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Population Estimation of Indus Dolphin from Jinnah-Guddu Barrage

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Abstract: In the present study population of Indus dolphin *Platanista minor* was estimated in the River Indus from Jinnah-Guddu Barrage during March 2001. Total 344, 417 and 306 dolphins were recorded in sum of best, high and low groups, respectively. Total 170 sightings of dolphins were recorded in which population ranged 306-417 dolphins. Population density per kilometer based on best estimates was found 0.41 dolphins. Mean width of the river was found 351.37 m, which was very low due to shortage of water and played important role in the accuracy of dolphin population estimation.

Key words: Indus dolphin, surfacing, sighting, population estimation

INTRODUCTION

Blind Indus dolphin (*Platanista minor* Owen, 1853) is an endemic Cetacean species, distributed in river Indus of Pakistan, hence owns its name due to its distribution. Locally the animal is called "Bhullan". Historically the species was distributed, in the Indus river system, including all the main tributaries (Jehlum, Chenab, Ravi and Sutlaj) of Indus river from the foot-hills, where the river entered the plains to Indus delta[1]. Presently it is confined to heavily turbid and silt laden waters of the Indus from about 24 km down stream of Jinnah Barrage to Kotri Barrage.

In the early 1960s, water of Indus river has been regulated by construction of Barrages, Dams and link-canals which has limited the dolphin habitat resulting into a decline in dolphin population. The most obvious and immediate threat to the Indus dolphin is from loss of habitat. Assuming that the range indicated by Anderson[1] is accurate, approximately 3,500 km of river was occupied by Indus dolphin a century ago. At present the potential habitat has shrunk to perhaps 1,400 km.

The Indus dolphin is the second most endangered fresh water dolphin and enlisted in IUCN Red Data Book since 1976. This species is on Appendix-1 of the convention on International Trade in Endangered species (CITES), hence wanted strict protection. It is also protected under Wildlife Acts of Punjab, NWFP and Sindh.

Many scientists have attempted to estimate the population of Indus dolphin in the past. Roberts[2] reported the total population of Indus dolphin below 200. Pilleri and Bhatti[3] counted 36 dolphins between Taunsa and Guddu Barrage in April 1978. A fairly good population of Indus dolphin was reported by Niazi[4, 5] Chaudhry and Chaudhry[6], Niazi and Azam[7] and Saif [8] at Taunsa Barrage. Niazi[4] estimated, 72 dolphins from Jinnah to Guddu Barrage in December 1972 at 15 unspecified location. On 27-28 January 1991, Reeves counted a minimum of 35 dolphins in the first 50 km of river upstream from Guddu Barrage.

Punjab Wildlife Research Institute, Gatwala, Faisalabad is carrying out population estimation survey of Indus dolphin annually since 1987. Minimum 109 individuals in 1987 and maximum 173 individuals in 1992 were directly observed from Chashma to Guddu Barrage.

In the present study population estimation survey was thoroughly conducted from Jinnah to Guddu Barrage during 12-31 March, 2001. The animals were counted by observing surfacing. The animal appear on water-surface for very short-time to take oxygen and dive. This rhythmic movements continue and this transitory surfacing period is very important for population estimation.

MATERIALS AND METHODS

Contrary to other Wildlife species, population of *Platanista* species can only be estimated by direct observation. All indirect clues that identify the presence of a species are not applicable in case of dolphin. Being an aquatic specie, indirect clues, such as foot-prints, faecal pellets etc. cannot be observed and results are based on direct observations only. The survey method described by Smith and Reeves[9], used for surveying *Platanista* species in other parts of its range was applied.

During this study which was conducted from 12 to 31 March 2001, two traditional wooden fishing unpowered vessels/boats were used for survey. The reasons for choosing unpowered vessels, rather than motor powered vessels were:

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a) The shallow draft ensures maneuverability in the shallow water channels where powered vessels may run aground.
b) Unpowered vessels are generally larger than smaller powered boats and offer an observation plateform approximately 3.5 m above the water line.
c) Fisher men can pull these boats along the Indus steadily at 6-7 km h^{-1}, whereas, it may be difficult to monitor a steady speed in our powered vessels.
d) Dolphin may be disturbed with noise of motor engine of the boat.

The survey team was divided into two equal groups and each group used a separate vessel. First vessel surveyed the main channel whereas, second vessel surveyed the side channel of the river. On each boat there were five research positions, serving as under:

1. Left observer-surveyed the water from in front of the vessel to 90° from the vessel on the left side.
2. Central observer-surveyed the river directly in front of the vessel and 45° on either side of the vessel.
3. Right observer-surveyed the water from in front of the vessel to 90 degrees from the vessel on the right side.
4. Rear observer-surveyed back side of the vessel and searched for dolphins missed by the main survey team.
5. Data recorder was responsible for filling the data sheets and using Global positioning system (G.P.S-Model III, Germin).

After every half an hour each member of the survey team changed his research position so that every member could participate and concentrate equally. The number of sightings recorded by each observer was highly dependent on his concentration, therefore it was important that all observers remain fresh.

Survey data form was used for collecting data on survey. Every information was recorded in data form daily. When a dolphin was sighted, its sighting position i.e. latitude and longitude was immediately recorded with the help of G.P.S and width of the river was recorded with the help of laser range finder (Bushnell Corp., Japan) The vessel was not stopped during sighting but active effort was suspended while the observers determined group size. Average speed of the vessels ranged 5-5.5 km h^{-1}. A sighting was an event and the focus of the event was animal group. Group size was estimated using best, high and low estimates, as suggested by Smith *et al.*[10]. High and low estimates were used to reflect the confidence of observers in the accuracy of the best estimate. The low estimate was considered a minimum and the high estimate a maximum count in determining population range. Population density of dolphin per km was calculated by applying the following formula:

$$\text{Density km}^{-1} = \frac{\text{Sum of best estimates}}{\text{Km covered}}$$

RESULTS

Indus river from Jinnah-Guddu Barrage was surveyed by dividing river into seven transect and moving downstream of the river. Location of each dolphin group was recorded with the help of G.P.S. First group was observed between Jinnah-Chashma Barrage at 32° 48.095' North and 71° 24.865' East. Last group was observed on the upstream of Guddu Barrage at 28° 25.931' North and 69° 43.396' East. Eighty six solitary individuals and 30 calves were observed. Two largest schools of 10 and 11 individuals (based on best estimates) at about 13 km upstream of Nishtar Ghat (28° 58.618' North and 70° 32.313' East) and 37.5 km, down-stream of Nishtar Ghat (28° 43.367' North and 70° 08.498' East), respectively were observed. During survey 170 sighting were noted in which total 344 individuals in best, 417 in high and 306 in low group size were recorded, which indicated that population of dolphin from Jinnah-Guddu Barrage ranged between 306-417 dolphins. Population density per kilometer based on sum of best estimates was calculated 0.03 in transect from Jinnah-Cahshma Barrage, which was found minimum. Maximum density was found 0.67 km^{-1} in the transect from Taunsa Barrage-Ghazi Ghat. Overall population density was found 0.41 individuals km^{-1}. Survey results indicated that the area from Taunsa Barrage Ghazi Ghat and Chachran Sharif-Guddu Barrage has a good population of dolphin. Generally, population density km^{-1} increased as we moved down-stream of the river. Survey results are shown in Table 1.

DISCUSSION

Dolphins observed from Chahsma-Guddhu Barrage during population surveys 1998-2000 are shown in Table 2. Total 131, 119 and 114 dolphins were observed in 1998, 1999 and 2000, respectively. The number of dolphins observed during the surveys was very low as compared to present survey, whereas, the survey method was almost same. Following were the reasons for the drastic increase in number of observed dolphins as compared to previous surveys.

Table 1: Distribution of dolphin population from Jinnah-Guddu barrage observed 12-31 March, 2001

Transects/location	Date	Distance/ Ave. Vessel speed	No. of dolphin sightings	Sum of estimates			Density/km (based on sum of best estimates)
				Best	High	Low	
Jinnah-Chashma barrage	12-13 Mar	68.4 km (5 km h^{-1})	1	2	4	2	0.03
Chashma barrage-D.I.Khan bridge	14-16 Mar	114.3 km (5.3 km h^{-1})	6	9	13	8	0.08
D.I. Khan bridge-Taunsa barrage	17-21 Mar	192.4 km (5.4 km h^{-1})	39	75	94	68	0.39
Taunsa barrage-Ghazi Ghat Down	22-23 Mar	86.2 km* (5.5 km h^{-1})	29	58	67	51	0.67
Ghazi Ghat Down-Khanwah	24-27 Mar	126.6 km (5.4 km h^{-1})	41	72	82	64	0.57
Khanwah-Chachran Sharif	28 Mar	88.0 km* (5.1 km h^{-1})	14	33	38	27	0.37
Chachran Sharif-Guddu barrage	29-31 Mar	153.5 km* (5.3 km h^{-1})	40	95	119	86	0.62
Total	20 days	829.4 km	170	344	417	306	0.41

* Included side channel

Table 2: Dolphins observed from Chashma to Guddu barrage during population surveys

Year	Chashma-Taunsa barrage	Taunsa barrage-Nishtar Ghat	Nishtar Ghat-Guddu barrage	Total dolphins	Approximate water flow in the river
1998	31	53	47	131	32000-41000 Cusic
1999	30	55	34	119	32000-37000 Cusic
2000	35	49	30	114	29000-33000 Cusic
2001	76	142	86	304	13000-15000 Cusic

a) During this survey water flow in the river was luckly very low, which ranged approximately 13000-15000 cusics. Side channels have mostly become finished. Only a few side channels of approximately 74 km were present, in which total 23 dolphins were observed, whereas, in the past only main stream of the river was surveyed and side channels were ignored. Due to low quantity of water, mostly dolphins had migrated to main stream of the river.
b) Two boats were used during survey. One with the left and other with the right bank of the river where width of the river was greater, whereas, Punjab Wildlife Research Institute, Faisalabad conducted population surveys in the past by using only one motor-boat and main stream of the river was surveyed whereas side channels were ignored due to lack of resources.
c) Average speed of the boats ranged 5-5.5 km h^{-1} which was very low as compared to motor-boat speed, used during previous surveys.
d) Wooden un-powered boats were used instead of powered boats because powered boats are biased as dolphin may be disturbed with the noise of the engine.

The most important reason for the drastic increase in number of observed dolphin was quantity of water flowing in the river which had reduced the width of river too much (Table 2). During the survey at every sighting width of the river was also estimated with a laser range finder, which ranged 38-1515 m. Mean width of the river was calculated 351.37 m, which was very low. This indicated that surveys intended to estimate population would be conducted at the lowest water stage of the low-water season.

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