Status of Yellow Bittern, Cinnamon Bittern and Black Bittern in Ukai-Kakarapar irrigation command area, South Gujarat

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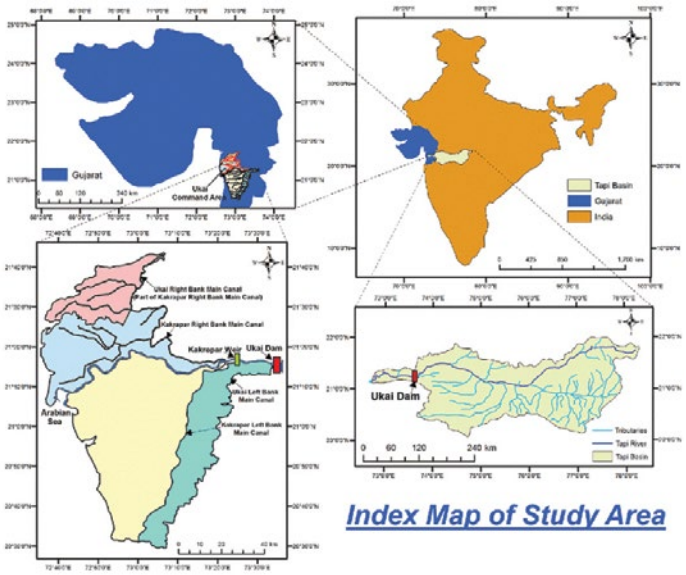

Index Map of Study Area

Bitterns belong to subfamily *Botaurinae* of *Ardeidae*. *Botaurinae* consists of *Ixobrychus*, *Botaurus* and *Zebrilus*. The genus *Ixobrychus* contains mainly small bittern species. Here, we give a report about the distribution and status of three species of bitterns, Yellow Bittern (*Ixobrychus sinensis*), Cinnamon Bittern (*Ixobrychus cinnamomeus*) and Black Bittern (*Dupetor flavicollis*), in the Ukai-Kakarapar irrigation command area in South Gujarat.

The Ukai-Kakarapar irrigation project, the second largest irrigation scheme of Gujarat, was constructed on the Tapi River in two stages in Tapi District of Gujarat. The first stage of the Kakarapar weir was constructed in 1954 at Kakarapar and the second stage of Ukai Dam was constructed in 1975 near Ukai. The project comprises of (i) Kakarapar Left Bank canal (KLBC), and Ukai Left Bank Canal (ULBC), which runs as a contour canal parallel to the Kakarapar Left Bank, and commands the area above the Kakarapar dam up to the river Par; (ii) Kakarapar Right Bank Canal commands the area between Tapi to Kim rivers, and Ukai Right Bank Canal (URBC), which starts from the Kakarapar Right Bank Canal (KRBC) and commands the area between the rivers Kim and Narmada (Rao *et al*. 1997, Karodiya *et al*. 2014). The total command area of the project is 331557 ha. (Karodiya *et al*. 2014) and is spread over fourteen Talukas of five districts, namely Bharuch, Surat, Navsari, Valsad and Tapi in South Gujarat. Map 1 shows the entire irrigation area of the project (Sharma *et al*. 2016).

Habitat in the irrigation project area

Most of the canals were unlined in the earlier days as they were made 40 years ago. Once the water for irrigation was made available, the crop pattern changed and farmers preferred crops which gave higher returns i.e. sugarcane (*Saccharum officinarum*) and other cash crops, and hence, the demand for water for irrigation also increased. The farmers started taking crops in all seasons, requiring irrigation throughout the year (Karodiya *et al*. 2014). More than twelve co-operative sugar mills are working in the area and sugarcane has become the one of major crops. Paddy (*Oryza sativa*), which requires water for irrigation at regular intervals, started to be sown in two seasons, summer and monsoon, and also became one of the major crops in the area.

The first author (JP) conducted an extensive survey in the URBC and adjoining places, which is his regular birding area. In most of the villages of URBC, besides the main village pond, natural and man-made streams exist, and there are small tanks in the fields, which are locally called '*sim talavadi*'. The roads also have in-built drainages on both sides. All these ponds, streams and at some places, even the drainages, remain full of water throughout the year due to constant water supply from the dam. On account of easy availability of water, farmers of the area tend to irrigate their crops excessively. As a result, a huge volume of run-off water gets accumulated in the adjoining uncultivated or barren lands or flows to

streams, lakes and drainages (Patel 2015). Seepage, percolation, overflow, cracking, and damaging of the earthen canal also adds to the volume of water. Waterlogged areas and wetlands are prevalent in most parts of the URBC command area, which could be due to perennial irrigation facilities provided for sugarcane cultivation, improper maintenance of field channels and inadequate drainage causing water stagnation and luxurious growth of hydrophytes and sedges. Plant species occurring on waterlogged and aquatic lands include *Typha angustata*, *Ipomoea aquatica* etc. (Rao *et al*. 1997). Due to this suitable environment, one of the major growths in the area is of *Typha angustata*. Most of *sim talavaldi*, flooded barren lands, periphery of canals and drainages beside roads, are covered with dense or scattered perennial hydrophytes and this provides suitable habitat for bitterns. Very few villages of URBC, which lie at the end of the canal, do not have growths of *Typha angustata*. At some places, it is extremely dense and covers large areas e.g. more than 50 ha. at Ankalava (Hansot), more than 30 ha. at Bolav (Hansot), 30 ha. at Nangal (Ankleshwar) and more than 25 ha. at Adol (Ankleshwar).

The same geographical, agricultural and marshy conditions were found by the second author (YP) in his regular birding area of KRBC of Olpad and Choryasi, by the third author (BP) in many parts of Kamrej and Bardoli of KLBC, and by the fourth and fifth authors (MP & PK) in many parts of Navsari and Jalalpore of KLBC. We have received reports from other bird watchers that similar conditions are present in scattered areas in other parts of this region.

Bittern sightings

Reports of three species, Yellow Bittern, Cinnamon Bittern and Black Bittern, are given in two different tables. The first table contains Takula-wise survey for distribution of these three species in URBC and adjoining areas by the first author (JP). His survey was in all 46 villages of Hansot, 30 villages of Ankleshwar, and 5 villages of Mangrol under URBC area, 19 villages of Olpad under KRBC, adjoining URBC.

The second table contains Taluka-wise sightings by other authors in total 79 villages of Olpad, Kamrej, Bardoli, Jalapore, Navsari and Surat city under command area of KRBC and KLBC. Olpad Taluka is under KRBC while other areas are under KLBC. These sightings were recorded during regular birding trips and were made without specific surveys. The sightings were spread over the last five years and were recorded in all seasons.

Yellow Bittern

Grimmett *et al*. (2011) show only isolated records for Yellow Bittern for Gujarat. Rasmussen & Anderton (2012) mention it as a breeding visitor in western Gujarat (i.e. some parts of Kachchh). However, both these texts do not show any records for South Gujarat. According to Ganpule (2016), it is an uncommon breeding migrant, seen in many areas of Saurashtra and scattered elsewhere in the state, and is relatively the most common bittern in Gujarat.

Jugal Patel

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Distribution and density

Table 1: Taluka-wise summary for Yellow Bittern observed by the first author (JP)

Sr.	Name of Taluka	Villages visited	Villages where it was found	Percentage
1	Hansot	46	37	80.43
2	Ankleshwar	30	25	82.75
3	Olpad	19	15	78.94
4	Mangrol	5	3	60.00
	Total	**100**	**80**	**80.00**

Thus, Yellow Bittern was found in 80 % villages of the area in URBC and adjoining area during surveys by JP.

As given in Table 2, the species was sighted in 13 villages of Olpad, 5 villages of Surat outskirts area, 29 villages of Kamrej,

8 villages of Jalalpore, 9 villages of Navsari, and 14 villages of Bardoli by the other authors.

Table 2: Taluka-wise summary for Yellow Bitterns observed by the other authors

Sr.	Name of Taluka	Villages visited	Villages where it was found	Observers
1	Olpad	13	13	Yogesh Patel
2	Surat City	5	5	Yogesh Patel
3	Kamrej	29	29	Bharat Patel
4	Jalapore	9	8	Minal Patel, Priyank Kapdi
5	Navsari	9	9	Bharat Patel, Minal Patel
6	Bardoli	14	14	Bharat Patel, Minal Patel

Generally, all species of bitterns are shy and secretive, and live in dense vegetation. We could see only the birds which were perched on top of reeds or which were in flight. However, 20 birds at Sisodra, 14 at Mangrol, 13 at Adol and 12 at Untiyadra were seen within half an hour by JP in URBC during one visit. As mentioned earlier, the majority of villages of URBC and KRBC have more than one area of reeds or a long belt of reeds along the canal and road, which are most suitable habitats for the species. From these figures, we can get an idea about the density of the species here. Thus, the Yellow Bittern is widespread and common in the Ukai-Kakarapar irrigation project.

Status

Table 1 contains the results of the survey of hundred villages of URBC and nearby areas in all seasons, and multiple sightings were noted in most of the villages. The species was found only in the summer and monsoon, from mid-March till end of September, except on three occasions in URBC when it was seen in the winter. These sightings are as follows: three birds seen on 15 February 2018 at Untiyadra, where one individual was seen continuously for fifteen days; one bird at Kalam on 02 October 2017 and one bird at Moti Pardi, Mangrol on 26 January 2012. We intensively searched for the Yellow Bittern along with other bittern species during the winter for five years. However, the species was found in the winter only on three occasions as mentioned here. We also checked the possibility that it may be resident here but we did not find it during the non-breeding season, when it remains hidden in the thick vegetation at day time. *Typha angustata* is a perennial species in the area; however, it dries out for a month during the winter at a number of places because the canals remained closed for one to two months from 2013 due to maintenance and other reasons. During this period, dried reed beds were burnt and destroyed many times by the villagers. Compared to summer sightings, these three sighting are very less, and hence it seems that the Yellow Bittern is mainly a summer visitor in the URBC area.

However, its status is still not clear in other areas of the project, especially southwards of Tapi. Table 2 contains records of other authors. It should be noted that these sightings were not a part of intensive surveys but are the result of sightings recorded during bird watching trips.

However, some records in winter are available. Minal Patel and Priyank Kapdi have seen the species in twelve villages (Table 2) and the sightings were made multiple times in most of the villages. Out of these, only two sightings of the species were in the winter. Almost no data of the species is available on popular website 'eBird' (accessed on 28 September 2018), probably due to the fact that very few birders of South Gujarat use the site. There are twelve records of the species southwards of Tapi and out of these, four records are from the winter; two records at Gaviyar (Surat), one at Navsari and one at Devsar (Bilimora). This data is insufficient to decide whether it is resident or migratory southwards of Tapi. Further research in the winter is required to know the true status of the species here.

Breeding

During May and June, we observed the birds chasing each other, circling in flight, calling, calling with stretched and inflated throat from top of trees when perched etc. Juveniles were observed during July - August. Hence, the species is definitely breeding here.

Conclusion

Overall, our conclusion is that Yellow Bittern is a widespread and common summer breeding visitor in URBC and considering the number of records southwards of Tapi, the species is probably a common breeding resident in other areas of the project.

Cinnamon Bittern

Grimmett *et al*. (2011) show it as a winter visitor around the Gulf of Khambhat and give one isolated record from Kachchh. Rasmussen & Anderton (2012), in the distribution map, give it as resident in coastal South Gujarat, up to Khambhat, and also in Kachchh. Ganpule (2016) gives it as 'uncommon monsoon/ breeding migrant; reported from Saurashtra and South Gujarat, and in suitable habitats locally all over the state'.

Jugal Patel

Distribution and density

Table 3: Taluka-wise summary for Cinnamon Bittern observed by the first author (JP)

Sr.	Name of Taluka	Villages visited	Villages where it was found	Percentage
1	Hansot	46	36	78.26
2	Ankleshwar	30	25	83.33
3	Olpad	19	14	73.68
4	Mangrol	5	2	40.00
	Total	**100**	**77**	**77.00**

Thus, Cinnamon Bittern was found in 77 % villages of URBC and nearby areas surveyed; 21 birds at Sisodra, 15 at Mangrol, 12 at Adol, 12 at Rohid were seen within half hour in URBC. Thus, it is common in URBC and nearby areas.

As per details given in Table 4, the species was seen in 13 villages of Olpad, 5 villages of Surat outskirt, 29 villages of Kamrej, 8 villages of Jalalpore, 9 villages of Navsari and 11 villages of Bardoli. Hence, the species is wide spread and common in the Ukai-Kakarapar irrigation project. This species is less common than Yellow Bittern but more common than Black Bittern.

Status

During our surveys in URBC, this species was seen only in the summer and monsoon season, except on one occasion when it was found in the winter on 15 February 2018 at Untiyadra and it may be an exceptional sighting. The species was found from March till end of September. No data is available on 'eBird' regarding sightings of Cinnamon Bittern in the winter. Hence, Cinnamon Bittern is a widespread summer visitor in this area. However, further study is required, especially southwards of Tapi in the winter for knowing its true status here.

Table 4: Taluka-wise summary for Cinnamon Bittern observed by the other authors

Sr.	Name of Taluka	Villages visited	Villages where it was found	Observers
1	Olpad	13	13	Yogesh Patel
2	Surat City	5	5	Yogesh Patel
3	Kamrej	29	29	Bharat Patel
4	Jalapore	9	8	MInal Patel, Priyank Kapdi
6	Navsari	9	9	Bharat Patel, Minal Patel
7	Bardoli	14	11	Bharat Patel, Minal Patel

Jugal Patel

Breeding

Males were seen in characteristic breeding plumage like orange bill, purple-red lores and bright legs. Courtship and territorial behavior was observed, which was similar to Yellow Bitterns. Chicks and juveniles were observed during August to September. Thus, it breeds here.

Conclusion

Cinnamon Bittern is a common summer breeding visitor in the entire command area of the project.

Black Bittern

Grimmett *et al.* (2011) show only isolated records of Black Bittern from Gujarat while Rasmussen & Anderton (2012) do not give any records from the state. The species was not recorded in Gujarat by Ali (1954). Ganpule (2016) mentioned it as 'uncommon/rare monsoon breeding migrant', with the

remark that it is probably more common than believed. Dr. B. M. Parasharya and others have been recording the breeding activity of Black Bittern, along with Yellow Bitterns and Cinnamon Bitterns in Kheda and Anand Districts since 1990 (Mistry 2016). A recent sighting from Daman is also known (Mishra & Patel 2017).

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Distribution and Density

Table 5: Taluka-wise summary for Black Bittern observed by the first author (JP)

Sr.	Name of Taluka	Villages visited	Villages where it was found	Percentage
1	Hansot	46	25	54.34
2	Ankleshwar	30	23	76.66
3	Olpad	19	9	47.36
4	Mangrol	5	2	40.00
	Total	**100**	**59**	**59.00**

The species was found in 59 % of villages of URBC and nearby areas where surveys were conducted. It was seen in groups of three to four birds at a number of places. Thus, it is wide spread and common in the area of URBC.

As per details given in Table 6, the species was sighted in four villages of Olpad under KRBC, three villages of Surat outskirts and Jalalpore, each under KLBC. Piyush Patel has reported it from Majigam, Chikhli (*pers. comm*., verbally). One sight record by Trupti Vyas in October from Navsari was obtained from 'eBird'. Hence, the species is widespread but not very common, at least in KRBC. Further study is required in areas like Kamrej, Bardoli etc. from where no sighting has been reported yet.

Table 6: Taluka-wise summary for Black Bittern observed by the other authors

Sr.	Name of Taluka	Villages visited	Villages where it was found	Observers
1	Olpad	13	4	Yogesh Patel
2	Surat City	5	3	Yogesh Patel
3	Kamrej	29	0	Bharat Patel
4	Jalapore	9	3	Minal Patel, Priyank Kapdi
6	Navsari	9	0	Bharat Patel, Minal Patel
7	Bardoli	14	0	Bharat Patel, Minal Patel

Status

This species was seen only in the summer and monsoon season. It was found from March up to second half of October. None of us has observed it in the winter. However, Mukesh Bhatt has reported one Black Bittern on 27 January 2016 on Olpad-Surat Road (*pers. comm*., verbally) and this is the only record in the winter from entire South Gujarat in the recent past.

Breeding

Juveniles were observed from June to September. Two chicks were seen on 4 June 2015 at Untiyadra by the first author, which was the earliest nesting observation, and juveniles, which still had hair on their crown, were observed on 2 October 2018 at Parvat, which was the last observation of juveniles. It seems that its breeding starts earlier compared to Yellow Bittern and Cinnamon Bittern, and is spread over four months.

Thus, the Black Bittern is a widespread and common summer breeding visitor in URBC area and widespread and not very common summer breeding visitor in KRBC and KLBC. However, this species is less common when compared to Yellow Bittern and Cinnamon Bittern.

Habits

Generally, it is believed that bitterns are crepuscular, shy and secretive, and usually hide in thick vegetation. We have observed all these species on top of reeds, foraging, feeding chicks, and in flight in day time from morning to noon and two hours before sunset. Yellow Bitterns and Cinnamon Bitterns were occasionally observed on shrubs or trees of medium height while Black Bittern was frequently observed

on trees. Yellow Bitterns and Cinnamon Bitterns were seen calling from top of reeds for five to ten minutes but Black Bittern was never seen calling in the open. We observed that Cinnamon Bittern continues calling even in the presence of humans. Probably, bitterns are bold during the breeding season. However, the first author (JP) has observed Yellow Bittern foraging during day time, without being concerned by his presence, and also in the non-breeding season (winter) for fifteen days at Untiyadra in February. All these three bitterns were breeding at the same place in a mixed colony. Once, in 2013, the first author (JP) observed a breeding colony of Cinnamon Bitterns in a 50 mts area, next to a colony of Yellow Bitterns in another 50 mts area and thereafter, a colony of Black Bitterns. This is quite unusual, and has not been reported from our state earlier.

Threats

Barren land is one of the major parts of reed beds in the area. In a number of places, especially in Hansot and Olpad, the barren land is converted into legal and illegal fish and shrimp farms. Further, these farms use crackers to keep away egrets and herons (*Egretta* sp. and *Ardea* sp.), which also affects nearby roosting and nesting of bitterns. These trends are increasing day by day and the government is allocating more and more land for these farms. Farming of Eucalyptus (*E. globulus*) for paper mills is also increasing in this uncultivated and less fertile land. *Sim talavadies*, which is one of the main parts of reeds, are now-a-days hardly used for irrigation, and are being cleaned and dug under various government schemes like '*Sujalam Suflam*' or even illegally by the clay mafia, which is a major threat. Very deep lakes are not useful for *Typha* species and we have noticed that at most places, these *sim talavadies* were dug deeper than approved by the government for the purpose of illegal sale of soil by the contractors. The removal of the reed beds along road and canal sides by farmers and government agencies due to various reasons is also one of the major threats. Sugarcane is a major crop and in earlier days, at the time of it harvesting, labourers used sugarcane leaves for bundling stalks of sugarcane. Now, labourers harvest the crop and use *Typha angustata* for bundling the stalks. Due to this extensive cutting, reed beds are destroyed in some areas, especially in Bardoli and Kamrej. Water level in the dam and irregularity in irrigation schedule has also affected the habitat. All unlined canals are now being repaired with concrete, which has reduced seepage and percolation of water, and this will affect reed beds in the long term. The continued presence and nesting of bitterns in this area depends on the reed beds and necessary action is required to be taken to conserve this habitat in this region.

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