YEARLY REVIEW

Year 2021

Tiger population in 'Panna Tiger Reserve', M.P.

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This Yearly Review of tiger population in Panna Tiger Reserve (PTR) brings out net addition to number of tigers in PTR in a calendar year. All known births and all known deaths have been taken in to consideration in coming out with a figure. In addition to the number of tigers, this review will also try to provide information on health of tiger population from the point of view of genetic diversity of cubs and to check, whether or not, new born cubs are due to pairing of close siblings, which may raise questions of inbreeding in future.

1. Tiger Numbers

a) Scenario at the end of the year 2021:

It was expected that there will be more than 12 breeding tigresses by the end of year 2021 and at least 7-8 tigresses will give birth to cubs in year 2021. As of 31/0122021, following 13 tigresses are in the 'breeding tigresses' category:

Breeding Tigresses of PTR		
Sr No.	Tigress	Approximate Age
1	T1	15
2	T2	15
3	T6	11
4	P222	9
5	P234	8
6	P433	8
7	P141	7
8	P142	7
9	P151	5
10	P643	4
11	P234-22	4
12	P234-23	4
13	P141-12	4

Though T1 and T2 are added in the list of breeding tigresses, due to their age they might not further breed. T1 has not produced any litter for last 5 years while T2 has not produced litter for last 3 years.

Following is the list of 9 tigresses who have given birth to cubs in year 2021:

Table 2

Sr No.	Tigress	Approximate Age	Number of cubs Surviving	Age of Cubs (as on 31/12 2021)
1	T6	11	4	9-10 months
2	P222	8	1	10 months
3	P234	8	3	7-8 months
4	P142	6	1	9-10 months
5	P151	5	2	10-11 months
6	P643	4	1	10-11 months
7	P234-22	4	2	11-12 months
8	P234-23	4	3	10-11 months
9	P141-12	4	1	10-11 months
TOTAL			**18**	

Pic 1: T6 with her four cubs

Pic 2: P151 with her two cubs

This list of 9 tigresses includes following four tigresses which have produced their first litter in year 2021:

1. P 643 - 1 cub surviving
2. P 234-22 - 2 cubs surviving
3. P 234-23 - 3 cubs surviving
4. P 141-12 - 1 cub surviving

b) Net addition to tiger population in year 2021:

There are 13 breeding tigresses at present (11 if we remove T1 & T2). Out of these eleven, 9 tigresses have produced litter with a total of 18 surviving cubs in year 2021.

Now for the loss, following is the detail of tiger deaths in 2021:

1. Tigress P213-32 died on 15/05/2021.
2. Tigress P213-63 died on 10/11/2021.

In addition to death of above two tigresses, tigers are continuously moving across the boundary of PTR in to the Panna Landscape. Till now, as per records kept, more than 35 tigers have been considered to dispersed out side PTR. Taking average dispersal rate of 4 tigers per year, it can be assumed that 4 tigers might have dispersed in to Panna Landscape in year 2021. At the same time, earlier considered dispersed tigers have also come back to PTR after a long gap. For example: Tigress P151-11, age nearly 3 years was seen in South Panna division in June 2021 and was considered dispersed. But she is now again seen inside PTR since November 2021. Similarly, P213-32(13), male tiger, considered dispersed since September 2020, has again been seen inside PTR since September 2021. This flow of tigers inside and outside of PTR is difficult to predict, monitor and manage.

Overall, 18 new entrants, 2 deaths and average 4 dispersals, makes it 12 net addition in the tiger population of PTR in year 2021.

In addition to dispersing into Panna Landscape for space and suitable habitat, within PTR also, tigers are exploring new areas which were earlier having no presence of tiger. In this process, for the first time, three tigresses have given birth and raring cubs in the PTR Forest Ranges West of Ken river, in Chhatarpur district. We are having at least 8 adult tigers along with 2 cubs currently in these Forest Ranges West of Ken river within the boundary of PTR. There are, at least, three tigresses namely P641, P642 and P433-22, on west side of Ken River, which are expected to give birth in early year 2022. This number will grow further as lots of habitat improvement work has been done in these areas assessing their potential in becoming good tiger habitats. The area is in contiguity with the forest of Chhatarpur Forest division which makes it large enough to have good tiger population.

c) Projection for Year 2022:

Following is the list of 10 tigresses which are likely to be added in the list of breeding tigresses in the year 2022:

Tigresses which are expected to be added in the list of Breeding Tigresses in 2022		
Sr No.	**Tigress**	**Approximate Age**
1	P 641	4
2	P 642	4
3	P 152	5
4	P 213-62	3
5	P 652	3
6	P 653	3
7	P 433-21	3
8	P 433-23	3
9	P 222-32	3
10	P433-22	3

Along with these 10 tigresses, P141 and P433 can also be expected to produce litter in year 2022. So, a total of 12 tigresses can be expected to produce litter in year 2022. With an

average litter size of 2, end of year 2022 may see a further addition of 24 cubs in to the tiger pool of PTR.

And along with these 12 tigresses, if we add 9 tigresses who have produced litter in year 2021, PTR will be having 21 breeding tigresses by the end of year 2022, which is a great news for PTR as for a viable tiger population, 20 breeding tigresses is a requirement (NTCA guidelines). Further, with 20 breeding tigresses, a viable population of 75-100 tigers can be sustained within a Core or inviolate area of around 800 sq km and 1000 sq km of Buffer area. PTR has a Core area of 576 sq km and a Buffer of 1021 sq km. With these statistics, it is certainly possible for PTR to have a viable tiger population of around 70-80.

Death are hard to predict but with increasing numbers, there will be more conflicts, amongst tigers and between human and tigers, which will lead to more tiger deaths. This increasing death figure will not threaten the existence of tiger in PTR, but need to be managed pragmatically by all. Concluding every tiger death as end of tigers in PTR cannot be the way ahead.

2. Genetic diversity

Panna's success has been attributed to high genetic variation among individuals, lesser anthropogenic disturbance and stress, and effective technological and management inputs. As per the joint study report of PTR and Wildlife Institute of India (WII), Dehradun, "Tiger reintroduction and recovery programme for Panna Tiger Reserve and Landscape complex-Project II (2014-19) Project Document", the genetic diversity of PTR tigers is moderate with 60% heterozygosity and structurally represent all the source populations and also include gene pool of original Panna population. It has kind of recreated the genetic mixture that would have existed in Central India many decades ago, before the habitat fragmentation and population isolation would have occurred.

Pic 3: Cubs of Tigress P141: P141-21 & P141-22 (Dec 2021)

[*P141-21 and P141-22, both male, born in 2020 and nearly 20 months old now, are considered little bigger in size (length and height) compare to other tigers of their age in PTR. They are widely believed to look like 'Panna Tigers of Older Times' (before local extinction in 2009) which were famed for their big sizes, at times up to 12 ft in length*.]

Joint Study Report also emphasizes that geographically and genetically closer population might be a hinderance in population growth. Charles Darwin (1871) has said that 'sexual choice is a specialized phenomenon in natural selection and plays a significant role in mating success'. It has been an accepted fact that the phenomenon of induced ovulation in felids is about females consciously choosing mates to improve genetic fitness of their off-spring. There might be genetic rejection amongst tigers if they are from same meta-population and possible relatedness.

Let us observe the genetic diversity of cubs born in year 2021 as per the record of PTR, based on relationship of their parents. Following is the list of 9 tigresses who have given birth to cubs in year 2021 and possible male tiger who fathered the cubs:

Sr No.	Tigress	Possible Male tiger (Father)	Cub's ID	Genetic Relationship
1	T 6	P 431	P661,662,663,664	Un-related
2	P 222	P 431	P222-61	Un-related
3	P 234	T 7	P234-41,-42,-43,-44	Un-related
4	P 142	P 621	P 142-31	Related
5	P151	P 621	P151-21,-22	Related
6	P643	P 222-21	P643-11	Distantly related
7	P234-22	P 111/ T 7	P234-22(11),(12)	Distantly related
8	P234-23	T 7	P234-23(11),(12),(13)	Distantly related
9	P141-12	Not known	-	-

As tiger population in PTR has been started by seven translocated tigers, from four different gene pool, current tiger population will mostly be genetically related to each-other, at times closely and sometimes distantly. And there will also be few cubs from unrelated parents. But eventually due to area limitation and absence of corridors, tigers will mate with other tigers in their own population in PTR. Over time, this will result in inbreeding, they will end up mating with their relatives. Whether this inbreeding compromises their fitness, their ability to survive, we do not yet know. The genetic mixing is an ongoing process and we have not yet seen 'inbreeding depression' in PTR which would be manifested by tigers with bad mutations. While genetic diversity across a population improves their chances of survival in future, fragmentation of tigers can decrease this variation, and endanger them. Enabling tigers to move between protected areas can help overcome these bottlenecks. This would require right type of habitat between Protected Areas. Having densely populated human settlements would not work.

3. Conclusion

It is true that everybody is fascinated by increasing tiger numbers. The faster it is, the better it is. It has led to a situation where even natural death of a single tiger is a depressing news. Tiger number cannot increase at the same rate as these have increased in past few years as limit of space and suitable habitats will bring the upper ceiling. But, stagnancy in numbers doesn't mean that a smaller number of cubs will be born. Cubs born will be more but at the

same time, death will also be more due to increasing competition amongst tigers for space and suitable habitat. In Panna Tiger Reserve, we have around 12 net addition in tiger numbers for the year 2021. This may also hold true for next few years i.e. net addition in tiger population in PTR. But it may not hold true for years after that as we are moving close to carrying capacity of PTR. We at PTR still believe that in next 3-4 years PTR will hit the figure of 100 Tigers (including cubs) as we are on the growth phase of Tiger Population Curve. But PTR can no longer just count on the success of tiger populations by numbers alone. Population management and conservation action must incorporate information on genetic variation. Doing so will help PTR maintain the gains in tiger conservation achieved so far…

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NOTE: Data used in above article is from data kept and gathered on weekly basis in PTR using 'Continuous Camera Trap' method, a management tool employed since 2016.

Picture Contribution:

i. Mr Sangram Goverdhane (Pic 2)
ii. Mr Hemant Masurkar (Pic 3)
iii. Pic 1: PTR archive