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World Pheasant Association

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TRAGOPAN



Newsletter of the WPA/BirdLife/Species Survival Commission Pheasant Specialist Group

Issue 16

March 2002

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Editorial

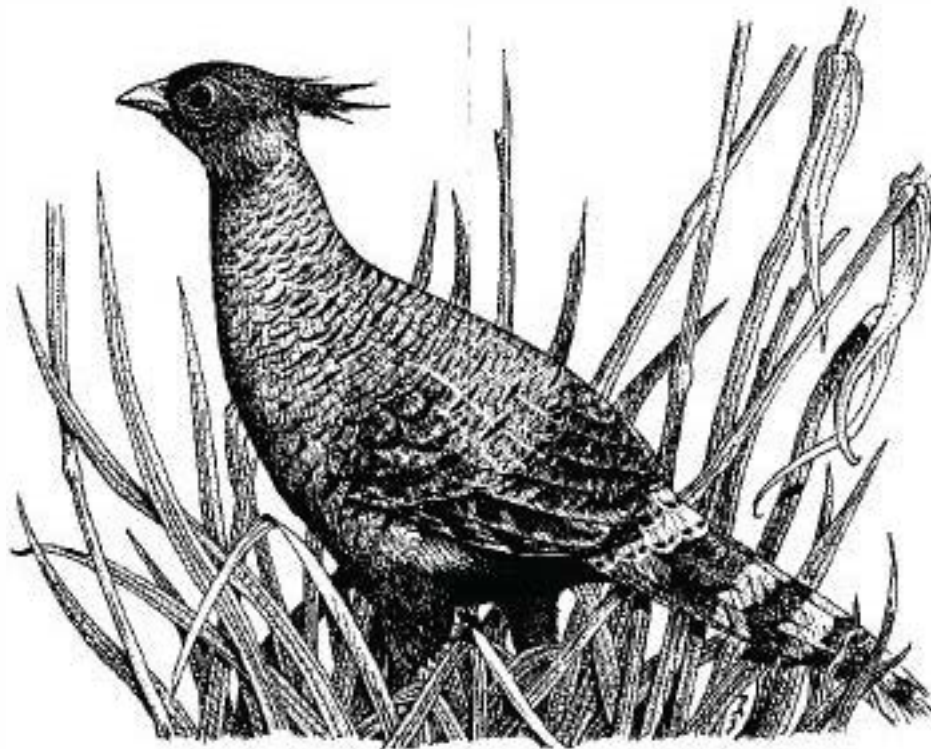
We have received generally favourable reviews of Tragopan 15, and especially its distribution as a pdf file. Any further thoughts or suggestions members have to aid production and distribution would be very useful to me as editor. Also I would be grateful for any suggestions for features to include in forthcoming issues. One idea is to feature a particular aspect of pheasant study in each issue. This would offer leaders in the field of pheasant study methods the chance to really help those ecologists embarking on new field projects. Topics could include radiotracking, pheasant capture methods, distance sampling and methods to identify bird-habitat associations. Any volunteers, please contact me.

I am receiving a good number of longer research reports/papers and it would

help me greatly if contributors consulted previous issues of Tragopan and submitted their articles in a similar style.

Once again, if you have any project news, requests for advice, grants information or other items for inclusion in the next issue, please get in touch. TraEoPar 17 should be out by September/October 2002. Thanks again to Peter Gaison for his invaluable technical assistance and proof-reading.

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Cheer pheasant by Dave Showler



From the Chairman

This issue of *Tragopan* sets out the new way in which the PSG will work in future. The pieces I have contributed on the constitution (p.5), operating by consensus (p.9) and appointments so far (p.8) indicate that we have come a long way in the period since last June, when I initiated a comprehensive audit of our structure, operation and activities. The principles have now all been agreed with the whole membership after two email consultations, through which I received many helpful suggestions.

All I need now is more volunteers, to fill the remaining vacant posts for PSG Officers and Representatives. So please consider whether you have the time, skills and motivation to help us by offering to take up one of these roles, either immediately or in the future should an appointed officer wish to stand down. I would particularly like to hear from anyone who thinks they might have the time, energy and skills required to edit the next edition of the Action Plan (covering 2005-09) during 2004. Speaking from experience, I can tell you that this is a very demanding task, especially if you are in full time employment already!

Another product of our audit was a list of eight priority areas in which our activities need either initiation or a boost (see p.9). Can you contribute to this effort, by

- offering Maureen Woodburn (now our Membership Officer) suggestions for new members from under-represented countries?,
- developing a project proposal that relates closely to any in the Action Plan that so far remains dormant (see p.9)?, or

- one that seeks to measure the impact of hunting or develop sustainable conservation solutions whilst safeguarding human livelihoods?

Your collective energy is once again reflected in the number of Project Proposals I have received over the past six months. We have been able to endorse the following:

- *The status and conservation of the ring-necked pheasant in Mongolia* (8 February 2002): Togtokhbaatar Buyant (National University, Ulaanbaatar): 12 month pilot study commenced March 2002, funded through WPA.
- *Assessing populations and habitats of the Elliot's Pheasant *Symnancus ellioti* in Guizhou, southwestern China* (13 February 2002): Liang Wei (Hainan Normal University): 12 month pilot study commenced March 2002, funded through WPA.

In addition there are Project Proposals now in review on Bulwer's pheasant (*Lophura bulweri*) in Sarawak, cheer pheasant (*Calreus wallichi*) in Nepal [two projects], and surveys at Pipar Pheasant Reserve in Nepal. Please keep them coming, and seek every opportunity to focus on the priority activities outlined in the Action Plan. Thank you for your continuing support, and now that our administrative and policy reshuffle is complete, I hope we will be even more effective in our mission to conserve pheasant species and their habitats world wide. Go to it!!

Peter Garson, *PSG Chair*



Project round-up

NEW PSG PROJECTS

Ringnecked pheasant, Mongolia

Togtokhbataar Buyant (National Univ., Ulaanbaatar) has just started a 12 month study of the distribution, ecology and threats facing isolated populations of the ring-necked pheasant *Phasianus colchicus* in the Hovd (western) and Dornod (eastern) regions of Mongolia. These are the most northerly and isolated natural populations of this species, routinely enduring winter temperatures as low as -50°C . Field trips are planned for March, May and September/October 2002 with the aim of finding localities and habitat types used by the pheasants during the pre-breeding, breeding and post-breeding periods, to map these in relation to the habitats available, and also assess the effects of livestock management and hunting on these populations. Buyant carried out fieldwork for her Masters in her native Hovd area since the mid-1990s (see *Tragopan* 15, p.11) and hopes to extend this work into a PhD study, beyond this first year which is being funded through WPA.

Elliot's pheasant, China

Liang Wei (Hainan Normal Univ.) has joined forces with Li Zhu-mei (Guizhou Inst. of Biology) to carry out a 12 month study of Elliot's pheasant *Symanticus ellioti* in five protected areas and other remnant primary broadleaf habitat in the south-western extremity of its geographical range in Guizhou province. Fieldwork has just begun and is focused on developing reliable population indices for use in a long term monitoring programme, whilst studying the habitat requirements of this species in its primeval habitat in spring and autumn. This project is being funded through WPA.

PSG PROJECTS PROGRESS

Sclater's monal, India

Suresh Kumar (Sharjah, UAE; ex-Wildlife Inst. of India) is ready to submit his definitive paper proposing a new all-white tailed form of Sclater's monal *Lophophorus sclateri*. Thanks to a small grant from WPA, he was able to study the collection of monal skins at the Natural History Museum (Tring, UK) in September, when he also spoke at the WPA Annual Convention.

Great Argus, Sumatra

Nurul Winarni (Wildlife Conservation Society Indonesia Program & University of Georgia, USA) has completed her fieldwork on ranging patterns of great argus *Argusianus argus* in relation to habitat structure and food abundance in Bukit Barisan Selatan NP in southern Sumatra. During July-November 2001 she leg-snared nine males on trails and near dancing grounds, and succeeded in obtaining 81-122 radio-locations for seven of the birds. Many radio-fixes were close to dancing grounds, but adjacent males had overlapping home ranges of 7-22 ha each.

Western tragopan survey, India

Shahid Bashir (Aligarh Muslim Univ.) has completed a GIS analysis of forest habitat distribution in the Western Himalaya. This is linked to his 1998-2000 field surveys of western tragopan *Tragopan melanacephalus* populations in the Chamba area of Himachal Pradesh.

See the Research Reports section of this issue on pp.17-33 for details of progress on other current projects that have been endorsed by the PSG: radiotracking studies of Reeves's pheasant *Symanticus reevesii* (by Zhang Zheng-wang) and western tragopan *Tragopan melanacephalus* (by K. Ramesh), and surveys of Sclater's monal *L. sclateri* in Yunnan, China (by Han Lian-xian).



News from PSG

PSG structure, constitution and operation

1. The need for change

Since its foundation in 1993, the PSG has been run principally by the Chair, with advice and assistance mainly coming from members of the UK-based Core Committee appointed by him. The PSG is best described as a 'voluntary self-help network', and is a typical IUCN/SSC Specialist Group in this respect: relatively few have either substantial funds or paid staff. However there are two important ways in which it differs from many other SGs. One is in having its executive function centred in a country (UK) which is outside the native range of the species for which it is responsible (principally Asia), clearly a less than ideal situation. The other difference is in having three parent bodies (the IUCN Species Survival Commission [SSC], BirdLife International and the World Pheasant Association [WPA]), and in receiving very substantial core support from WPA. The current operation of the PSG, with most of its functions being performed by the Chair, together with the great increase in activity since its foundation, has made the workload of the Chair unsustainable. From now on much greater use needs to be made of the expertise and commitment of PSG members world wide, and especially in Asian countries rich in pheasants.

General guidelines on the responsibilities and operation of SGs are set out on the SSC website (<http://www.iucn.org/themes/ssc/>), and more details are given in the Terms of Reference issued to all Specialist Group Chairs in May 2000.

2. The Choir

Under IUCN regulations all SG Chairs are periodically appointed (or re-appointed) by the Chair of SSC. Invitations to individuals are sent out after the dissolution of the whole SSC at each IUCN World Conservation Congress. These meetings recur every 3-4 years, the last one being in October 2000 at Amman in Jordan. A Memorandum of Understanding between SSC and WPA states that (i) WPA has responsibility for the day to day management of the five SGs for Galliformes species, and (ii) the Chair's appointment (or re-appointment) for these SGs

should be approved by WPA, SSC and BirdLife International. Thus, at least 6 months before any IUCN World Conservation Congress, WPA will take the lead in seeking opinions from PSG members and others about the appointment (or re-appointment) of the Chair for the next 3-4 year period, and will then make a recommendation to SSC with the agreement of BirdLife International.

3. The Choir's Advisory Committee

The current Core Committee harbours significant global knowledge and expertise, and the Chair values greatly the advice he receives on many issues, both in the regular bi-annual meetings held in UK, and individually at other times. Recently, time set aside for informal discussion at the Core Committee's meeting venues has proved to be extremely valuable in developing a strategic direction for PSG, and pushing forward project planning, fundraising and action on particular species, regions or topics. Thus despite the decision to distribute the function and operation of the PSG across the whole membership, a UK-based committee will remain in existence for the foreseeable future. It will be renamed the Chair's Advisory Committee (CAC) to more accurately reflect its function. All members of the present Core Committee have agreed to serve on the CAC. No term of office has been fixed, but members are free to resign when they please. New members may be invited to join by the Chair, in consultation with current CAC members, to either replace a resigning member or in response to changing needs.

The bi-annual issues of *Tragopan* are prepared in the period immediately following committee meetings, and cover the business of each meeting through the Chair's contributions, project reports and other news. The formal minutes of meetings go to its members, plus key contacts in SSC, BirdLife, WPA, and Galliformes Taxon Advisory Groups (GallITAGs) constituted under the American Zoo and Aquarium Association (AZA) and the European Association of Zoos and Aquariums (EAZA).



4. The Membership

Each SG Chair is empowered by the SSC Chair to appoint and remove members from his/her SG. All members of all SGs are also members of SSC, a global volunteer network currently numbering more than 7,000 people. Neither SSC nor the SGs can afford to support inactive members. Thus current policy within the PSG is for the Chair to invite anyone who is involved in work relating to the conservation of pheasants and their habitats to join, and for existing members who cease to focus their attention on any such activity to be removed from the list. The Chair will discuss all proposed additions to and removals from the membership list with the CAC. CAC will also review any case that is brought to its notice, of apparent misrepresentation of the PSG by any member, and may then request the Chair to expel him/her.

5. PSG Officers

Each SG Chair is also charged by SSC with responsibility for the governance and organisation of his/her SG, including the appointment of any officers. In the PSG these appointments will have no fixed term, but officers will be free to resign at any time (although normally giving 6 months notice). From time to time and with the agreement of the CAC, the Chair may negotiate the replacement of a long-serving officer with a new volunteer. The CAC will be responsible for reviewing any case of apparent misrepresentation or under-performance by any officer, and might then request the Chair to remove him/her from office.

Alongside all existing members, volunteers who have not previously been members of the PSG will be eligible for appointment. The following offices will be filled by invitation from the Chair, with the agreement of the CAC:

- Webmaster
- Editor of *Tragopan*
- Membership Officer (to maintain postal and email address lists of members and recipients of *Tragopan*)
- Records Officers (to log all known sightings, with dates, locations and observer's names and contact details, each officer acting for a different country or region)
- Literature Database Officer (to maintain a literature citation database and provide the membership with details of all recent

publications on pheasant conservation by email and/or via *Tragopan*)

- Action Plan Editors (to be appointed in time to start work in early 2004 on the 2005-09 edition)
- AZA and EAZA GallitAG Representatives
- CITES, Traffic and IUCN Trade Program Representatives
- WPA Conservation Breeding Advisory Committee Representative
- Sustainable Use SG Representative
- Conservation Breeding SG Representative
- Re-introduction SG Representative

6. Financial arrangements

The PSG operates by using three accounts:

1. A *Tragopan* production account into which all subscription income is paid. *Tragopan* is free to all PSG members, although some choose to make a periodic donation equivalent to or greater than the subscription. Many people in Asian countries rich in pheasants receive *Tragopan* free of charge at the discretion of the Chair. Others world wide pay a subscription, either annually via a surcharge to WPA members, or directly and normally for three years at a time. This account is used to pay for the cost of artwork for and printing of *Tragopan*. Postal charges are covered by the present Chair's institution, which also holds this account.
2. A core costs account which holds an annual donation from WPA. This is operated by the WPA Administrator and is used at the discretion of the Chair to pay for some of the necessary expenses incurred by the Chair and CAC members in attending their own and other meetings.
3. A project grants account into which any donations made specifically to cover the costs of running PSG-endorsed projects are paid. WPA's status as a registered charity in UK then allows Gift Aid (a tax concession) to be claimed and added to the sum donated. This account is also operated by the WPA Administrator under instructions from the Chair. The value of grants awarded to projects is agreed by the Chair with the donor(s) and the CAC.

Peter Garson, PSG Chair – 4 March 2002



PSG priorities for action

During the second half of 2001 the PSG reviewed its responsibilities, structure and function in the light of general guidelines offered by the SSC, and more particularly through an audit based on the Terms of References for SG Chairs issued by SSC in May 2000. This process involved the entire membership in an e-mail consultation, and was a major item on the agenda of the last two Core Committee meetings (July 2001 and January 2002). In general the PSG emerged from this audit with credit, but some particular facets of its activities were seen to be in need of innovation or change. Eight immediate priorities emerged:

1. Establish an independent presence on the world wide web

This is being taken forward in collaboration with the Game Conservancy Trust (UK), which already hosts the PQF SG website. The PSG site will be initiated by putting up statements on our responsibilities, parentage (with links), structure and constitution, all derived from text used during the audit. Other items to include are a list of names of all pheasant taxa, details of priority projects (from the 2000-04 Action Plan) and possible sources of funds for projects. In due course it will also feature a download area for obtaining the Project Proposal Form and guidelines, and all past issues of *Tragopan*. The most recent issue will be advertised through its front page including the contents details, accompanied by an invitation to become a subscriber. Later still, a map will indicate the location of all current PSG-endorsed projects, and clicking on them will give up-to-date details on each one.

2. Seek members in Asian countries that are rich in pheasants but poorly represented in the PSG

This will be taken forward primarily by the Membership Officer through seeking contacts from both the existing membership, and recommendations from Mariano Gimenez-Dixon (Programme Officer – Fauna) and the SSC membership administrators at the IUCN Species Programme Office at Gland.

3. Implement the present Action Plan and prepare to revise it again for the 2005-09 period

The Chair has reviewed progress on all current Action Plan Projects (see p.9) and will now be making a concerted effort to find Principal Investigators to take forward those not currently

receiving significant attention. The Chair is also seeking offers from PSG members who wish to be considered for appointment as editors of the next Action Plan edition, ready for work on this in 2004.

4. Encourage research aimed at assessing the impact of hunting on pheasant populations, and improving the sustainability of human activities in pheasant habitats

The Chair made a request in *Tragopan* 15 (September 2001) for project proposals of this kind to be prepared. Ideally such projects need to determine human impacts quantitatively, and then move into a socio-economic phase designed to increase the sustainability of all natural resource use in the locality. Since this plea was made, Rahul Kaul (WPA, Delhi) and Jitender Jandrotia (District Institute of Education & Training, Chamba, Himachal Pradesh) have been awarded a grant by the Oriental Bird Club to study the extent of and motivations for the hunting of Galliformes species in forests under the control of the government and the local community in the western Himalaya. In addition Sarala Khaling (Darjeeling, NE India) has begun a pilot project on community participation in two villages adjacent to Singhalila N.P. This is focused on the sustainable use of all forest produce, monitoring the satyr tragopan (*Tragopan satyra*) and other wildlife populations as flagships and indicators, and seeking less consumptive alternative activities through which to contribute to family incomes. To further promote this area of work, Philip McGowan has agreed to draft a supplementary project brief which will be added to the 25 already given priority in the 2000-04 Action Plan.

5. Promote independent fund-raising by the principal investigators of PSG-endorsed projects
The existing list of international funding agencies will be updated, expanded and re-distributed by the Chair, with a request to all members for information on any other possible sources of project funds. The list will also be placed on the PSG website.

6. Improve the technical capabilities of Principal Investigators, in terms of research techniques and the preparation of reports and journal publications

Proposals on how to increase the potential for sharing information and



expertise across the whole PSG membership are detailed in 'PSG function: operating more by consensus' (p.9).

7. Become involved in advocacy for conservation action through liaison with government offices and NGOs

The traditional strength of the PSG membership, and of the whole SSC membership, is in technical and research expertise, leading to recommendations for conservation action on behalf of particular species or in particular places. The next objective, of persuading the responsible authorities to change policies for the conservation of particular pheasant species or the protected areas in which they live, requires advocacy activity on a broad front. Additional conservation recommendations derived by other researchers, and dealing with other taxa,

ecosystems or issues, need to be integrated into a single strong argument for change, and then presented in an appropriately targeted way to the concerned government authorities. Philip McGowan (Conservation Director, WPA) has undertaken to spearhead this kind of activity on behalf of the PSG and the other four SGs for Galliformes species.

8. Strive to operate more by consensus through giving greater numbers of members responsibility for participating in routine activities of the PSG
See 'PSG function: operating more by consensus' (p.9).

Peter Garson, *PSG Chair*

PSG Appointments

The following appointments (or re-appointments) have been made so far by the Chair:

Chair's Advisory Committee (CAC)

John Corder, Mike Crosby, Keith Howman, Carol Inskip, Stuart Marsden, Philip McGowan, Roger Wilkinson, Maureen Woodburn

Editors and Officers

Webmaster

Editor of *Tragopan*

Action Plan Editors (2004)

Membership Officer

Records Officers

Literature Database Officers

James Long

Stuart Marsden

to be appointed

Maureen Woodburn

to be appointed

Rajiv Kalia, others required (e.g. China)

Representatives

AZA GalliTAG

EAZA GalliTAG

CITES/Traffic/SSC Trade Prog.

WPA Cons. Breeding Adv. Comm.

Sustainable Use SG

Conservation Breeding SG

Re-introduction SG

Dou Bruning, Christine Sheppard

Alain Henache, Garry Robbins

Roger Wilkinson, John Corder

Han Assink

Gautam Das

to be appointed

to be appointed

Peter Garson, *PSG Chair* 4 March 2002



PSG function: operating more by consensus

With immediate effect, four ways are proposed through which to increase the involvement of and PSG members world wide, in addition to members of CAC, in its routine activities:

1. Project Advisors

Intimations that a Project Proposal is being prepared by someone with relatively little experience of project planning or implementation may prompt the Chair to identify a more experienced Project Advisor, who could then be approached for help, and would if possible belong to the same country as the proposer. If the proposer is a current or prospective postgraduate student, the Chair will seek the permission of the university supervisor before approaching any additional Project Advisor. The role of Project Advisors will be acknowledged by name in *Tragopan* and other reports on PSG activity (e.g. *WPA News*, *WPA Annual Review*, *Species*). By arrangement with the Principal Investigator (and any Ph.D. supervisor), a Project Advisor might make visits to the project when work was in progress, and/or become a co-author of reports and publications arising from the project for which s/he has accepted this responsibility on behalf of the PSG.

2. Review of proposals

The Chair will routinely request confidential comments on Project Proposals from PSG members (and others) world wide. A Proposal Review Form, designed to focus the reviewer's attention on critical features of the proposal, will be produced to make this a relatively simple task. Reviewers' work will

be acknowledged by name (but not with reference to particular Project Proposals) in *Tragopan*.

3. Project oversight

Each endorsed project in progress (i.e. from initiation to production of final report and/or journal publication) will be assigned to a member of the CAC as Project Overseer. S/he will be required to obtain and assess interim and final reports and draft publications from Principal Investigator in time for committee meetings, according to the schedule set up at endorsement (i.e. interim reports by each 15 June and 15 December during the project; final report or journal publication draft within six months of completion of the work). S/he will also be responsible for obtaining comments on these reports from any Ph.D. supervisor and/or Project Advisor. An Interim Report Form for Principal Investigators, and a Report Assessment Form for Project Overseers, Supervisors and/or Advisors, will focus attention on the achievement of objectives and expected outcomes according to the time table set out in the endorsed version of the Project Proposal.

4. Appointment of officers

There will be a policy of deliberately but gradually transferring responsibility for core functions, and communication with other organisations, beyond the membership of the CAC and towards the PSG membership in Asian countries rich in pheasants.

Peter Garson, *PSG Chair* 4 March 2002

Action Plan (2000-04) project review

The table below summarises information on project progress known the PSG Chair: so far, almost half way through the 5 year period for the implementation for this Action Plan. If there are errors or omissions, please supply him with the details.

Mos: Action Plan projects have several aspects to them. So, in order to identify activities still to be initiated within projects where there has been at least some activity, it is necessary to look at

the contents of the 'progress to date' column in this table alongside the project brief in the Action Plan itself. The Chair would like to hear from anyone who feels that they are in a position to take forward any activities still remaining to be implemented. Proposals that target species or activities highlighted in the Action Plan will be given priority attention during the project review process and are more likely to attract funding from donors following PSG endorsement.



No.	Title	Progress to date
A Global Projects		
1a	Increasing the effectiveness of the PSG	In hand following PSG audit
1b	Increasing the effectiveness of project monitoring and evaluation	In hand following PSG audit
2a	Converting project outputs into conservation action	Philip McGowan (WPA Conservation Director) has agreed to assist with advocacy for action
2b	Improving international exposure of research findings	'Paper writing camp' for Chinese researchers prior to IOC (August 2002) is being planned by Peter Garson
3	Maintaining an Asian Galliformes sites database	Appointment of PSG Records Officers in several countries/regions in hand following PSG audit; liaison with BirdLife required on threatened species records; no host institution yet identified
4	Assessing populations of Asian Galliformes within protected areas	Project proposal for India being developed by Rahul Kaul and Philip McGowan
B Regional Projects		
5	Review of information in Indochinese pheasants	Nick Brickley now involved, having completed work on region's PQF species
6	Surveys for threatened pheasants in southwest China	3 year project on distribution and ecology of Schaller's monal (<i>Lophophorus schalleri</i>) in Yunnan by Han Lian-xian continues
7	Surveys for threatened pheasants in Sumatra	No activity known other than radiotracking study of great argus (<i>Argusianus argus</i>) in 2001 now being written up by Nurul Winarni
8	Surveys for threatened pheasants in Borneo	No activity known other than survey project being planned by Andrew Sheppy in Sabah, and radiotagging study of Bulwer's pheasant (<i>Lophura bulweri</i>) in Sarawak proposed by John Rowden for summer 2002
C Strategic Projects		
9	Taxonomic re-assessment of pheasants	Published papers by Rebecca Kimball, Ettore Randi, Tim Crowe and others, relate to higher taxonomy of pheasants and other Galliformes; Ettore Randi and Alain Hennache have paper in preparation on the phylogeny of Annamese <i>Lophura</i> taxa; thesis by Sybille Moulin in preparation on phylogeny of silver-kahli <i>Lophura</i> complex
10	Effective management of captive pheasant stocks	Existing studbooks due for republication; no new studbooks known
11	Developing methods for re-introduction of pheasants	No activity known
12	Deriving and implementing habitat management strategies for better-known threatened pheasants	No activity known



D Projects for Critically Endangered and Endangered species

- | | | |
|----|--|---|
| 13 | Vietnamese lowland <i>Lophura</i> pheasants | Ettore Randi and Alain Hennache have paper in preparation on the phylogeny of Annamese <i>Lophura</i> taxa; they have identified and excluded hybrid lines of captive Edwards's pheasant (<i>L. edwardsi</i>) with Srinboe's pheasant (<i>L. swinhoii</i>) from the studbook population; field surveys and protected area designation and management in hand through BirdLife International Vietnam Programme |
| 14 | Bornean peacock-pheasant (<i>Polyplectron schleiermacheri</i>) | Survey project in Sabah being planned by Andrew Sheppy for summer 2002 |

E Projects for Vulnerable species

- | | | |
|----|--|---|
| 15 | Brown eared pheasant (<i>Crossoptilon manchuricum</i>) | No activity known |
| 16 | Elliot's pheasant (<i>Symaticus ellioti</i>) | 12 month project just started by Liang Wei on population sizes and habitat use in 5 PAs in Guizhou |
| 17 | Hume's pheasant (<i>Symaticus humae</i>) | Project being planned in northern Thailand by George Gale |
| 18 | Reeves's pheasant (<i>Symaticus reevesii</i>) | 3 year radiotagging project by Zhang Zheng-wang continuing in Dongzhai NNR, Henan; surveys of other PAs also being undertaken |
| 19 | Mountain peacock-pheasant (<i>Polyplectron binopinum</i>) | No activity known |
| 20 | Germain's peacock-pheasant (<i>Polyplectron germaini</i>) | Surveys of Cat Tien NP in Vietnam by Nguyen Tran Vy continue |
| 21 | Malaysian peacock-pheasant (<i>Polyplectron malacense</i>) | No activity known |
| 22 | Palawan peacock-pheasant (<i>Polyplectron napuanum</i>) | Surveys of lowland forest birds by David Lee currently suspended due to political unrest on Palawan Island |
| 23 | Crested argus (<i>Rheinardia ocellata</i>) | No activity known |
| 24 | Congo peafowl (<i>Afrapavo congensis</i>) | No activity known |
| 25 | Green peafowl (<i>Pavo muticus</i>) | Surveys in Cambodia by Tan Setha continue |



Other news

Himalayan monal: first record in Yunnan, China

Yang Ziao-jun (Kunming Institute of Zoology) has clarified details on the first record for the Himalayan monal *Lophophorus impejanus* in this province of China. The specimen of a male originated from Qingtong village (28°04'N, 98°38'E) to the east of the Salween river in the Hushan mountain range in NW Yunnan, and close to the borders with both Tibet and Myanmar, and in the Bingzongba district of Gogoshan county. It was taken at 3,400m in a mixed fir, rhododendron and bamboo forest on 15 February 2001. Villagers in the area reported that Himalayan monal is rare there, but indicated that Slater's monal (*L. slateri*) is also present. The specimen is being kept at the Gongshan Administration Bureau of the Gaoligongshan Natural Reserve. These details correct several errors and add details to those originally given in *Da Ziran [China Nature]*, 5: 43 (2001) in Chinese, and then translated for *Oriental Bird Club Bulletin*, 34: 48 (December 2001).

2002 WPA Annual Convention to be held in Belfast, Northern Ireland

The Northern Ireland Ornamental Pheasant Society (NIOPS) has kindly offered to host the 2002 Convention in Belfast on the 28th – 29th September 2002, followed by a post convention tour. The main conference will be held at the City of Belfast Zoological Gardens, by kind permission of the Director, John Strong. More details and the programme are to be published in the WPA May Newsletter; other information is available from Jimmy Reekie Tel. 01324 562239.

Updates of addresses/email addresses

If you have changed your postal address, telephone/fax number or, especially, your email recently, please make sure you let Maureen Woodburn (Membership Officer) and Peter Garson know. The database of all members' details will be updated regularly but if you have trouble contacting a member, please get in touch with Maureen at m.woodburn@jc.org.uk.

New Chairman for WPA

Award winning ornithologist Dick Potts is to take over from Richard Howard as chairman of WPA from next April. Known especially for his work on grey partridge and generally for game bird conservation in UK, Dick joins WPA following his retirement as Director General of the Game Conservancy Trust in December 2001. Dick joins WPA at what is probably the most challenging time in its existence, as the birds it cares for are more threatened than ever before. Dick's long-running and intensive work in the UK will now prove a great asset worldwide as WPA continues its battle to ensure the survival of these birds and their habitats. Dick said "Anyone who cares for these beautiful birds has a role to play in conserving them, and I look forward to working with these dedicated people from many different countries." *adapted from WPA News No. 68 January 2002*

Species Survival Commission e-bulletin

The e-bulletin of the SSC as well as other useful updates, new publications and news is available at <http://www.iucn.org/themes/ssc/whats-new.htm>

New members

Gautam Das (South Asia Regional Sustainable Use SG, Delhi) has accepted membership of PSG, offered in recognition of his efforts to organise and find funding for studies of red jungle fowl *Gallus gallus* – domestic fowl *Gallus domesticus* hybridisation in the wild, and the status of green peafowl *Pavo muticus spixhoferi* in NE India.

Charlie Cornwallis (Univ. of Sheffield, UK) has accepted membership following his explorations on islands hosting both feral red jungle fowl and domestic fowl (see p 26); he now starts a Ph.D. on the sexual behaviour and mating system of red jungle fowl populations in Sweden and Singapore.



Tibetan eared pheasant: publications and new research grant

Lu Xin (Wuhan Univ, Hebei) is to be congratulated for publishing three papers in international journals recently, with the promise of at least two more to come. The population of Tibetan eared pheasant *Crossoptilon karmani* that he has been studying since 1994 at Xiong-se Monastery near Lhasa fluctuates in size quite markedly from year to year and he has just been awarded a three year grant by the China National Natural Science Foundation to study its dynamics in detail, thereby making full use of the 104 individuals he has banded so far. His recent publications are:

- Lu Xin & Zheng Guangmei (2000). Why do eared pheasants in eastern Qinghai-Tibet show so much morphological variation? *Bird Conservation International*, 10: 305-309.
- Lu Xin & Zheng Guangmei (2001). Habitat selection and use by hybrid white and Tibetan eared pheasants in eastern Tibet during the postincubation period. *Canadian Journal of Zoology*, 79: 319-324.
- Lu Xin & Zheng Guangmei (2002). Habitat use of Tibetan eared pheasant *Crossoptilon karmani* flocks in shrub vegetation during the non-breeding season. *Ibis*, 144: 17-22.

Palawan peacock pheasant: name change and altitude range extension

A detailed review of the historical literature on this species by Edward Dickinson indicates that under the criteria set out in the International Code of Zoological Nomenclature there is a strong case for reverting to the original binomial: *Polyplectron napoleonis* (Lesson, 1831). The specific name in current wide usage (*P. ampharum*) was first used by Temminck in 1832!

Dickinson, E.C. (2001). The correct scientific name of the Palawan Peacock pheasant is *Polyplectron napoleonis* Lesson, 1831. *Bulletin of the British Ornithologists' Club*, 121: 266-272.

Jacob Esselstyn (Palawan Council for Sustainable Development) observed and banded this species at two sites near Puerto Princesa in early 2000. He witnessed the ease with which villagers were able to trap birds at one primary lowland

forest site (300-700 m). At a primary montane forest site interspersed with old landslips covered in bamboo scrub, he frequently heard birds calling. Prior to these observations at 1,300-1,500 m, there appear to have been no reports of its occurrence above 800 m.

from *Oriental Bird Club Bulletin*, 34: 69 (December 2001)

Survey in Tay Ninh Province, Vietnam

During October 2001 a team from the BirdLife International Vietnam Programme, the Institute of Ecology and Biological Resources and the Provincial Department of Science, Technology and Environment carried out a rapid bird survey of the Lo Go Sa Mat and Chang Riec forests in the south of the country. Germain's peacock pheasant *Polyplectron germaini* (Vulnerable) and Siamese fireback *Lophura diardi* (Near-threatened) were amongst 130 species recorded in this area, which now qualifies as an Important Bird Area. On account of its high biodiversity value and ecotourism potential, it is a candidate for protected area status as a national park.

from *BirdLife International Vietnam Programme Quarterly Reports*, 3(4) (December 2001)

Workshop and Symposium in India

Following the successful WPA-led Captive Breeding Workshop at Mormi Hills Pheasantry (Haryana) in April 2001, a further workshop was held at Chail Forestry School (Himachal Pradesh) on 26-27 November 2001. This was run by the State Wildlife Wing and WPA-India, with funding from the Central Zoo Authority. The 25 participants were mainly animal keepers and the medium of instruction was Hindi.

from *WPA News* 68 (January 2002)

M.C. Sathyanarayana (AVC College, Tamil Nadu) hosted a national symposium on Galliformes on 20-22 February 2002. This meeting attracted 17 visiting delegates and featured 29 papers, which will soon be available as a booklet.

Society for Conservation Biology Annual Meeting, 14-19 July 2002

Philp McGowan (WPA Conservation Director) and



Richard Fuller (2000 *Action Plan* editor; Oxford Univ., UK) are scheduled to present two papers at the SCB meeting at the University of Kent (Canterbury, UK). They deal with the effectiveness of Action Plans in prioritising and stimulating conservation action, drawing heavily on the experience of the three Galliformes SGs that published Action Plans in 1995 and again in 2000.

International Ornithological Congress, 11-17 August 2002

At this major event in Beijing, Peter Garson (Newcastle Univ., UK) and Zheng Guang-mei (Beijing Normal Univ.) are joint convenors of a session on *Forest management and conservation of Galliformes*, whilst Ettore Randi (INFS, Italy) convenes another on *Evolutionary genetics of the*

Phasianidae. There will also be a day-long meeting on 16 August for all Galliformes biologists attending the main IOC, organised by WPA-China. The Scientific Programme Committee has accepted abstracts from the following, amongst others: John Carroll (Sustainable hunting of Galliformes in Europe and USA), Philip McGowan (Galliformes and protected areas in Asia), Norimoto Kawai (status and habitat use of copper pheasant in Japan), Gao Yuren (vocalisations of Hainan grey peacock pheasant), Liang Wei (golden pheasant conservation), Lu Xin (social organisation of Tibetan eared pheasant), Zhang Zheng-wang (habitat use by Reeves's pheasant), Dipankar Ghose (status and conservation of Galliformes in NE India).

Newly published

Threatened birds of Asia: the BirdLife International Red Data Book published

Over the last 20 years, BirdLife International has worked to identify and document the world's threatened bird species. Red Data Books (RDBs) were published for Africa in 1985 and the Americas in 1992, and global checklists of the at-risk birds were published in 1988 and 1994 (as *Bird to watch*) and in 2000 (as *Threatened birds of the world*). The third regional RDB was published in 2001: the *Threatened birds of Asia: the BirdLife International Red Data Book*, with the support of the Ministry of the Environment of the Government of Japan through WING-Wild Bird Society of Japan. This RDB will be of greatest interest to members of PSG, as it covers all but one of the world's globally threatened pheasant species (as well as a high proportion of threatened megapodes and partridges).

A notable development since the earlier RDB volumes has been the full involvement of the region's ornithologists and conservationists in the project, with the initial drafts of the threatened species accounts being prepared by national compilers in almost all Asian countries. As a result, these accounts contain many proposals for action by regional experts, and the baseline data required

to develop new initiatives in the future, including a wealth of information that has never before been synthesised in an international work. A unique feature of the book is the distribution maps, as for the first time in the history of either zoology or conservation a major segment of an entire fauna is mapped using fully referenced point localities. The mapping element of the book was undertaken to provide a graphic illustration of the distribution, and hence conservation status, of the threatened birds of Asia, and to identify the key areas that need to be conserved.

Perhaps the most striking feature of the *Threatened birds of Asia* is its sheer size! It is published in two volumes, and totals 3,038 pages. It covers 323 globally threatened bird species (c.12% of the entire Asian avifauna), includes about 400 maps, a black-and-white illustration of each globally threatened, Data Deficient and Conservation Dependent species, and two colour frontispieces. About 7,200 references are cited in the book, and totals of about 160 principal compilers and data contributors and over 1,000 contributors are credited and acknowledged for their input.



The species accounts for threatened, Data Deficient and Conservation Dependent species include comprehensive sections on their distribution, population sizes and trends, ecological parameters (habitat, food, breeding, migration), the threats that are affecting them and current management activities. Most crucially, it identifies projects, programmes and policies for their conservation that the compilers or others recommend on the basis of the assembled evidence.

A total of 24 pheasant species are covered, including the Endangered Edwards's Pheasant *Lophura edwardsi*, Vietnamese Pheasant *L. latitarsis* and Bornean Peacock-pheasant *Polyplectron schlegelii*, and the Imperial Pheasant *I. imperialis*, which is treated as Data Deficient because of uncertainties about whether it is a valid species. The main threats to these species are habitat loss and exploitation for food. In some parts of the region there is on-going rapid forest loss, most notably in the Sundaic lowlands. Elsewhere, for example in many parts of China and in the Himalayas, forests are already highly fragmented and many populations of pheasants are small and isolated. The impact of hunting is generally poorly understood, but this must pose a serious threat to many pheasant populations. Many recommendations are made for new or extended protected areas, and for improved protection and management of habitats. Surveys and ecological studies are required for many species, and studies

to improve understanding of the impacts of hunting and human disturbance are particularly important.

In addition to the book, the *Threatened birds of Asia* is published on CD-ROM, and species accounts can be downloaded from a website (www.rdb.or.id). During 2002, a new version of this website will be launched, which will allow users to contribute new records of Asian threatened birds and other information relevant to their conservation, and through this make up-to-date data on the conservation status of Asia's birds freely available on the internet. This initiative will need to be coordinated with the project of the Galliformes specialist groups to maintain an Asian sites database (Project 3 in the Pheasant Action Plan). BirdLife is planning to publish another follow-up to the RDB during 2002, a *Strategy for the threatened birds of Asia*. This will essentially be a summary of the threats and conservation measures sections of the RDB species accounts, and will present an analysis of the most important actions for threatened birds and a baseline for monitoring progress with these actions. It will highlight priority sites, priority species for survey and research, and priority habitats and conservation issues.

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BOOK REVIEW: *Pheasants, Partridges and Grouse*

by Steve Madge and Phil McGowan. Colour Plates Norman Arlott, Robin Budden, Daniel Cole, John Cox, Carl D'Silva, Kim Franklin and David Mead, by Christopher Helm. London, 2002. 488pp. 72 colour plates. Over 250 species, each with colour maps. ISBN 0-7136-3966-0. Hardback £45.

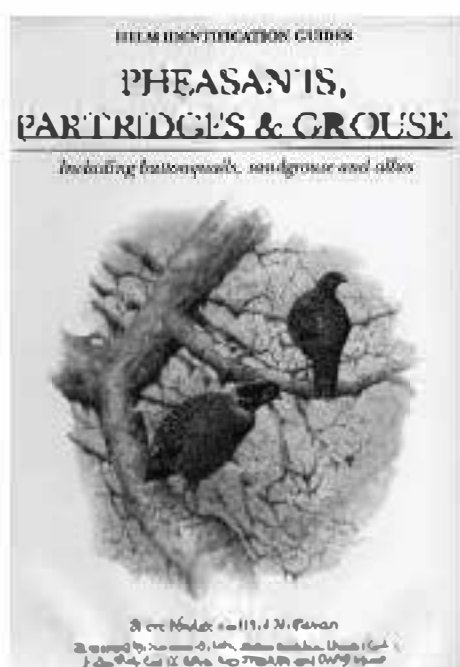
This is the latest volume in the popular and well-established series of Helm Identification Guides. The book covers over 250 species of mainly gallinaceous birds. As well as including birds from the former, enlarged family Phasianidae (pheasants, quails, francolins, partridges, grouse, guinea fowls and turkeys) the book covers the quail-like buttonquails, the sandgrouse (Pteroclididae) and also

the Plainswanderer *Pedionomus torquatus*, a buttonquail-like bird which is most closely related to the seed snipe and so belongs among the Charadriiformes. Two families of gallinaceous birds are not covered by this book: the Neotropical Cracidae (which comprises over 50 species of guans, chachalacas and curassows) and the Megapodiidae (comprising more than 20 species of megapodes, scrubfowl and brush turkeys).

The group described includes some of the world's most beautiful and spectacular birds, such as the tragopan and the monal pheasant. It is among the most threatened of all bird groups, mainly due to habitat loss and degradation and hunting



pressures. A recently completed assessment of the status of the pheasants considered that as many as half of them are at risk of extinction, according to the Red List of categories used by The World Conservation Union (IUCN). The book includes some of the best-studied species in the world, for example the Red Grouse *Lagopus lagopus scoticus*, Northern Bobwhite *Colinus virginianus* and Common Pheasant *Phasianus colchicus*. However, the breeding biology, ecology and taxonomic relationships of many species are still poorly known. The taxonomic relationships between several taxa of Vietnamese *Lophura* pheasants is still uncertain, for instance. In the past ten years there have been important discoveries. A so-far undescribed monal pheasant was discovered in the Himalayas of Arunachal Pradesh in 1998; its taxonomic status is still being investigated.



This book has the same high quality of production and attractive design as the other Helen Identification Guides. The 72 full colour plates that have been executed by leading bird artists, are all

of a high standard and some are excellent. With as many as seven artists it is inevitable that the style of the plates varies. Some show rather too much white background but this is a quibble. Others, notably those by Dan Cole, have evocative backdrops of vegetation which add to their eye-catching appeal. In contrast to his plates, Dan Cole's front cover is rather disappointing showing a somewhat diminutive pair of tragopan. The colour plates illustrate between two and five species. Each shows male, female, juvenile and subspecies plumages where relevant. Each bird is coded and captioned on a facing page with their sex and age, and with notes on identification features, habitat, altitude (where relevant) and world distribution. On the same facing page there is a colour distribution map for each species.

There are sections entitled Contents, Preface, Acknowledgements, Introduction, Style and Layout of the Book, Topography [of a bird], Glossary, Systematic Section, Bibliography and Index. There is no mention of taxonomy in these introductory sections. The all too short section on conservation in the introduction is also rather disappointing. It runs to less than three-quarters of a page and is very generalised; sandgrouse are not even mentioned.

The Systematic Section comprising the species accounts, is a large proportion of the text. Detailed accounts for each species are included under the headings Identification, Description, Geographical Variation, Measurements, Habitat, Voice Habits, Breeding, Distribution, Status and References. The inclusion of synonyms is certainly useful. In some cases more discussion of taxonomy would have been useful, for example on Red Grouse.

At £45 the book is not cheap, but it is well worth the investment and should remain a valuable reference book for years to come. It covers a number of charismatic and threatened species. The text is authoritative and the illustrations are both accurate and a delight to browse through.

Carol Inskipp



Research Reports

Some notes on behaviour in Golden Pheasant Chrysolophus pictus

The knowledge of behaviours of threatened species is crucial for the maintenance of viable populations. Particularly, features influencing these behaviours must be identified to develop promising conservation strategies.

From January to August 1996 in Foping Nature Reserve, Shaanxi Province, and from October 1998 to September 1999 in Kuankuosui Nature Reserve, Guizhou Province, China, the Golden Pheasant *Chrysolophus pictus*, an endemic species of pheasant to China, was studied intensely using radio-tracking. We found the following noteworthy behaviours of the species.

1. Though breeding from March to July, the Golden Pheasant was often observed to display whilst living in groups during the winter period. Display behaviour was easy to observe in the foraging groups, and there were usually several adult males displaying together (though they might lightly peck each other sometimes) towards one or two females while the other adult males, females and juvenile males nearby looked on. This pattern was very similar to the "lek" behaviour of grouse.
2. Radio-tracking and observation indicated that two females left their nests only once during a 23 day incubation period. No males were found nearby when the female incubated. To our knowledge, this has not yet been reported in other pheasants in China.
3. Group segregation was observed. This may lead to formation of "island" groups, though there was no habitat fragmentation at the site. It might be the result of resource partition among groups.
4. Male Golden Pheasants often call during the daytime during breeding season. However, we also witnessed some crowing at night, e.g. 23h00 to

02h00.

5. We could freely touch the female on her nest (two of the 33 nests, and in the middle of incubation). The female did not fly or leave its nest when we touched her, and in order to see the eggs, we had to actually move her from the nest, and then replace her on the nest.

Golden Pheasant is a particularly good species for behavioural study because it is so easy to find and observe. It is especially easy to catch for radio-tracking work. In the Kuankuosui Nature Reserve, the population density of Golden Pheasant was estimated to be 26 birds/km² in primary forest and up to 40 birds/km² in regenerating forest. Continuing research and survey work in this area may generate comparable results to allow detection of long-term changes in abundance. There is a need to continue fieldwork on this species, especially work on its behavioural ecology. Therefore, anyone interested in this respect should contact us, as your suggestions will be very helpful for our continuing work.

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Studies on habitat selection and home range of Reeves's Pheasant *Symaticus reevesii* using radiotracking techniques

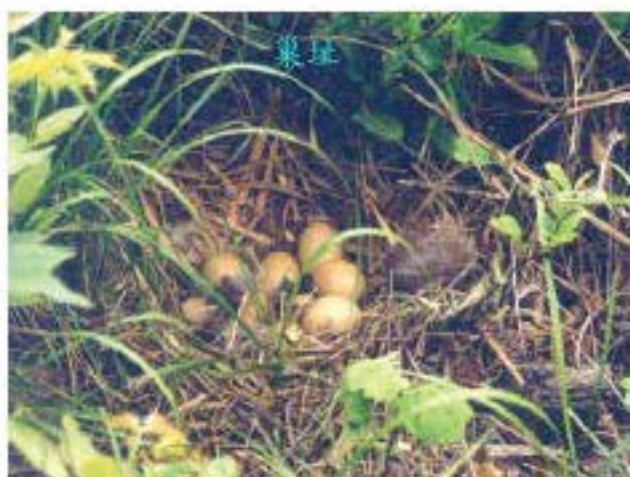
Report on the progress of a WPA Project

The project entitled "Studies on habitat selection and home range of Reeves's Pheasant *Symaticus reevesii* by using radiotracking techniques" was endorsed by WPA Pheasant Specialist Group in January 2000. The following is the report of the progress of this project in 2001.

In Dongzhai Nature Reserve, we expanded our study sites from the core area of Baiyun to other areas. In 2001, we continued to radiotrack 7 males, two of which were radiotrapped last year. This means we have two successive years data on their home ranges and activities. The signals of radiotransmitters are much better this year and we still have three birds being followed.

We investigated habitat fragmentation in the study area, as well as the influence of this on the population distribution and breeding densities. Using radiotracking, we also studied the dispersal of Reeves's pheasant in different seasons. We found that unsuitable habitat isolates individuals within populations. In the breeding season, we surveyed population densities in the nature reserve using counts of territorial males. In the field, we have found a further 6 nests and made detailed observations of the incubation behaviour. We also found 33 broods in Dongzhai Nature Reserve. The habitat of the broods was recorded. Nine blood samples have been taken from wild birds, which will be used for the study of genetic diversity of this species.

Figure 1. Reeves's Pheasant nest and eggs found in 2001.



Apart from field work in Dongzhai Nature Reserve, we also conducted investigations in Qinling Mt. The investigation showed that the population density of Reeves's pheasant was 10.9 and 2.4 individuals km^{-2} in the spring of 2001 in Yangxian County and Taibai County respectively. We also studied the relationship among the three species of gamebirds in the same areas, e.g. Reeves's pheasant, Golden pheasant and Ring-necked pheasant. The habitat used by the three species have been compared.

Figure 2. Reeves's Pheasant habitat in Dongzhai.



We have finished two papers on this work. One paper "Habitat selections by Reeves's pheasant in Dongzhai Nature Reserve" has been accepted and will be present on the 23rd IOC in Beijing 2002. At present, three PhD students are working on Reeves's Pheasant in Dongzhai Nature Reserve. Sun Quanhai, Zhang Xiaohui and Xu Jiliang just returned from the field.

Acknowledgements

Many thanks to WPA in UK and USA for providing grants for the fieldwork and PSG for endorsing this project. We thank Dr Peter Garson for his encouragement and help during the project.

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Research on Sclater's Monal in western Yunnan, China

WPA Project Progress Report: July to December of 2001

Introduction

This project aims to gather data on the distribution and ecology of Sclater's Monal in western Yunnan, then to implement conservation measures for the pheasant after the study work. The project continued between July and December 2001. This report details the research work during that period in terms of fieldwork days and sites, bird density and sex ratio, diet and faecal analysis, and predation.

Research progress

Field work days and sites: We undertook two periods of fieldwork. The first field study was carried out at Danaozi and Ernaozi in Gaoligong Nature Reserve during October. Due to heavy rainfall, we had to end the field work early and plan to arrange more time in the second fieldwork period. Two persons spent 16 days in the field for first survey. The second period of fieldwork was carried out at the same sites during December.

Density and sex ratio: During the October field period, we surveyed along 6 transect-lines with total length of about 12 km each day. We saw the monal five times in flocks of 2, 4, 4, 3, and 3 individuals. The proportion of cocks and hens was 1:1.

Diet and faecal analysis: We observed the pheasant eating 5 kinds of food plants not recorded in the diet before, and also observed the species consuming an earthworm. We once observed 3 birds feeding in grassland near bamboo and *Azalea* for 23 minutes - the birds mainly using their bills to pick from the ground or turn leaves over to find

food. The birds rarely used their feet to scratch the ground. We analysed 34 faecal samples from field to identify the species of plants eaten by the birds but we have not identified all the contents of the droppings precisely yet.

Predation risk: Indian Black Eagle *Icthyophaga malayensis* and Hodgson's Hawk Eagle *Spizaetus nipolensis* were observed five times during the first fieldwork period. These birds were recorded flying around the feeding area of Sclater's Monal and produced an alert reaction in the pheasants.

Planned Activities and problems

We plan to organize two further field teams to undertake research in 2002. We will use call counts to record the number of the pheasants during breeding season at different sites in the Gaoligong Mountains and then compare the density of the bird in different areas. Because we had to change study site since birds were absent from Nanzhaigongfang during the spring fieldwork of 2001, we have lost observation time in the field. We have decided to fix our ecology research site at Datang next spring and to repeat the research work of spring 2001 using a group of 3-4 persons from March to June, 2002. We will also try to improve our identification of plant species from droppings of the pheasant.

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*The status and distribution of Green Peafowl *Pavo muticus* in southern Mondulhiri Province, Cambodia*

Introduction

Historically, Green Peafowl *Pavo muticus* was distributed throughout most of the wooded lowland and lower hills of Cambodia, and ancient Khmer carved it on the temples of Angkor. Unfortunately due to hunting for food and for trade of its tail feathers it is now extirpated from large parts of the country. Important populations were recently discovered in Mondulhiri and Preah Vihear Provinces (Setha & Bunrat 2000).

Mondulhiri Province lies in the north-east of Cambodia, much of it between 200m and 400m elevation. It remains one of the most forested province of Cambodia. In the south of the province, a large part has been leased as a logging concession to Samling International and much of the remainder is in Snoul Wildlife Sanctuary. Mondulhiri Province has a human population in 1998 estimated to be 32,407, one of the lowest human densities in the country (2 person/km²) (Piseth 2001).

Our survey focused mainly on the Samling concession and adjacent areas of Snoul W.S., where there are many areas of good habitat, such as evergreen forest, semi-evergreen forest, deciduous dipterocarp forest, grassland, bamboo, scrub and many wetlands - streams, lakes and ponds (Walston *et al.* 2001).

Objectives

The survey, which will be continued and expanded during 2002 dry season, aims to:

1. Identify key areas for Green Peafowl conservation.
2. Investigate the species habitat use and limiting factors.
3. Predict the distribution of Green Peafowl across Mondulhiri, and to estimate its population.

Methods

The survey was carried out between 23 March and 5 April 2001. The survey used Green Peafowl call counts as the primary tool to investigate its distribution, following the methodology of Brickle *et al.* (1998). The calls of Green Peafowl are very loud and easily heard in good conditions at distances up to about one km. The survey was conducted in breeding season as in this time males are most vocal. Outside of this period, the birds are generally silent.

Point counts were conducted at least 2km or more apart. The call counts were usually made in early morning (05h30 to 07h30) and in the evening from (16h30 to 18h30). Only after heavy rain were Green Peafowl heard calling during other hours (from 10h00 to the early afternoon). Counts were made by two observers. The compass bearing and distance, time and type of call were noted for every Green Peafowl call heard.

At the end of each observation period, we estimated the number of calling birds present. This was based on direction and timing of the calls. For example if two calls were heard from different compass bearing or distances two birds were judged to be present. If we heard calls from the same distance and direction we counted only one bird. Sightings of peafowl or their tracks were also recorded separately, but these were seldom made.

Results

A total of ten independent point counts were made in three districts of southern Mondulhiri Province; O Reang, Keo Seima and Snoul. Table 1 details the dates, locations and major characteristics of each of the survey sites and the numbers of peafowl recorded. As the availability of water in the dry season may be a key limiting factor for peafowl distribution, sites are named by the principal dry season streams (Khmer language - O).



Figure 1. Green Peafowl survey site.

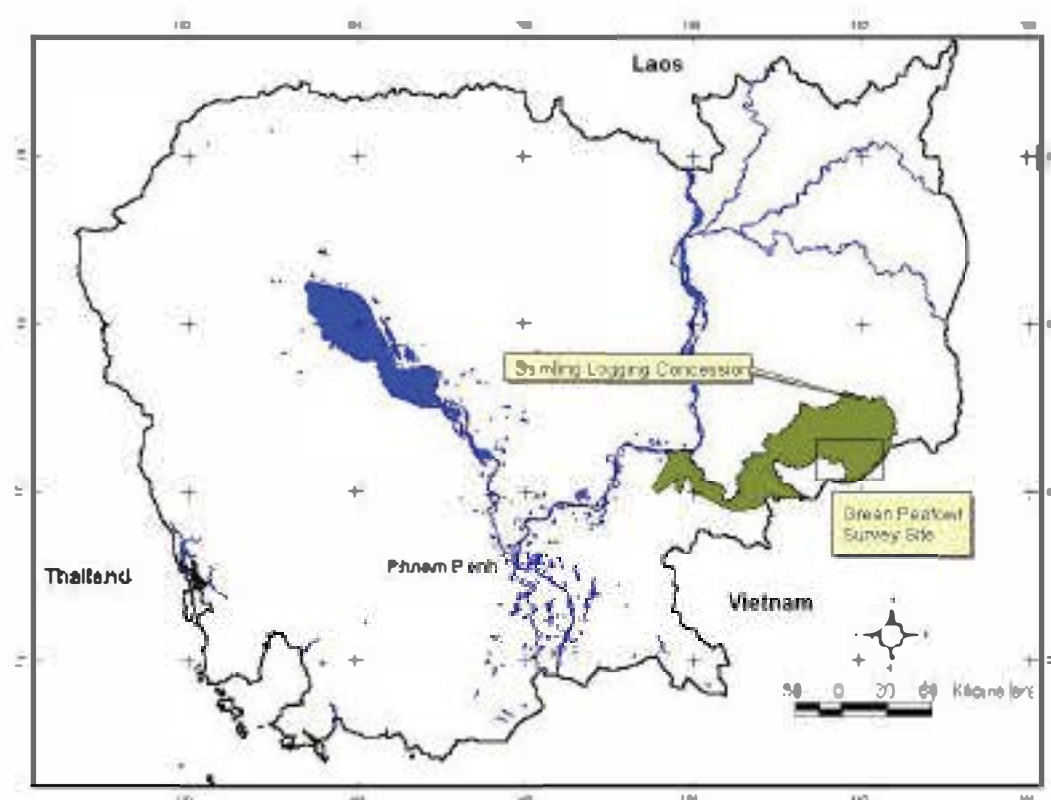


Table 1. Green Peafowl survey results by site.

Survey site	Date	UTM (India-Thailand datum)	No. of birds min max		Dominant forest habitat	Water in dry season	Human presence
● Pure	24/3/01	0715893-1365525	0	0	Semi- evergreen	Yes	Medium to high
Near O Pue	25/03/01	0715944-1363108	2	2	Deciduous dipterocarp	Yes	Medium
● Kamong	26/03/01	0715616-1362282	4	5	Mixed decid.	No	Low
Near O Kamong	26/03/01	0716634-1362128	2	2	Mixed decid.	No	Low
● Khmang	27/03/01	0716952-1359526	7	8	Deciduous dipterocarp	Some	Medium to high
● Chhlomg	28/03/01	0717198-1358844	2	2	Evergreen	Yes	Medium to high
Coupe 2a	29- 30/03/01	0715563-1346936	0	0	Evergreen	Some.	High
Snoml W.S.	31/03/01	0663806-1335917	1	2	Semi- evergreen	Yes	High
Stung Chhneang	01- 02/04/01	0669998-1332482	5	6	Mixed decid.	Yes	High
● Rolae	05/04/01	0717217-1359965	2	3	Mixed decid.	Little	Low



Peafowl were recorded from eight of the ten sites. The minimum number recorded during the survey was 25 and the maximum was 30. The highest numbers were recorded in deciduous dipterocarp forest and mixed deciduous forest. They were rarely recorded in evergreen forest. Their distribution also appeared to be related to both the presence of permanent water and the distance from human settlement, although disturbance levels at each site did not appear to suppress numbers at certain sites.

In total 162 bird species were recorded during the survey, but the only other threatened galliform to be recorded was Germain's Peacock Pheasant *Polyplectron germaini*. This was locally common in the logged evergreen and semi-evergreen forest of Coupe 2a, with five recorded, primarily heard, with only two direct sightings.

Discussion

This was the first species-specific survey for Green Peafowl in Cambodia and there were a number of problems that limited its success. The survey was begun rather late, as by the time it started the calling season had nearly finished (according to local reports). It was also implemented in a small area only. The survey period was short and it rained every day, making it difficult to move between sites during fieldwork. The number of Green Peafowl recorded at each site is therefore not considered to be representative of the relative density at the site. Point counts could be located only where access was possible, and the distance between points was not always two km, due to access constraints, habitat type and water.

However, we conclude that large, relatively undisturbed areas of deciduous dipterocarp and mixed forest with access to permanent water are essential for Green Peafowl. This habitat is also of major importance to several large mammals species, particularly wild cattle (Soriyum 2001), as well as several endangered large waterbirds such as adjutant storks *Leptoptilos* sp. It is therefore a major priority for conservation. Although Mondulhiri Province still contains large area of forest, it is heavily disturbed by resin collectors and local people collecting non-timber forest products. The most significant threat to the peafowl in Mondulhiri is targeted and incidental hunting by such local people for both domestic consumption and trade.

Recommendations

More intensive and longer field surveys using the point call count methodology are planned for the dry season of 2002. They should begin earlier in the year (i.e. early February) to coincide better with the main calling season. They should focus on unsurveyed areas of suitable habitat in O Reang District, Snoul W.S. and Phnom Prich W.S. in both Mondulhiri and Kratie Provinces. The long-term conservation of Green Peafowl as well as other important threatened large mammals and birds, will involve the protection of large, continuous blocks of deciduous dipterocarp and mixed forest with undisturbed access to permanent water.

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Old misidentified record of Himalayan Monal Lophophorus impejanus from Adung Valley, Myanmar

Himalayan monal *Lophophorus impejanus* Latham 1790, is a wide ranging species occurring all along the Himalayan Range from eastern Afghanistan in the west through Pakistan, India, Nepal, Bhutan, South-east Tibet to Myanmar in the east (Ali & Ripley 1983; Johnson 1986; McGowan & Garson 1995); and now further east in Yunnan, China. The only record of the species in Myanmar was based

on a specimen taken in 1969 from Hpungan Pass (27°30'N 96°48' E), along the Indo-Myanmar border (Yin 1970). Here I report on two skins of Himalayan monal collected much earlier, in 1931 from Adung valley in Myanmar close to the Chinese border (see Fig. 1), these skins were originally misidentified as Sclater's monal *Lophophorus sclateri*.

Figure 1. Map showing Himalayan monal sites in Myanmar.



In 2001, while examining monal skins at The National Museum of Natural History (NMNH), Washington D.C and at The Natural History Museum (NHM), Tring, UK, I came across two female monal skins labelled Sclater's monal (one skin was loaned to the NMNH from the Field Museum of Natural History (FMNH), Chicago).

The two skins were collected from the Adung valley, north-east Burma by Ward-Cranbrook during Captain Kingdon Ward's 1931 expedition to the sources of the Irrawaddy (Kinnear 1934). Though labelled Sclater's monal, the tail coloration of the skins (dark brown, barred with rufous and tipped with white) appeared



like in Himalayan monal. On examination of other body part colorations and on comparisons with juvenile and immature skins of Himalayan and Selater's monal, the skins strongly matched with the former. See Table 1 for further analysis on plumage coloration of the monal skins.

The NHM skin was observed to be bigger than the FMNH skin. Many primary wing feathers and rectrices were not fully grown. Information in the skin labels indicate that both birds were collected at the same time and at the same locality. See details below:

NHM (BMNH), Tring, U.K. (1932-12-10-82): 19 August 1931 from Adung valley, North-East Burma - 28°20'N 97°45'E. Altitude 13,000 ft. Lord Cranbrook (153). Bill - dark olive brown; Feet - yellow black; Iris - brown; Skin around eye - blue.

FMNH, Chicago (97920): 19 August 1931 from Adung valley, North-East Burma - 28°20'N 97°45'E. Altitude 13,000 ft. Ward-Cranbrook (154). Bill - dark olive brown; Feet - yellow black; Iris - brown; Skin around eye - blue.

Table 1. Analysis of plumage coloration of the monal skins from Adung valley, Myanmar in comparison with juvenile and immature Himalayan and Selater's monal. (The body parts shown in the table were used as only in these were distinct differences observed).

Body part	Himalayan Monal	Ward-Cranbrook's Monal skins	Selater's Monal
Rectrices	Dark brown, barred with rufous and with narrow white tip	Dark brown, barred with rufous and with narrow white tip	Brownish black, with narrow white wavy bars, pale cinnamon or rufous lateral mottling between the white bars. Broadly tipped with white.
Rump	Upper rump pale cinnamon with faint brown wavy markings. In older birds the brown marking become darker and is V-shaped. Towards the upper tail coverts rump is pale cinnamon with dark brown irregular bars, and with distinct shaft streak.	Upper rump pale cinnamon with faint brown wavy markings. Towards the upper tail coverts rump is pale cinnamon with dark brown irregular bars, and with distinct shaft streak.	Greyish white background with a pale cream wash, with dark brown wavy marking bordering the terminal end.
Upper tail coverts	Similar to lower rump but broadly tipped with white.	Similar to lower rump but broadly tipped with white.	Similar to tail. Brownish black with thin wavy white bars, and tipped with white.
Wing: Secondaries	Brownish black with number of irregular rufous crossbars	Brownish black with number of irregular rufous crossbars	Brownish black with thin irregular stripes of pale rufous and heavy mottling.
Breast & upper belly	Pale to dark brown with a wide central area of pale buff split by a dark shaft streak.	Pale to dark brown with a wide central area of pale buff split by a dark shaft streak.	Pale brown or greyish brown background, with dark brown wavy patterns. In adult the dark wavy patterns give place to fine markings.

Ward-Cranbrook's misidentification of the Himalayan monal skins as Selater's monal is primarily due to the fact that the former was not known to occur as far east as Myanmar at that time. Moreover, they also reported sighting Selater's

monal at the site from where the two juvenile monal were collected (Kinnear 1934). Himalayan monal at that time was known to occur only till Bhutan and in the adjoining parts of Arunachal Pradesh.



(then Assam) in India, where it meets Schater's monal. In 1946-47 Frank Ludlow, during a bird collection trip in Kongbo and Pome, Southeast Tibet, obtained Himalayan monal there (Ludlow 1951), which he describes as:

"The discovery of the Impeyan Pheasant as far east as Trulung caused me no little surprise, and I was almost equally astonished to find Schater's Monal at the same altitude and in the same valley. Being perfectly good species, of course, there is no reason why they should not be found together; still, I hardly expected this to occur."

The records of Himalayan monal from Adung valley and in Yunnan, China suggests that the species occurs further east from its earlier known site and well into the Schater's monal range.

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The status and degree of hybridisation of Red Junglefowl on three islands – a comment

Introduction

There is good evidence that the red jungle fowl, *Gallus gallus*, (here after, jungle fowl), is the sole ancestor of the domestic fowl, *Gallus gallus domesticus* (Fumihito et al., 1994; Fumihito et al., 1996). Domestication of jungle fowl still occurs and throughout their native range they coexist with domestic fowl (Bump & Bohl 1961). Due to their promiscuous nature, hybridisation frequently occurs between domestic and jungle fowl, resulting in fertile hybrids and there is now increasing concern about the genetic integrity of wild populations of jungle fowl (Bump & Bohl 1961; Collias & Saichmae 1967). Indeed, it has been suggested that the ancestral wild type jungle fowl has been lost and that wild populations found today are all hybridised to some extent with domestic breeds (Bisshin 1996; Siegel et al. 1992).

The objectives of this project were to: 1) determine the abundance of jungle fowl on three islands, Kauai (Hawaii), Rarotonga (Cook Islands) and Pulau Ubin (Singapore); 2) assess the extent of hybridisation between jungle fowl and domestic fowl using morphological features, and 3) identify a potential location for in-depth behavioural research on jungle fowl. The study consisted of two separate expeditions to three different island populations of jungle fowl.

Study areas

The first survey was carried out in August 2000 in Kokee State park on the island of Kauai (22°13' - 22°14'N; 159°40' - 159°41'W). The park has an area of 22 km². The second survey was conducted in August and September 2000 on the island of Rarotonga (21°10' - 21°12'S; 159°43' - 159°49'W), which has an area of 68 km². Kauai and Rarotonga are outside the native range of jungle fowl and it is believed that the jungle fowl were introduced to both islands around 3000 years ago by the Polynesians (Ball 1933; Ali & Ripley 1981). The Polynesians acquired jungle fowl from Malaysia and eastern India for the purposes of food, sacrifice and entertainment in the form of cock fighting (Ball 1933). In the 13th Century domestic fowl were also introduced to both islands with the arrival of Europeans (Ball 1933). The third survey was conducted in December 2001 on the island of Pulau Ubin (1°24' - 1°26'N; 103°57' - 103°59'E), which has an area of 12 km². This is on the south-eastern

edge of the native range of jungle fowl and it is believed that jungle fowl reached the island from Peninsular Malaysia by flying over the Johor Straits (S. Rajathura *Pers. comm.*).

Methods

Two methods were used on the islands to study jungle fowl: 1) transects, and 2) behavioural observations to evaluate dominance hierarchies, sexual activity and social structure. Footpaths provided routes through the otherwise dense jungle on all islands. Where jungle fowl were heard calling or seen, the time, estimated location and number of birds was recorded. A description of all birds was made on Kauai and Rarotonga and on Pulau Ubin the birds were filmed. On all islands tape recordings were taken of crowing males. On Kauai sunrise was at 06h30 and sunset at 18h45. Transects were carried out between 06h35 and 12h55 and behavioural observations were made between 15h45 and 19h00 around Kokee Natural History Museum where a population of fowl reside.

On Rarotonga sunrise was at 06h50 and sunset at 18h30. Transects were conducted between 07h00 and 11h30. After locating a site where jungle fowl congregated, behavioural observations were carried out between 07h00 and 18h10. On Pulau Ubin sunrise was at 07h15 and sunset at 19h20. Transects were conducted between 09h00 and 13h00. Between 14h00 and 19h15 attempts were made to locate and observe birds.

The genetic purity of jungle fowl was assessed on the basis of the following phenotypic features: horizontal carriage of the tail; absence of comb in females; crowing shorter and higher pitched than domestic fowl; slate grey legs, and the plumage (Delacour 1977). The following description of plumage was used and any deviation from this was considered a sign of hybridisation. Males adorned with a red comb and wattle, elongated rufous-orange and golden-yellow hackles across nape and mantle, blackish-brown underparts, crimson band across back, rufous secondaries and long greenish-black, sickle-shaped tail. Females have a 'shawl' of elongated (edged golden-buff, black-centred) feathers across nape and mantle, and a naked reddish face. Rest of upperparts are rufous-brown, finely vermiculated with black, and underparts are rufous-brown streaked with buff.



(del Hoyo et al. 1994).

Results

1) Kauai

Six different transects were conducted within Kokee State Park totalling 28 km. Crowing was heard 14 times and was indistinguishable from that of domestic fowl. Two males and one female were seen on separate occasions and all showed signs of hybridisation. Around Kokee museum a population of about 50 fowl were observed. All but two of these birds displayed indications of hybridisation and many appeared the same as a number of domestic breeds. Outside of the park many domestic fowl were seen both free ranging and being kept by people.

2) Rarotonga

Six different trails were surveyed covering a total of 38 km. Around the edge of the island, where all human activity was based, many fowl (c.150) were seen free ranging near small dwellings, on agricultural land and in fruit plantations. The morphology of these birds was highly variable with plumage ranging from that typical of jungle fowl to that characteristic of domestic breeds such as white leghorns. These fowl were usually seen in groups of about five males and ten females. Males were frequently heard crowing and when startled the whole group would often elicit the alarm call for terrestrial predators (Collas 1987). Towards the centre of the island the terrain becomes mountainous reaching a peak of 653 m and is devoid of settlements. When conducting the transects that penetrated the interior, beyond the inner island road, 11 different bouts of crowing were heard and nine fowl were seen of which four were males and five were females (Table 1). Although the morphology of these birds was closer to jungle fowl and less variable than those seen around the edge of the island, there were still indications of hybridisation. For example, two males had yellow legs and all females had combs. Furthermore all fowl displayed upright carriage of tails and all crowing was indistinguishable from that of domestic fowl.

Ninety-six hours of behavioural observations were carried out in the orange orchards below the Takitumu Conservation Area (TCA) where a population of fowl could be watched continuously. This population consisted of around 50 birds and had a skewed sex ratio of about three females to each male. Of the males seen continuously (n=12) four showed definite signs of hybridisation. The proportion of females that were hybrids was estimated to be around half. From the birds that had plumage consistent with jungle fowl it was evident that at least two subspecies of jungle fowl may have been introduced. A number of individuals had white ear spots typical of *Gallus gallus gallus* whereas the others had red ear spots characteristic of the other four subspecies (*G. g. murgii*, *G. g. spadiceus*, *G. g. jabouillei*, *G. g. bankiva*) (Ali & Ripley 1981). This is consistent with the evidence presented by Ball (1933) suggesting that these fowl were introduced from eastern India (where *G. g. murgii* occur) and Malaysia (where *G. g. gallus* occur).

3) Pulau Ubin

The majority of human activity is based in the central-south area of the island and here many (c.100) domestic fowl were being kept by local people. Beyond these settlements 76 km of transect was surveyed, on which 35 bouts of crowing heard and 16 different groups were located. A total of 16 males and 26 females was seen, of which one male (6%) and one female (4%) were considered hybrids. The two hybrids were seen on two occasions in the same place near a small holding. The morphology of the other 40 birds was highly consistent and met the criteria for wild type jungle fowl, with all individuals having slate grey legs, horizontal carriage of the tail, no plumage defects and white ear patches suggesting they were of the subspecies *G. g. gallus*. Furthermore all females lacked combs and the crowing of jungle fowl was distinct from that of domestic fowl being higher pitched and abbreviated. As these birds were extremely secretive it was only possible to observe them for a total of 11 minutes and film them for 5 minutes.



Table 1. Occurrence of jungle fowl and the extent of hybridisation on six transects on Rarotonga

Trail	Crowing (bouts)	Sightings		Signs of Hybridisation (% individuals)	
		Individuals	Dist. from houses (km)	Yellow legs	Plumage defects
Maungtea Bluff Trail	6	1	2	0	0
Raemaru Trail	0	0			
Avana Steam Trail	0	0			
Takitumu Conservation Area Trail	4	0			
Cross Island track	1	8	2.5	25	12.5
Inner Island Road	20+	18	0.2	83	72

Discussion

Jungle fowl and domestic fowl were common on all islands. On Kauai 96% of all the fowl observed were either phenotypically similar to domestic breeds or showed some indication of hybridisation. Local natural historians mentioned that if domestic fowl were no longer wanted the owners would just release them into the wild. Furthermore, people sometime purposely release domestic fowl with the aim of enhancing the natural population of fowl.

On Rarotonga hybridisation was extensive, although not to the degree observed on Kauai. There appeared to be a gradient with interbreeding occurring frequently around the edge of the island where people kept domestic fowl, but in more remote areas further inland, hybrids were less common. I was informed by a local woman that around 20 years ago a large number of domestic fowl escaped from a battery farm, which has led to a great amount of interbreeding with the wild population. Furthermore, the domestic fowl I observed were always free ranging and with no predators on the island there is nothing to stop these birds from becoming feral and hybridising.

In contrast, on Pulau Ubin there appeared to be extremely little hybridisation. Ninety five percent of the jungle fowl seen met all the morphological criteria for wild type jungle fowl. I believe that hybridisation is kept to a minimum by: 1) most locals restricting the movements of their domestic fowl through fencing, and 2) the elimination of hybrids by predators and hunting. Artificial selection is likely to have favoured individuals that were not stressed by human presence as these birds were probably more productive and easier to keep. Domestic fowl may therefore have been indirectly selected to be less wary of predators including humans, and hence

hybrid individuals are likely to be eliminated through natural selection. On Pulau Ubin potential predators include leopard cats, *Prionailurus bengalensis*, and reticulated pythons, *Python reticulatus*, which are likely to feed on fowl. In conclusion, the jungle fowl on Pulau Ubin appear to have minimal gene introgression from domestic fowl and I feel measures should be taken to ensure that this, perhaps unique, population remains free from hybridisation.

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Report on radio tracking of western tragopan in the Great Himalayan National Park, India

The Western Tragopan *Tragopan melanocephalus* is one among the poorly studied threatened pheasants of the world. The global status of the population is precariously low (<5000 individuals) and seems that they have about only 2000-3000 km² for survival in the entire distribution range (Gason *et al* 1983; Birdlife International 2001). Conservation initiatives have often been handicapped by inadequate scientific support on the ecology of the species. The dearth of knowledge is such that, prior to two independent studies just completed in India (Ramesh *et al* 1999, Khan *et al* 2000), the six months study by Islam (1985) in Pakistan was the only intensive effort to study the ecology of the species. Perhaps its elusive behaviour and low density have resulted in highly variable and poor sighting records, which limit conclusive inferences on its ecology. In order to counter such problem and also to obtain home range estimate for Western tragopan, we initiated a study in Great Himalayan National Park (GHNP), India with radio telemetry as the primary sampling protocol.

Attempts were made to trap the birds during spring (April-June) 1999 in Tirthan valley of GHNP using two types of locally made traps viz., 'Fall net' (n = 6) and 'Leg-hold noose' (n = 9). A total of 12 localities were chosen for trapping and traps were placed in previously identified sites such as water holes, roost sites and daily movement areas, and were monitored periodically. Also, on locating or hearing the bird, the traps were set at 200m above the bird and the bird was chased

towards the net by 3-4 persons forming semicircle. A total of 256 man-days (4 persons x 64 days in three months) were spent trapping in the altitudinal range between 2600m and 3000m, where we had maximum sightings of tragopans during the past three years of fieldwork as part of a larger project carried out by Wildlife Institute of India. Considering the number of traps and the amount of time spent each day, the total trap hours amounted to 6694 during the trapping exercise, contributed by 3924 net hours and 2767 noose hours.

On 14 May 1999, a female Western tragopan was trapped in a leg-hold noose placed in a nullah within mixed broadleaf and conifer forest above Grahani thack. The bird was fitted with a radio transmitter using standard Biotrack necklace type collar weighing about 50g, which had the potential life span of minimum 12 months. The bird was radio-tracked (using three element Yagi antenna and Mariner 57 Biotag receiver) until November 1999 covering both summer (May-September) and autumn (October and November) seasons, after which there was no signal obtained perhaps due to transmitter failure or the radio tagged bird had been taken by a predator. A total of 72 radiolocations representing summer (51 locations) and autumn (21 locations) seasons were obtained and the home range was estimated based on 100% Minimum Convex



Polygon (MCP) method using the arc/view software.

The home range of the female tragopan for the entire study period was estimated to be 31.6 ha, and for summer and winter, the home ranges were 20.5 ha and 4.7 ha respectively. The bird was found to move in the elevation range 2530 - 2710m in summer and 2440 - 2530m in autumn. In both the seasons, the bird was using broad leaf dominated forests (Fig.1), with moderate level of canopy cover and shrub density. It used areas with high tree density (8.4 ± 1.2 / plot, $n = 9$) and shrub density (8.7 ± 1.5 / plot, $n = 9$). The dominant shrub species in the home range area was montane bamboo (*Thamnochlamus spathiflorus*).

Despite our intensive efforts to radiotag a minimum of 6 individuals, our trap success was limited to just one bird. The time selection and inexperience could possibly have contributed to low trap success. It was a great challenge to trap the birds during the breeding season when they were largely secretive and had dispersed in wide areas. Local trappers, who claimed to have trapped the birds in earlier days, were of the same view and were unambiguously pessimistic on trap success in this season. Nonetheless, we were certainly convinced that with the experience gained, the trap success can be increased if attempted in winter as the birds are then concentrated in lower elevation areas and perhaps baiting can also attract the birds to the traps due to resource crunch in this season. Future study with adequate number of radio-tagged bird would not only help to arrive at decisive inference on the home range and habitat preference of the species, but might also reveal other interesting facts on its ecology and social behaviour. The collective empirical data obtained from recent studies, past surveys and through telemetry study would greatly benefit conservation of the species.

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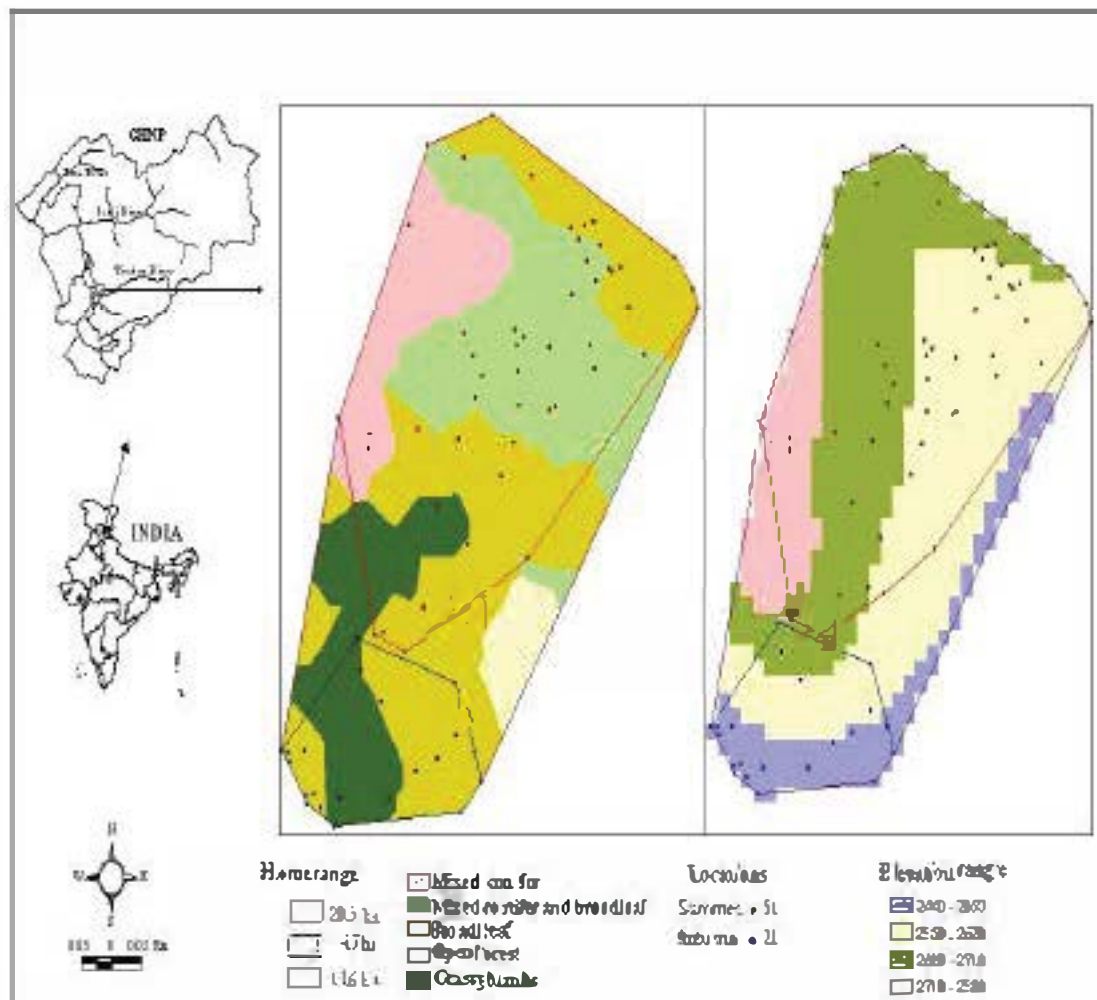
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Figure 1. Vegetation types and elevation used by the radio-tagged Western tragopan during summer (upper large polygon) and autumn (lower small polygon) seasons in GHNP (May – November 1999).



Habitat associations of Grey Junglefowl *Gallus sonneratii* in the Western Ghats: A PhD synopsis

Introduction and aims

The Grey Junglefowl *Gallus sonneratii* is a near-threatened species, which has a fragmented global range and is endemic to India (Fuller & Garson 2000). Its distribution is confined to peninsular India and extends up to Mount Abu in southern Rajasthan in the North. Occurring from sea level to around 1,500 m, the species inhabits evergreen forest as well as scrub, bamboo, teak and mixed forests (Johnsgard 1986). Although the species has received protection through the Protected Area Network, and its inclusion in Schedule IV of the Indian Wildlife (Protection) Act, 1972, the management of the species is still constrained by a paucity of scientific knowledge. It needs to further emphasize that such scientific information is crucial for its long-term conservation. In an attempt to bridge some of the gaps in knowledge, the present PhD study was conducted in Theni Forest Division, Meghamalai, Western Ghats, Tamilnadu. The study had the following objectives:

- To describe the habitat available to Grey Junglefowl within the Theni Forest Division.
- To document habitat use and relative habitat preference during the breeding and non-breeding seasons.
- To study the role of microhabitat on Grey Junglefowl distribution and abundance.

Study areas and methods

Two intensive study areas viz., Gudalur (23 km²) and Meghamalai (82 km²) Ranges were chosen within the Theni Forest Division (723 km²) located at 9°31' to 10°10' N, 77°20' to 77°40' E in Theni District, Tamilnadu. Based on the pilot survey, the intensive study area was selected and 'gridded'. Vegetation structure and composition was studied using the Relevé method of Mueller-Dombois & Ellenberg (1967) and Kershaw (1973). Plant community classification was performed using TWINSpan (Two Way Indicator Species Analysis) Software.

Based on this classification, 30 transects (each 1 km in length) covering different habitat types were sampled once in a month. The different habitat types that were covered were (i) Southern Deciduous Scrub Forest (SDSF) [4 transects], (ii)

Southern Dry Mixed Deciduous Forest (SDMDF) [6 transects], (iii) Southern Moist Mixed Deciduous Forest (SM MDF) [10 transects], (iv) Miscellaneous + Plantation forest (MISC+PL) [7 transects] and (v) Southern Sub-Tropical Hill Forest (SSTHF) [3 transects]. For every Grey Junglefowl sighting on the transect, data on number, perpendicular distance and sex were recorded.

The habitat type and microhabitat variables used by Grey Junglefowl were recorded for all sightings obtained along the transects. For this purpose, bird focal plots (10m x 10m) were laid out to quantify variables such as canopy cover (%) and tree numbers (N). Within these bird focal plots, sub-quadrats (5m x 5m) were laid out to quantify shrub cover (%) followed by laying of even smaller quadrats (1m x 1m) to estimate the grass cover (%), litter cover (%), and litter depth (cm). Similarly, the availability of microhabitat variables along transects were quantified in 10m² plots placed at 100m interval along all transects. An availability utilization approach (Heuvelink *et al.* 1974) for habitat use was adopted for the analysis using the 'PREFER' Software (Prasad & Gupta 1993).

Results

Junglefowl abundance

A total of 88 Grey Junglefowl sightings were obtained during the entire study period. Of these, there was only one sighting in SSTHF so this habitat type was not considered for further analysis. The overall density estimate for Grey Junglefowl in the study area was 11.9 birds/km² (95% CI = 8.0 - 18.0). The density estimates ranged from 2.8/km² (95% CI = 0.54 - 14.2) in SSTHF to 34.9/km² (95% CI = 18.4 - 66.4) in SDFS.

The Grey Junglefowl sightings varied significantly across seasons and habitats ($\chi^2 = 14.4$, $df = 3$, $p < 0.05$). However, there were no significant differences in Grey junglefowl sightings in different habitats in the post-monsoon season ($\chi^2 = 0.52$, $df = 3$, $p > 0.05$) and monsoon season ($\chi^2 = 2.2$, $df = 3$, $p > 0.05$).

Habitat use

The Availability-Utilization analysis showed that junglefowl used SM MDF habitat more than its availability (preferred) and



used MISC+PL less than its availability (avoided). The habitats SDSF and SD MDF were used in proportion to availability. In summer, SM MDF was used more than its availability and SD MDF was used less than its availability. The remaining habitats were used in proportion to their availability. During the premonsoon season, SD MDF was used less than its availability and other habitats were used in proportion to their availability.

Across seasons, the Grey Junglefowl tended to use moderate shrub cover (41 - 60%), low grass cover (21 - 40%), low litter cover (21 - 40%), with higher litter depth (> 5cm). Although the species uses low canopy cover and areas with low tree numbers, it appears that canopy cover and tree number does not have any direct influence on junglefowl habitat use.

Index of Selectivity revealed that except for SD MDF, the junglefowl seems to prefer the higher category of shrub cover (> 41%) and low levels of grass cover (< 40%) in all the habitat types. In SD MDF, low levels of litter cover (< 40%) and higher levels of litter depth (> 5cm) were used. In MISC+PL, low litter cover (< 40%) and higher litter depth (> 5cm) were preferred.

Habitat use across seasons

Grey junglefowl sightings in different habitats did not vary significantly in the breeding and non-breeding seasons ($\chi^2 = 2.86$, $df = 4$, $p > 0.05$). However, they did appear to avoid high amounts of canopy cover (> 41%). In both seasons, junglefowl avoided high levels of shrub cover (> 41%). In the breeding season, low amounts of grass (< 40%) and

litter cover (< 40%) were preferred but in non-breeding season, high levels of grass cover (> 41%) were preferred. In the breeding and non-breeding seasons alike, high levels of litter depth (> 5cm) were preferred by junglefowl.

Breeding habitat

During the study period, 12 sightings of hens with chicks were obtained in four different habitats: SDSF ($n = 2$), SD MDF ($n = 1$), SM MDF ($n = 4$) and MISC+PL ($n = 5$). Hens with chicks used areas where mean percentages of microhabitat variables were 39.5 ± 5.4 for canopy cover, 44.2 ± 4.7 for shrub cover, 33 ± 7.2 for grass cover, 3.5 ± 1.3 for tree numbers, 39.7 ± 13.3 for litter cover, and 2.7 ± 1.4 litter depth.

Conclusion

From this study, it appears that choice of habitat by Grey Junglefowl depends largely on the inter:persion of moderate shrub cover (41 - 60%), higher litter cover (> 41%), high litter depth (> 5 cm) and low grass cover (< 40%). While shrub cover may offer protection from predators (escape cover), the litter and grass or herb cover provide invertebrate food items. This information along with food habit studies, if carried out in future, will be of significant use for Grey Junglefowl conservation and management.

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