Establishing a population-density estimate in suitable habitat range of Red-shouldered Vanga *Calicalicus rufocarpalis* in southwest of Madagascar

By

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Calicalicus rufocarpalis

Type of spiny forest Habitat

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Summary

Red shouldered Vanga showed low density at all records varying between one to three individuals per hectare per transect surveyed. More detailed densities estimations are reported in this project allowing more accurate estimation of total population size of Red-shouldered Vanga in future. The range of Red shouldered Vanga in protected areas (Tsimanampetsotsa National Park) increase since we found new areas of presence of species in remote places of the park in which the species may take refuge. The chance to sight the species at its northern limit range (Ankilibe road to St-Augustin) starts to decrease since the human disturbance on spiny forest habitat around these sites continues to increase. The restriction of the range of this species from its north limit could continue to appear since the species became difficult to sight outside of protected areas. Further investigation is needed for determining the change on the northern and southern range limits of species.

Introduction

Expedition was initiated between 21st August and 22th December 2011 inside the band of spiny forest in which distribution of target species is known. In addition, further visits were also made before and after this above fieldwork period. Given the large patches of species range and limitation from logistic arranging and transport, we surveyed only some points which may give an idea about the home range density of species around its known distribution.

Red-shouldered Vanga *Calicalicus rufocarpalis* is a Malagasy endemic bird species. It is actually classified by IUCN as vulnerable (BirdLife International 2013). It was a new species firstly described in 1997 (Goodman *et al.*1997, Hawkins *et al* 1998). It inhabits in small patches of spiny forest ranging in southwest of Madagascar but previous records revealed the presence of species around Andatabo road to Saint-Augustin (Morris and Hawkinsn1998), Hatokaliotse (Zicoma 1999), Tsimanampesotse National Park (Goodman *et al.* 2002) and south of Menarandra river (Sim and Zefania 2002).

Recent observation showed the presence of the species around Andatabo mountain and Road to St-Augustin when the other study reported none resighting of species in that area (Scott et al. 2008).

Studying its distribution, population size of species and initiation of conservation measures in priority areas are recommended as priority in Zicoma 1999. And establishing a population-density estimate in different habitats and degree, carrying out sample surveys of suitable habitat in its projected range to confirm its presence /absence especially in south of Lintsa are proposed as conservation measures for the species (BirdLife 2004). This project was initiated to address some of these recommendations focusing on the objectives below.

Objectives

- To estimate density of Red-shouldered Vanga in spiny forest suitable habitat between Onilahy River (S23º33' E43º47') and Menarandra River (S25º11' E44 º 30');
- To map the important bird areas of species among its range;
- To train local people (including local agent of protected area) on surveying the species,
- To publish latest knowledge and data about the species toward local manager of park (Madagascar National Parks) and tourists agencies.

Study sites

We visited the following sites from the north to the south:

*** Site 1: Ankilibe-Namakia**

- Ankilibe: S23.42 E043.75
- Namakia: S23.44 E043.76

*** Site 2: Ambohimahavelo**

- Ambohimahavelo: S23.43 E043.90

*** Site 3: Tsimanampetsotsa National Park**

- Mitoho: S24.06 E043.76
- Poste de Garde: S24.11 E043.93
- Vohodambo: S24.25 E043.79
- Ankororoky : S24.70 E044.01
- Ankilimitata: S24.80 E044.12
- Antagnatagna: S24.56 E044.13
- Antatiboatavo: S24.31 E044.00

*** Site 4: South of Manarandra River**

- Lintsa: S25.02 E044.43

Materials and methods

(i) Density estimating using distance sampling: transect with distance in bands

Transects were installed at each survey area (sub-site). Each transect was visited once or several times according to the access.

For each survey time (between 6 to 10 am and 3 to 5pm), I work slowly the predefined transect with very limited speed (1 to 2 km per hour). Observer should be very quiet for listening or /and observing every individual species found.

I noted down the site, the date, the number of transects, the starting time. During each transect survey; I took the number of individuals found with its placement (inside or outside of bands) and GPS locations for each group of target species encountered. I fixed the distance of band line from transect as 50m on left and 50m on right and sometimes 25m each. Length of each transect is measured with GPS at the end of each visit.

I worked with local people and student and trained them on species identifying (morphology and song) and surveying method during the fieldwork of this project.

Density of target species is calculated from the following formulate: D = 10NK/L (Zicoma 1997) where:
D= Density = number of individual per square metre or per hectare

N = total number of individuals = number of individual inside of band (n1) + those in outside of band (n2)

L = transect length,

K = detecting index = [1- square roots of (1-p)]/Y where

p = detecting probability of target species = n1/N

Y = distance between the transect line and band of observation = 50 m

Every visit of transect has an estimation of density and I choose only the highest value of estimation for illustrating the home density of studied species in each transect.

(ii) Distribution of target species

All GPS coordinates corresponding to the presence of Red-shouldered Vanga which were recorded during the surveys are placed together for mapping the distribution of species in its habitat home range.

Results

We focus on density estimation and distribution.

Population-density estimate

Table 1: Population-density estimate of Red-shouldered Vanga in its suitable habitat Density

Sites	Sub sites	Transects number	Number of individuals	Transect length (m)	Density (individuals/ ha)
Tsimanampetsotsa National Park	Mitoho	1	1	4000	1.00
		2	1	2010	0.00
	Poste de garde	1	3	5250	0.42
		2	5	6030	0.75
		3	7	6480	2.69
		4	5	2850	2.58
		5	0	614	0.00
	Vohodambo	1	0	1200	0.00
		2	1	2000	1.00
		3	2	1000	0.00
		4	2	3030	0.00
	Antagnatagna	1	10	4840	0.44
		2	0	3490	0.00
		3	10	7560	0.00
		4	7	2070	1.05
		5	6	896	1.17
		6	6	2350	1.50
		7	6	1540	0.00
		8	0	1090	0.00
	Antatiboatavo	1	3	1700	0.00
		2	10	4540	1.29
		3	1	2690	0.00

		4	6	2800	0.00
		5	0	2450	0.00
		6	6	4620	0.00
		7	5	3260	1.13
		8	4	3350	0.32
		9	4	3880	1.03
	Ankilimitata	1	4	2400	1.67
		2	4	4200	0.95
		3	3	1090	1.01
	Ankororoky	1	1	5150	0.39
		2	2	4030	0.00
		3	0	4000	0.00
South of Menarandra river	Lintsa	1	3	1000	2.54
		2	1	1400	1.43
Ankilibe Namakia	South East	1	0	2000	0.00
	East	2	0	1300	0.00
Ambohimahavelo	North	1	0	3300	0.00
	East	2	0	2800	0.00

The presence of species at Tsimanampetsotsa National Park and Lintsa is evident showing some highest density found during the survey (they are highlighted in bleu in table 1).

The target species was not resighted at its northern limit range such as spiny forest around Ankilibe-Namakia and Ambohimahavelo.

Distribution of Red-shouldered Vanga

GPS coordinates of all resighted points of the presence of the studied species are summarised in table 2 below.

Table 2: GPS location around which the Red-shouldered Vanga was recorded

Sites	Sub-sites	Transects	Latitude	Longitude
Site 3	Ankilimitata	1	-24.812567	44.112946
	Ankilimitata	1	-24.793185	44.124273
	Ankilimitata	1	-24.793177	44.124332
	Ankilimitata	2	-24.812784	44.115575
	Ankilimitata	2	-24.811780	44.118749
	Ankilimitata	2	-24.805878	44.123686
	Ankilimitata	2	-24.805227	44.126933
	Ankilimitata	2	-24.793723	44.145043
	Ankilimitata	2	-24.805061	44.119524
	Ankilimitata	2	-24.805277	44.128624
	Ankilimitata	3	-24.798126	44.117689
	Ankilimitata	3	-24.813301	44.117021
	Ankilimitata	3	-24.817848	44.118589
	Ankororoky	1	-24.623690	44.047569
	Ankororoky	1	-24.620271	44.038457
	Ankororoky	2	-24.667202	44.022396
	Ankororoky	2	-24.693789	44.009476
	Ankororoky	2	-24.680877	44.019183
	Antagnatagna	3	-24.537749	44.133186
	Antagnatagna	3	-24.532229	44.123372
	Antagnatagna	3	-24.542813	44.142158
	Antagnatagna	3	-24.542813	44.142158
	Antagnatagna	1	-24.549699	44.151625
	Antagnatagna	1	-24.549699	44.151625
	Antagnatagna	1	-24.551800	44.149349
	Antagnatagna	1	-24.554625	44.146507
	Antagnatagna	1	-24.562523	44.137499
	Antagnatagna	1	-24.568064	44.128578
	Antagnatagna	1	-24.573233	44.120867
	Antagnatagna	3	-24.548738	44.152648
	Antagnatagna	3	-24.523348	44.107632
	Antagnatagna	3	-24.512872	44.089176
	Antagnatagna	3	-24.531517	44.122199
	Antagnatagna	5	-24.566985	44.130265

Antagnatagna	5	-24.565375	44.129462
Antagnatagna	5	-24.560597	44.126212
Antagnatagna	5	-24.560315	44.123441
Antagnatagna	4	-24.542865	44.156506
Antagnatagna	4	-24.538760	44.154282
Antagnatagna	4	-24.538447	44.150515
Antagnatagna	4	-24.537941	44.145921
Antagnatagna	4	-24.539076	44.136452
Antagnatagna	4	-24.538690	44.141199
Antagnatagna	4	-24.537679	44.137315
Antagnatagna	6	-24.549493	44.145080
Antagnatagna	6	-24.551003	44.142567
Antagnatagna	6	-24.555501	44.134602
Antagnatagna	6	-24.558227	44.132542
Antagnatagna	6	-24.559742	44.129713
Antagnatagna	6	-24.559479	44.126349
Antagnatagna	7	-24.545884	44.142789
Antagnatagna	7	-24.552987	44.131839
Antagnatagna	7	-24.553050	44.129833
Antatiboatavo	1	-24.300418	44.008899
Antatiboatavo	1	-24.309818	43.996937
Antatiboatavo	3	-24.300026	44.020458
Antatiboatavo	4	-24.290339	43.971633
Antatiboatavo	4	-24.293369	43.973767
Antatiboatavo	4	-24.295027	43.975906
Antatiboatavo	6	-24.300979	44.017632
Antatiboatavo	6	-24.300979	44.017632
Antatiboatavo	6	-24.277591	44.020777
Antatiboatavo	6	-24.259509	44.022863
Antatiboatavo	8	-24.307313	44.016497
Antatiboatavo	8	-24.322878	44.018377
Antatiboatavo	8	-24.329296	44.018670
Antatiboatavo	8	-24.330623	44.025449
Antatiboatavo	2	-24.293551	43.996482
Antatiboatavo	2	-24.291309	43.991475
Antatiboatavo	2	-24.285910	43.975781
Antatiboatavo	2	-24.282992	43.967210
Antatiboatavo	2	-24.281879	43.964095

	Antatiboatavo	2	-24.280849	43.961039
	Antatiboatavo	7	-24.280812	43.961000
	Antatiboatavo	7	-24.247031	43.953442
	Antatiboatavo	7	-24.244901	43.952978
	Antatiboatavo	9	-24.280840	43.961009
	Antatiboatavo	9	-24.275974	43.946767
	Antatiboatavo	9	-24.271198	43.933146
	Antatiboatavo	9	-24.271198	43.933146
	Mitoho	1	-24.061176	43.759425
	Mitoho	2	-24.046259	43.757027
	Poste de garde	1	-24.114190	43.924093
	Poste de garde	1	-24.108942	43.927760
	Poste de garde	1	-24.108942	43.927760
	Poste de garde	2	-24.114557	43.923890
	Poste de garde	2	-24.126649	43.926595
	Poste de garde	2	-24.136013	43.928681
	Poste de garde	2	-24.154059	43.932649
	Poste de garde	3	-24.099863	43.920611
	Poste de garde	4	-24.097168	43.908556
	Poste de garde	4	-24.105569	43.896072
	Vohodambo	3	-24.228728	43.790371
	Vohodambo	4	-24.237032	43.807384
	Vohodambo	4	-24.239307	43.818700
Site 4	Lintsa	1	-25.0207459	44.430165
	Lintsa	2	-25.0193497	44.428043

Species range is restricted at Tsimanampetsotsa National Park and around Lintsa (south of Menarandra River) during this project.

More detailed and new sub sites location are reported in table 2 above about the distribution of species inside the Tsimanampetsotsa National Park.

There was none evidence or non chance to resight the species at its previous known range around Ankilibe (road to St Augustin) and Ambohimahavelo.

The presence of species in other sites inside of its actual range (BirdLife 2013) needs further investigation since the human activities increased in the sites outside of protected areas.

Discussion

The result from this project and previous report (Scott et al 2008) showed the lack of chance to find the species on its previous north limit range between the roads from Andatabo to St Augustin. Species may move far away (in remote mountain intact area inside of spiny forest patches) because of increased human activities (field for planting or farming, charcoal and fire wood production for the town of Toliara) leading to the forest degradation.

Further exploration is needed for confirming possible extension or restriction of limit range of species at its north and south parts of known actual range of species.

The research at Ifotaka north protected areas (around Mahavelo: S24.76 E046.15), which is found several kilometres to the South East from Lintsa and show a spiny forest habitat close to the Eastern part of Madagascar, revealed the presence of Red-tailed Vanga *Calicalcus madagascariensis*, not the Red-shouldered Vanga (Sama Zefania personal observation).

Conclusions

More detailed sites with density estimates for Red shouldered Vanga were found in known range with extension of records of species at the remote areas Eastern part of Tsimanampetsotsa National Park. More accurate population size estimate for the species could be provided in future.
Restriction of north limit range of species may continue to appear since the species is not recorded or became difficult to resight at its first record around Ankilibe or road to St Augustin.
Further surveys are requested for confirming the north and the south limit range of species since the evolution of human pressure on spiny forest degradation outside of protected areas continue to increase.

Recommendations

- Approach for reducing human pressure around the unprotected range of species is needed.
- Determining the change on southern and northern limit range of species is also required.

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