pattern, in which heavy, salty Persian Gulf water flows out through the bottom of the strait of Hormuz, while a compensating quantity of lighter and less saline Indian Ocean water flows inward at the surface (Basson et al., 1977). 34 islands located on northern part of Persian Gulf, four of them located on mouth of Khore Mosa in Khuzestan province, two island ( Sheedvar and Bani Faro or Faror Kochek located in Hormozgan province and four of the islands located on southeast of Bushehr. The Persian Gulf is situated in south of Iran and has 34 relatively small islands at Iranian coasts, differing in size, habitat structure and the degree of isolation. Among 34 islands, 10 islands were selected for this study (Fig1). There are no springs or surface water in these islands. Rainfall is very low, and the summer temperatures frequently exceed 40°C.

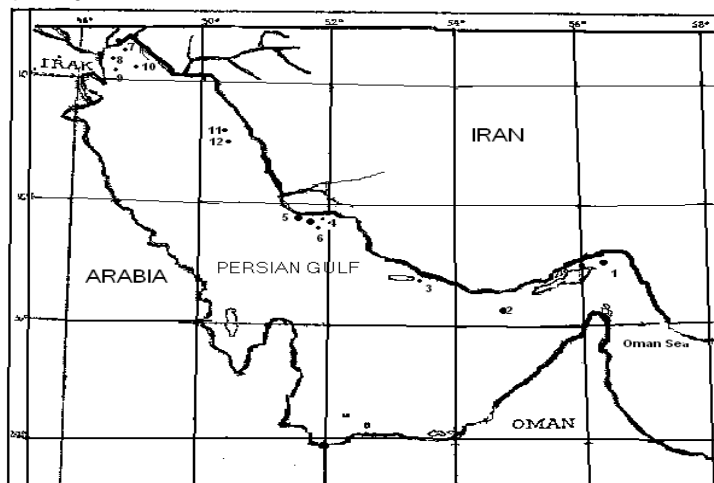


Fig1. Location of study area:1-Hormoz (27°01'34" N 56°28'28" E), 2-Bani-Faror

(26°06'51" N 54°26'43" E), 3-Sheedvar (26°48' N 35°24" E), 4-Om-Al-Gorm (27°00' N 51°33' E, 140 km SE of Bushehr), 5-Khan (27°29' N 51°16' E, 108 km SE of Blusher), 6- Nakhilo (27°49' N 51°28' E, 133 km SE of Bushehr), 7-Tiff (30°25'12" N 49°09'47" E), 8-Ghabre Nakhoda (30°20'26" N 48°55'53" E), 9- Dara (30°05'59" N 49°06'32" E ) and 10- Bone (30°08'27" N 49°10'19" E), 11-Kharku (29°18' N 50°20' E), 12-Khark (29°12'45" N 50°17'56" E)

**Methods:** Search in sensitive habitats of waterfowl in the Persian Gulf has been held from 2003-2009. Number of breeding pairs of water birds in tables 2,4,5,6 and7 (2003-2008) obtained from this study

results. Censuses of the number of breeding pairs and the contents of nests of each of 10 species were done on each island on July (1-20) 2009 in the nesting period. One or two day used for per island (one day for small islands and two days for bigger ones). Total count method was used to count the breeding population of Western Reef heron *Egretta gularis*, White Cheeked Tern *Sterna repressa*, Little Suander's Tern *Sterna suandersi*, Gull-billed Tern *Sterna nilotica*, Caspian Tern *Sterna caspia* Crab Plover *Droma ardeola* and Dalmatian Pelican *Pelecanus crispus*. Quadrate sampling method was used for the main colonies of three species: Bridled Tern *Sterna anaethetus*, Lesser Crested Tern *Thalasseus bengalensis* and Swift Tern *Thalasseus bergii*. Area of the breeding ground of each species determined by GPS on each islands. Area of the nesting place on island was 24, 30, 3, 60 and 50 hectare for Nakhilo, Um-Al-Gorm, Ghabre Nakhoda, Sheedvar and Bani-Faror (Faror Kocheh) islands.

## RESULTS AND DISCUSSION

**Breeding Species of Birds:** Total 11 species of waterbirds had been bred in 10 islands. Western Reef Heron *Egretta gularis* was only species that had been bred on 8 islands. Maximum population of this species were 92 pairs in Nakhilo, and the Saunders's Little Tern, *Sterna saundersi* (three pairs on Nakhilo), Gull Billed Tern *Sterna nilotica* (five pairs on Khan) and Dalmatian Pelican *Pelecanus crispus* (six pairs on Tiff), and Little Egret *Egretta garzetta* (two pairs on Ghabre Nakhoda) were four species that had been bred only on one island in 2009 (Table 1). Small numbers of *Platalea leucorodia* have been recorded on Morghu (Khan) mudflats in winter in 1975 (Scott, 2008).

Table 1: Breeding pairs of waterbirds in Persian Gulf Islands in 2009

Islands	1	2	3	4	5	6	7	8	9	10	Total
Western Reef Heron	12	-	1	2	92	56	12	21	-	4	200
Little Egret	2	-	-	-	-	-	-	-	-	-	2
Dalmatian pelican	-	-	6	-	-	-	-	-	-	-	6
White Cheeked Tern	6	8	6	-	12	-	-	950	-	-	982
Lesser Crested Tern	1500	45	-	-	21500	1110	-	3320	2310	-	29875
Bridled Tern	250	150	50	-	17320	135	450	15320	32340	-	66015
Swift Tern	110	8	-	-	1420	135	-	120	145	-	1938
Saunders' Little Tern	-	-	-	3	-	-	-	-	-	-	3
Caspian Tern	75	3	5	-	-	8	-	-	-	-	91
Gull-billed Tern	-	-	-	-	-	-	-	-	-	-	5
Crab Plover	520	-	-	-	2110	-	310	-	-	2940	2940
Total	2475	214	62	8	42457	1444	772	19731	34795	2944	102057

Legend: 1- Ghabre Nakhoda; 2- Boneh; 3- Dara; 4- Tiff; 5- Nakhiloo; 6-Khan; 7-Um-Al-Gorm; 8-Sheedvar; 9- Bani-Faror; 10- Hormoz

Six species of waterbirds (Socotra Cormorant *Phalacrocorax nigrigularis*, Grey Heron *Ardea cinera* Indian Pond Heron *Ardeola greyii*, Great White Egret, *Egretta alba*, Striated Heron *Butorides striatus* and Goliath Heron *Ardea goliath*) did not breed in islands in 2009, but reported as breeders in some of the island in 1970s. A pair of Lesser Sand Plover *Charadrius mongolus* had bred on Nakhilo in 2006 but it did not breed in 2009. Dalmatian Pelican was recorded by van der Have et al (2002) along the Persian Gulf coast of Iran as a wintering and now add to the breeding birds of Persian Gulf islands. More detailed characteristics are given below for each species in 2009.

**Western Reef Heron:** This species had bred on 8 island in 2009 (Table 1). Totally 200 nest counted on the islands. Maximum were on Nakhilo (92 nest- Table 1). This species bred twice on eastern high bushes of the Nakhilo Island. At first time a number of five nests received 2-4 eggs and at 2<sup>nd</sup> time three pairs of birds of this species laid eggs in the same nests the number of which were counted to be 3-4. The main population of Western Reef Heron *Egretta gularis* is summer breeding visitor in the Islands.

Breeding population of this species from 2003 to 2009 has been shown on table 2. There was three breeding colony of Western Reef Heron *Egretta gularis* on Persian Gulf islands in 1970s, 26 pairs on Um-Al-Karam (Om-Al-Gorm) in June 1975, 20 pairs on Morghu (Khan) in June 1975 and 8-12 pairs on Sheedvar island in 1972, 1976 and 1977 (Scott, 2007).

**Table 2: Breeding population of Western Reef Heron in Persian Gulf islands 2003-2009**

Islands	2003	2004	2005	2006	2007	2008	2009
Um-Al-Gurm	27	30	0	11	54	92	12
Nakhilo	0	8	34	44	64	92	92
Khan	22	35	45	77	55	72	56
Sheedvar	43	43	56	32	24	33	21
Ghabre Nakhoda	44	43	19	23	45	45	12
Hormoz	-	-	-	-	8	6	4
<b>Total</b>	<b>36</b>	<b>159</b>	<b>154</b>	<b>187</b>	<b>250</b>	<b>340</b>	<b>187</b>

**Little Egret:** Breeds in south, south East and East Asia (Cramp, 1983, del Hoyo et al, 1996)). Two pairs of Little Egret had bred only on Ghabre Nakhoda in 2009. 200 pairs of this species had bred on Mangrove trees on Gheshm island coasts on Mehran river delta ( $29^{\circ}51'34''\text{N } 55^{\circ}33' 38''\text{E}$ ) in 10 August 2009. This colony supplants between Mangrove forests on Qeshm Island and Bandar Khamir on Mehran delta. Govater Bay ( $25^{\circ}10'15''\text{N } 61^{\circ}30'30''\text{E}$ ) was other breeding habitat of the Little Egret. In 1984, 40 pairs of Little Egret had bred on Mangrove trees on Govater Bay (Behrouzi-Rad, 1984).

**Dalmatian Pelican:** Breeds in Albania, Bulgaria, Federal Republic of Yugoslavia (Serbia only), Greece, Kazakhstan, Mongolia, Romania, Russian Federation, Turkey, Turkmenistan, Ukraine and Uzbekistan (Crivelli, 1994). Following massive declines during the 19th and 20th centuries, numbers have stabilized between 10,000-20,000 individuals (Crivelli, 1995, Krivenko et al., 1994). The world population of this species is estimated at between 3215 and 4280 breeding pairs, nesting at 20 or 21 sites (Crivelli, 1981). Each nesting site can contain several colonies spread over quite a large geographical area, this being particularly true for the former USSR. The former USSR harbors between 80% and 84% of the world population of *P. crispus*. Kazakhstan alone harbors more than half of the breeding pairs in the former USSR (Krivonosov et al, 1994; Litvinova, 1994; Crivelli et al., 1994; Perennou et al., 1994) after the former USSR, Greece is the most important country, with between 6% and 8% of the world population (Crivelli, 1981; Michev, 1981; Vizi, 1981; Pyrovetsi, 1990; Scott, 1995; Vizi 1979). *Pelecanus crispus* breeds locally in south-eastern Europe, which account for less than half of its global breeding range. Its European breeding population is small (as a few as 1600 pairs), but increased substantially between 1970-1990 (Crivelli, 1994). Despite marked declines elsewhere within its global range during 1990-2000, the species underwent a moderate increase overall in Europe. Nevertheless, its population size still renders it susceptible to the risk affecting small populations, and consequently this globally threatened species is evaluated as Rare in Europe. Breeding population of this species were 5-10 pairs in Iran until 2005 (Scott, 1975, 1995, 2007, Evans, 1994, Behrouzi-Rad, 2003, 2009). The Parishan and Bakhtagan wetlands were only breeding site in Iran until 2005, and these two wetlands harbors 0.5% of the world breeding population of the *Pelecanus crispus* (Behrouzi-Rad, 1999). However, there is no chance that *P. crispus* breed in this area, flowing the major damage caused by the drying all the marshes in Fars province especially Parishan and Bakhtagan in 2005-2010. Recent and reliable estimates of the number of breeding pairs and nesting sites are shown in table 3. In June 1970, eight pairs were nesting on a disused reed boat the parishan lake. The only other breeding record of this species in the 1970s was a single nest (with two chicks) near Bandar-e- Immam Khomeini, south-east of Shadegan Marshes in January 1975 (Scott, 2007).

Table 3: Number of breeding Dalmatian Pelican *Pelecanus crispus* in Iran

Year	Breeding pairs			Reference
	Parishan	Bakhtagan	Persian Gulf	
1970s and 1995	5-10	-	-	Argyle 1975; Scott, 1995, 2007
1983	7	-	-	Behrouzi-Rad 1983 unpublished report
2003	11	-	-	Behrouzi-Rad 2003, Unpublished report
2004	9	-	-	DoE of Fars province, Unpublished reports
2005	6	3	-	DoE of the Fars Province, Unpublished
2006	0	-	-	DoE of the Fars Province, Unpublished
2007	0	-	-	DoE of the Fars Province, Unpublished
2008	drv	-	-	DoE of the Fars Province, Unpublished
2009	drv	-	-	DoE of the Fars Province, Unpublished
2010 Dec. 2009	dry	-	6	First record, Behrouzi-Rad 2009 and 2010

**White Cheeked Tern** Breeds in tropical warm waters of Indian Ocean, mainly coastal and inshore, avoiding inland waters (Cramp, 1983). Nests on sandy islands, sometimes on a bare and exposed sand-flat some 400m in from sea, or on sand blown or washed into hollows of rock surface (Cramp, 1983). On islands in Persian Gulf favors sparsely vegetated open ground, e.g. sand dunes above high-water mark on branches (Cornwallis, 1977 and Scott, 1995). On coast of Bahrain, on flat ground or sand hummocks up to 0.5 high (Gallagher and Rogers, 1978). Sheedvar Island (Iran) declined; birds remained widely distributed over open ground but withdrew from beaches Cornwallis, 1977; Scott, 2007). Nest shallow scrape, sometimes very small, unlined or with a few pieces of shell and other objects. (Gallagher and Rogers, 1978). This species had bred in five islands in 2004-2007. The number of their counted nests was shown in (Table 4). This bird had bred in two different areas consisting of one colony with 44 nests around Gabreh Sheikh Karamah in Nakhilo and the second colony in the northern part of this island with 26 nests and totally in 70 nests in 2007. On the other four islands had bred in one colony. The biggest colony was on Sheedvar, 3450 pairs in 2004 (Table 4). An abundant breeding birds in the Persian Gulf, with known colonies as follows: Kharku (1500-2500 pairs), Bushehr Bay (50 pairs), Morghu (Khan) (65 pairs), Um-Al-Karam (Om-Al-Gorm) (300 pairs), Nakhilu (Nakhiloo) (170 pairs), Sheedvar (300,000 pairs in 1972 but only 27000-45000 pairs in 1977 (Scott, 2007). Comparing the breeding number in 1970s with breeding pairs in 2003-2009 shows, the breeding population of this species declined from 300,000 in Sheedvar to 3450 pairs in 2004. This species had not bred in Kharku from 2003-2009.

Table 4: Breeding pairs of White Cheeked Tern in Persian Gulf Islands 2003-2009

Islands Name	2003	2004	2005	2006	2007	2008	2009
Um-al-Gurm	42	0	59	700	0	0	0
Nakhilo	10	74	70	67	134	26	12
Khan	44	65	35	12	16	12	0
Sheedvar	2310	3450	2190	1800	2000	1230	950
Ghabre Nakhoda	10	0	0	0	0	10	6
<b>Total</b>	<b>2416</b>	<b>3589</b>	<b>2354</b>	<b>2579</b>	<b>2150</b>	<b>1278</b>	<b>968</b>

**Lesser Crested Tern:** Breeds Red Sea, Gulf of Aden, Persian Gulf (Cramp, 1983), where present all year through number reduced in winter, (Scott, 2008). This species Breeds in lower middle and low latitudes from Mediterranean through subtropical and tropical warm seas, associates commonly with Swift tern *Thalasseus bergii* sharing nest-sites on flat sandy upper beaches, especially on low-lying islands, among dwarf or stunted and sparse vegetation, and on bare sand-spits, flat rocks or coral reefs

(Cramp, 1983). Forages in surf, but ranges well offshore, much as *Thalasseus bargain* from which no clear distinction record, (Archer and Goodman, 1937; del Hoyo et al, 1996). It is estimated 2000 birds breeding on islets in Gulf of Sirte 1937 (Bundy, 1976). In Persian Gulf breed on Sheedvar (Cornwallis, 1975; Scott, 1975; Argayl, 1975; Behrouzi-Rad, 2008), Gabre Nakhoda, Dara, (Behrouzi-Rad, 2005, 2008), Nakhiloo, Om-Al-Gorm (Scott, 1975; Behrouzi-Rad, 2008, 2009), Tahmadon (Behrouzi-Rad, 2008, 2009), Bani-Faror or Faror Kochek (Behrouzi-Rad, 2008, 2009). Breeding population of this species shown on table 5 in 2005-2009. Scott has reported the breeding of this species in 1970s as follows: Kharku island (600 pairs), Nakhilo (1000 pairs ) and Sheedvar (1000 adults and 10 nest in 1972; 40 adults and 10 nest in 1977) and Um-Al-Karam (15000 pairs).

**Table 5: Breeding pairs of Lessr Crested Tern on Persian Gulf Islands**

Islands Name	2005	2006	2007	2008	2009
Gabre Nakhoda	3212	3320	2340	2410	1500
Boneh	56	0	0	120	45
Dara	110	0	0	0	142
Nakhiloo	10169	13399	17521	17742	21500
Om-Al-Gorm	3	965	0	0	0
Khan	4245	4258	64	1230	1110
Sheedvar	2700	3200	800	2500	3320
Bani-Faror	0	0	3450	4320	2310
<b>Total</b>	<b>20495</b>	<b>25142</b>	<b>24175</b>	<b>28322</b>	<b>29927</b>

Nest site is on ground in the open and colonial. Nest is shallow scrape, unlined. In Persian Gulf 94% of clutch size was 1 and nest site was on ground in the open zone. Nest is shallow and unlined (Behrouzi-Rad and Tayfeh, 2008). These species had bred in large colony in a mixed way (Fasola, 1991). The breeding population of these birds has been shown in table 5. The average number of nests in every m<sup>2</sup> of this colony was 14.7 and the colony covered area of 1070 m<sup>2</sup> in Nakhiloo Island in Persian Gulf. Ultimately the total number of nests for Lesser Crested *Thalasseus bengalensis* in Nakhiloo Island was estimated 17657 nests in 2008. The single egg nests that Lesser Crested Tern had made were 94% and Swift Tern 99% and others were of tow-egg nests type in Nakhiloo in 2008. Of course, three egg nest pattern were rarely seen. For the said double species of tern. The rare number of them might belong to two female. A certain number of such Terns laid eggs even after the season of breeding about 5-10 m away from each other the population of each colony had 10-45 nests and in total four colonies had 85 nests. The first egg that was seen from these specie in first of June 2005 and it continued by the end of June. The chicks were born on first July and began to fly tow month later. Breeding population of Lesser Crested Tern has been relatively stable between 2004 and 2008, but increased since 1975 (15000 pairs on Um-Al-Gurm (Om-Al-Gorm) in 1975 (Scott, 1975), 21500 pairs in 2009, on Nakhilo. Nests which have been built near to the water are known to have been flooded in 2005 on Khan Island.

**Bridle Tern:** Bridle Tern breeds on islands and in some areas, on mainland, nesting under bushes on sand and coral islets. Nest site are variable, on ground in the open, or in shade of small bushes or plant. Breed in large colony, nest shallow scrape, or eggs laid on bare rock (Colin Harrison, 1975). In Persian Gulf region, breeds on Dare island near Al-Few (Ticehurst et al., 1926), Cheddar (Scott, 1975, 1995), Bone (Behrouzi-Rad, 2008), in Kuwait, 2000-3000 pairs breeds on Kubbar Island (Cramp, 1983), Nests of Bridled Tern are most often invisible. In 2006, not less than 23189 nests of Bridle Terns had bred in Nakhilo Island. Turn Stone *Arenaria interpres*, *Rattus rattus* and sometimes Crabe Plover are the natural foes to the eggs and they feed on the eggs of Bridle Tern as have been reportedly seen. This species breed in a large colony. It is noteworthy that rang of egg-laying that was measured by measuring GPS system was 22.8 hectares to 24 hectares. Maximum 32340 breeding pairs were on

Bani-Faror in 2009 (Table 6). Scott has reported the breeding population of this species as follow: Kharku islan (250-300 pairs), Morghu (5500 pairs), Um-Al-Karam (1000 pairs), Nakhilo (15000 pairs), Sheedvar (3000-3500 pairs) (Scott, 2007). This species had not breed in Kharku in 2003-2009.

**Table 6: Breeding population of Bridled Tern in Persian Gulf island 2003-2009**

Islands	2003	2004	2005	2006	2007	2008	2009
Om-Al-Gorm	24837	20620	500	700	60	50	450
Nakhilo	947	20620	23189	29461	21661	17052	17320
Sheedvar	40300	34200	36500	35050	34987	25130	15320
Bani Faror	-	-	-	-	36200	34120	32340
Khan	-	-	-	-	600	325	135
Boneh	112	-	-	-	-	-	150
Ghabre Nakhoda	310	-	-	-	-	-	250
Dara	-	-	-	-	-	-	50
<b>Total</b>	<b>66506</b>	<b>75440</b>	<b>60189</b>	<b>65211</b>	<b>93508</b>	<b>76677</b>	<b>66015</b>

**Swift Tern:** In Persian Gulf, Arabian Sea and Bay of Bengal present all year (Tuck, 1974), occurring along entire seaboard of Arabia, southern Iran, India subcontinent, and Burma to western Malaya (Ali and Ripley, 1969), but movements in relation to Natta colony unknown in absence of ringing (Moore and Balzarotti, 1983). Nest site is on bare ground or among scattered bushes (Cornwallis, 1975). Swift Tern *Thalasseus bergii* breed in colony. Maximum breeding population of this species was 1430 pairs on Nakhilo in 2009. At least 40 breeding pairs reported in 1975 on Um-Al- Karam (Om-Al-Gorm), 30-40 pairs on Sheedvar (Scott, 2007). Swift Tern and lesser Crested Tern had been bred in a large colony in a mixed manner near in Nakhilo.

**Saunders' Little Tern:** Some uncertainly about this species in west Palearctic (Cramp, 1983).. Known to breed in Iran and on Persian Gulf coast of Saudi Arabia (Scott 2008). The Saunders' Little Tern breeds only in place with no vegetation at all, or with small patches of herbs. Small part of northeast of Nakhilo has no vegetation and is breeding place for White-checked Tern and Saunders's Little Tern. Three pairs had been bred in Nakhilo in 2009. Small breeding colonies were located on islands in Bushehre Bay (10-15 pairs), on the island of Morghu (3 pairs), Ummal-Karam (Om-Al-Gorm, 5 pairs) Nakhilo (4 pairs), Hormoz island (30 pairs) and Larak (100 pairs). This species had not bred on these island in 2003-2009, (only 3 pairs had bred on Nakhilo in 2009).

**Caspian Tern:** Breeding Black, Caspian and Aral Seas. Egg-laying begins early to mid-May (Dementiev and Gladokov, 1951; Zubakin and Kostin, 1977). Breeding population of the species in Kuwait were 330-350 pairs (Sales, 1965). Migratory throughout most of west Palearctic. In Iraq eggs found early April (Ticehurst et al., 1922). Nest site is on ground in the open on sand gravel, stony beaches, or flat rocks, colonial or solitary. Nest shallow depression; usually unlined, sometimes with rim of available pieces of vegetations or debris. (Cramp, 1983). Clutch: 1-3 of nests clutches. The breeding population of the Caspian Terns is low in the Persian Gulf islands (120 pairs in Ghabre Nakhoda, 60 pairs in Buneh, 30 pairs in Dara, 5 pairs in Khan in 2002 (Pandam, 2002). The breeding areas are flat, sandy and Shelly with out any vegetation or with asperves mosaic of halophytic plants in all islands. Between 5-10 breeding pairs reported on Um-Al-Karam (Om-Al-Gorm) and 5-10 pairs on Helleh delta in 1975 (Scott, 2007).

**Gull-billed Tern:** In west Palearctic breeds in lower middle and middle latitude, in temperate, steppe, Mediterranean, and subtropical zone. Inhabits lowland coasts, estuaries, deltas, and lagoons, and also inland lakes, rivers and marshes, ascending to maintain lakes in Armenia at c.2000m (Dementia and

Gladkov, 1951; Cramp, 1983) and to similar altitudes in Turkey and Spain (Glutz and Baur, 1928). Generally near water, but less aquatic and less marine than most Sternidae. Laying begins end of April, extending to June. Nest site is on ground in the open, through usually close to tuft of vegetation, stick or other object, less often in scattered vegetation. Breed in small colony. Nest is shallow depression excavated in soil, often with rim of soil or sand, to which small pieces of available vegetation and debris added clutch 1-4. Rarely 5-6 eggs (Moller, 1975). The Gull-billed Tern is not regularly breeding in all islands of Persian Gulf. Two pairs breeder reported in 1975 from Ummal- Karam( Om-Al-Gorm), 10-20 pairs Helleh delta, Bushehr Bay 15-20 pairs (Scott, 2007). A colony with five nests discovered near Lesser Crested Tern on Khan Island in 2008. There are no data for 1980's and 1990's in Persian Gulf islands. A total of 30000 to 40000 breeding pairs of Gull-billed Tern are reported for the Former USSR (Chernichko, 1989).

**Crab Plover:** The breeding population of Crab Plover *Dromas ardeola* on Nakhilo island were 2500, 3500, 4100 and 2266 pairs in 2006, 2007, 2008 and 2009 ( Behrouzi-Rad and Tayfeh, 2008 ) respectively. By 2008, when 481 pairs of Crab Plover *Dromas ardeola* bred successfully on Om-Al-Gorm, Golden Jackal was extinct there and had not been superseded by other predators. In 2007, 2266 pairs of Carb Plover have bred in Nakhilo (Behrouzi-Rad andTayfeh, 2008). A large colony (1500 pairs) of *Dromas ardeola* was discovered in the dunes on Ummal Karam during a survey of all three islands in June 1975 (Scott, 1975). Other terns nesting on the islands at that time were *Sterna nilotica* (two pairs), *S. caspia* (5-10 pairs) and *T. bergii* (at least 40 pairs). There was also a colony of *Egretta gularis* (26 pairs) on Ummal Karam (Scott, 1975). There was another breeding colony of Crab Plover in Persian Gulf in Khore Mosa on Ghabre Nakhoda island with 520 pairs in 2009 (Table 7).

Table 7: Breeding pairs of Crab Plover in Persian Guls islands

Islands	2003	2004	2005	2006	2007	2008	2009
Nakhilo	-	-	2500	3500	4100	2266	2210
Om-AL-Gorm	700	2168	2825	2624	-	481	310
Ghabre Nakhoda	1420	870	1311	1890	2310	2420	520

### Reported Breeder Species

**Socotra Cormorant:** It is scarce and local in the southern Persian Gulf (Scott, 2008). Previously known to breed only on islands off the Arabian Coast of the Persian Gulf (Vaurie, 1965; Hue and Etchecopar, 1970) suspected that it might breed on islands off the Iranian coast. A colony of 100 pairs with 200 Juveniles was discovered at the east end of Sheedvar island (DAS et al, June 1972). About 150 birds including 50 juveniles were present at this site on 23-24 June 1976 (Argyle, 1976). Sixty birds were present on 20-21 June 1977, although no nest were found (Cornwallis, 1977), and 150 birds were present a month later on 19 July 1977(Argyle, 1976). About 90 birds were present on Sheedvar Island on 24 June 1985, 30 birds on Sept. 2004, 25 birds on Sept. 2008, but no nest or chick seen during these years on the Sheedvar island (Behrouzi-Rad, 1985, 2004, 2008). 17 birds on Faror, 16 birds on Bani Faror, on 6 Sept. 2008 and one bird on Hendoraby on 8 Sept. 2008, 12 birds on Hengam on Sept. 2007 were seen. (Behrouzi-Rad, 2008). The colony of 30,000 breeding pairs (c 20% plus world population) on Suwad Al Janubiyah Hawar is the only Socotra Cormorant colony offered protection under State Laws anywhere in the Persian Gulf. It is also the Ramsar Site nominated under criteria specific to waterbirds.

There appears to be no transfer of birds between the Persian Gulf and the Arabian Sea populations. In the Arabian Sea, colonies exist on Hasikiyah in the Hallaniyat group, Dhofar Oman and further south in Yemen nesting has been recorded on Baraqa, and Sikha Island and in Socotra archipelago on Kaal Faroon. It is rare in the Red Sea. It seems to have almost disappeared from the northern part of the Persian Gulf but breeding records exist for Kurayn (1992) Arabiyah (extinct), Kuwait on Umm al



Maradim (extinct) and Qaru (extinct). There are probably no more than 100 pairs breeding in this zone today. The Gulf of Salwa holds the highest breeding concentration of this species today, representing over half the world population. In Saudi Arabia, the number of breeding pairs is thought to have declined dramatically however birds breeding on the Saudi islands in the Gulf of Salwa seem to switch islands regularly and may breed in large numbers one year and be absent others. Colonies have been sporadically reported on the island of Zakhnuniyah (site of major colonies in the past), Judahm and Unabir. It is also possible that there is some interchange between the Saudi and Bahrain colonies. In the UAE the breeding population is c 33,000 pairs, and spread through seven colonies although development further threatens more of these. Sir Abu Nair (extinct 1987) Arzahnah (extinct 1982), Dalma (extinct 1975), Qarnain (extinct 1989), Zirku (extinct 1981), and Nai'tah (extinct), of the extant colonies there is little up to date information but records indicate colonies present on Sinaiya (1995), Dayyinah (1997), Ghagha (1995), North Yasat (1995) Dhubaya (1995), Umm Qassar/Ghasha (1995) Qassar Selaha (1995). Reports of other breeding (unquantified) are from South Furayjida (1994) Muhammaliya, (1994) Khardal (1994) and Umm al Kirkum (1992). On the Qatar east coast were it probably now only breeds sporadically it has bred on four islands in the past Hulul (extinct), Shara'ah, Al Ashat and Al Aliyah Island. They occur and probably still breed on the Iranian side of the Persian Gulf but do not get as far east as Pakistan (Table 8).

**Table 8: Status of Socotra Cormorant breeding in Persian Gulf Islands**

No	Site	Reference
<b>Might be breed</b>	-	Hue and Etchecopar (1970)
<b>100 pairs with 200 juveniles</b>	Sheedvar	9-11 June 1972 (DAS et al, 1972)
<b>150 individuals including 50 Juv.</b>	Sheedvar	23-24 June 1976 (Argayl, 1976)
<b>60 individuals (no Nest and No Juv.)</b>	Sheedvar	20-21 June 1977(Cornwalis 1975)
<b>150 individuals</b>	Sheedvar	19 July 1976(Argayl 1976),
<b>14 individuals</b>	Geshm	26 January 1974 (DAS et al, 1974)
<b>2 immature</b>	Larak	24 May 1974 (DAS et al, 1974)
<b>12 individuals</b>	Hengam	Janury 2008 (Behrouzi-Rad 2008)
<b>56 individuals (No Nest and No Juv.)</b>	Sheedvar	June 1985( Behrouzi-Rad 1985)
<b>12 individuals</b>	Faror Bozorg	January 2008 (Behrouzi-Rad, 2008)
<b>This species did not breed in last three</b>	Dedicate in	Iranian coasts of Persian Gulf

Nobody observed directly the nest or eggs of this species in Iranian side of Persian Gulf. It may breed on the southern island of Persian Gulfs (Out of Iranian coasts). The immature observed on the islands, may be, has been migrated from southern part to northern part of Persian Gulf.

**Grey Heron:** This species did not breed on islands in 2009 and there is not report of breeding of this species on Persian Gulf islands before 2009. Grey Heron had been bred on mangrove tree on Bandar Khamir Mouth of Mehran River and Govater Bay coastal wetlands in 1999 (15 pairs on Govater Bay and 25 pairs on Bandar khamir).

**Indian Pond Heron:** Breeding in southern Iran and east to India, Burma, Bangladesh and Sri Lanka. They nest in small colonies, often with other wading birds, usually on platforms of sticks in trees or shrubs. Most nests are built at a height of about 9 to 10 m and in large leafy trees. This species did not breed on island. There is not any report to breeding of this species on Persian Gulf islands. All information's and reports mentioned, that the Indian Pond Heron bred on Mangrove trees specially on Qeshm Island and Givater Bay.

**Great White Egret:** The Great White Egret is bred on mangrove tree on Govater bay and Bandar Khamir coast on Mehran river delta ten chicks of this species was ringed on Meharn river delta in August 1984. (Behrouzi-Rad, 1984). This species is not breeder of other islands. It bred on coastal wetlands habitats on trees.

**Striated Heron:** In June 1972, a small population was observed on Lavan Island and nearby Sheedvar Island in the Persian Gulf (Scott 1975, Cornwallis, 1977). Four adults and an unfledged young were found on Sheedvar Island in June 1976 (Argyle, 1976). This species had not bred in this 10 Island in 2009.

**Goliath Heron:** This species had not bred in 2009 in the islands of Persian Gulf. Breeding of this species was first suspected in Hara Protected Area in 1975, when two adults and an immature were observed amongst mangrove-fringed islands west of Laft on 5-8 June (Scott, 2008). Breeding was confirmed in 1976, when a pair was found nesting in a colony of Great White Egrets *Casmerodius albus* and Western Reef Heron *Egretta gularis* in tall mangroves on 5-6 July (Argyle, 1975). A single half-grown chick was ringed. A nest with two chicks was found in the same area on 23-24 June 1977, and again the chicks were ringed (Scott, 2008). These were the first official breeding records of this species in Iran. After that, there is not any official report of breeding of this species in Persian Gulf islands and mangrove forests.

**Lesser Sand Plover:** On 30 July 2006 three chicks of Lesser Sand plover were seen in the north of Nakhilo Island (Behrouzi-Rad and Tayfe, 2008). This species had not bred in the islands in 2009.

The terns are a distinctive group of seabirds that occupy aquatic environments the world over and demonstrate an interesting array of variations on a life history centered around aquatic foraging and colonial nesting (Bridge et al., 2005). There are many species of these seabirds in the Persian Gulf, but three in particular nest in vast number on the islands. These are the Lesser Crested Tern *Thalasseus bengalensis*, White-checked Tern *Sterna repressa* and the Bridled Tern *Sterna anaethetus*. All three species occur together on most of the Persian Gulf islands, but each has distinctive nesting habitats. The population of White-Checked Tern declined from 300,000 pairs to 3450 pairs in 2004 and 950 in 2009 in Sheedvar Island. On Khark and Kharku islands none of the terns breed in 2009. There are two main reasons for these problems; the first main reason is the developing of oil industries and occupying all surface of Khark by oil and petrochemical industries, and establishment of army in Kharku Island. The second one is increasing of the House Crow *Corvus splendens* population in Khark to more than 5500 individuals that finds the eggs and chicks of terns and eats them. However, these two problems are caused none of the species of waterbirds do not have possibility to breed on these islands (Behrouzi-rad 2008, 2009). Besides terns, which breed in summer, several other species of bird use the islands for breeding, notably Crab plover *Dromas ardeola* (Maximum 3500 pairs in 2006 in Nakhilo), Reef heron *Egretta gularis* (Maximum 92 pairs in 2008 on Om-Al-Gorm and Nakhilo), Lesser Sand Plover *Charadrius mongolus*, and land birds such as Crested Lark *Galerida cristata*. Also, at migration time in spring and in fall the islands are visited by a number and variety of shore birds such as *Tringa* ssp and *Calidris* ssp. Some terrestrial animals also inhabit the islands (Evans 1994). These include a considerable variety of insects and spiders, which have not been studied in any detail, a couple of species of Lizards, and innumerable *Rattus rattus*. The Nakhilo, Tahmadon, Khan and Om-Al-Gorm islands are a part of Dayer National Park and have few known threats. A large colony of *Dromas ardeola* was discovered in the dunes on Ummal Karam during a survey of all three islands in June 1975 (Scott, 1975). Other terns nesting on the islands at that time were *Sterna nilotica*, *S. caspia* and *T. bergii* there was also a colony of *Egretta gularis* (26 pairs) on Ummal Karam (Om-Al-Gorm). Small numbers of *Platalea leucorodia* have been recorded on Morgue (Khan) mudflats in winter (Scott, 1995, 2008). The Khan, Om-Al-Gorm, Nakhilo, Bani-Faror, Ghabre Nakhoda and Sheedvar (Wildlife refuge) islands are more sensitive habitats during summer, because 5 species of waterbirds (Crab Plover, Swift and Lesser Crested Tern, Bridled Tern and White-checked Tern) breed regularly on these islands. Gaber Nakhoda, Nakhilo and Om-Al-Gorm islands are more important for conservation of breeding population of Crab Plover (Table 7). 9-13 breeding colonies of Crab Plover were known in the Middle East, eight of which in Middle East and Three of them in the Persian Gulf islands in Iranian Border (Table 7). Fluctuation of breeding population of Terns, Crab Plover and Western Reef Heron are biological indicators for environment of islands. Quite apart from the avifauna, there are also known to

be sizeable populations of Dugong, at least two breeding species of sea turtle and an extensive, mainly undisturbed, development of coral reef and its associated fauna. All of these can be regarded as being of conservation importance equal to that of the avifauna. Coral reef is also present along the Persian Gulf coast, and is reportedly richer and more diverse than that found inside the Persian Gulf. The Green Turtle *Chelonia mynas* and Hawksbill Turtle *Eretmochelys imbricata* both breed in the Ghabre Nakhoda, Nakhilo islands and Om-Al-Gorm (Behrouzi-Rad and Tayfeh 2008).

**1% or more of Population:** Table 9 shows the breeding species of birds which their population were more than 1%. The threshold levels or individual species to be considered as internationally important according to the criteria of the Ramsar Convention in islands.

**Table 9: Breeding Population of Species are more than 1%**

Species Name	Breeding pairs	Breeding Pairs (Behrouzi-Rad 2008)
<i>Dramas ardeola</i>	1500pairs (Evans 1994)	Maximum 2500 pairs (2004-2008)
<i>Thalasseus bengalensis</i>	1000 pairs (Evans 1994)	Maximum 15000pairs (2004-2005)
<i>Sterna anaethetus</i>	21500 Evans 1994	Maximum 21000 (2004-2005)
Species restricted wholly or largely to the Middle East		
<i>Dromas ardeola</i>	Breeds (see Tables 3-6)	
<i>Sterna repressa</i>	Breeds and summer visitor, 535 individuals (Evans 1994)	
<i>Sterna saundersi</i>	Summer visitor 9 pairs (Evans 1994) 3 pairs Behrouzi-Rad 2008.	

Invasive predators, namely the *Rattus rattus*, and other birds, *Arenaria interpres* and Crab plover *Dromas ardeola* frequently interfere in success of terns. *Rattus rattus* is often noted as a predator of Cory's Shearwater chicks. Predation of chicks by Black Rats is noted where their density is high (Jean-Claude Thibault, 1989). Some colonies of terns and Crab plover on the Om-Al-Gorm and Khan islands have been deserted in the 2003 and 2004, due to predation by Golden Jackal *Canis auratus* (It was entered to this island at low tide in 2003; it removed from islands in 2005 by DoE personal). It is also believed that some colonies have been deserted in the past due to continuous disturbance of breeding site by a few fishermen. Nakhilo, Om-Al-Gorm, Tahmadon and Khan Islands are good representative example of low-lying inshore islands characteristic of the Persian Gulf. The islands support important breeding colonies of *Dromas ardeola* and terns (*Sterna* spp). Maximum number of breeding population of birds which have been censused in 2009 in the Nakhilo, Bani-Faror and Um-Al-Gorm was approximately 21500 pairs for, Lesser Crested Tern and 32340 pairs for Bridled Tern in Bani-Faror and 310 pairs for Crab Plover in Om-Al-Gorm, (Table 1). Nakhilo and Om-Al-Gorm islands are managed by a National park authority. Nakhilo, Khan (Morghu), Om-Al-Gorm (Ummal Karam) and Sheedvar are recognized as Important Birds Area (IBAs) (Enans, 1994). Important Bird Areas are areas recognized as critical to the conservation of continental population of water birds. Sheedvar is Ramsar site and the other three islands (Nakhilo, Om-Al-Gorm and Khan) can listed in the Ramsar sites as a important habitat for breeding sites of Terns (Tables 1-4). The fluctuations of the number of breeding population could be due to variation in the local environment of the islands. Many Components of the environment affect the distribution of birds species. The general habitat greatly influences the presence or absence of the through the restriction of nesting and breeding areas, nutrition, temperature, natural resources, ect. During 2004-2008 the terns species have colonized in the islands, these patterns suggest the influence of some common factors, acting on a small scale. An increase of Bridled Tern occurred throughout islands, and was attributed to the food and security provided during breeding time. The number of colonies and the average number of per colony (tables 1-3) are extremely stable between the islands, and are presumably determined by the local environment. Since 1970, only nine active colonies of Crab Plover have been reported. A colony lies in the Farasan Islands (belonging to the Saudi Arabia) in the southern Red Sea. Four other colonies are known around the Arabian peninsula, two in the United Arab Emirates (UAE) in Abu Dhabi; one on an islet off Umm al Karam (Aspinall and Hockey 2008) This colony, the largest known, held 1500 pairs in the early 1970s (Scott 2008; Evans

1994) and still survive at the present time with more than 2500 pairs. Another colony of Crab Plover with 520 breeding pairs on Ghabre Nakhoda island counted in 2009 (Behrouzi-Rad, 2009). At present, the offshore islands of the Persian Gulf, with their coral reefs, present a picture of unspoiled beauty. Their plant and animal population are rich and unique, and are exceptionally beautiful land is interactive as well as being of great scientific interest. Much of the beauty and uniqueness of these sites, however, result from the fact that they have so far remained relatively free from human interference. They represent a valuable, fragile and irreplaceable resource. (Tuck, 1974; Behrouzi-Rad and Tayfe, 2008).

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