



भारतीय वन्यजीव संस्थान
Wildlife Institute of India

W.I.I. Newsletter

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News : Training Programme and Workshops

XXXI P.G. Diploma Course in Wildlife Management

The Course commenced on September 1, 2009. Eleven officer trainees joined the course. Seven of them were from the Forest Departments of various States of India, one self-sponsored veterinarian and three from neighbouring countries.

State/ Country	No.of Trainees	Sponsor
Andhra Pradesh	1	MoEF
Arunachal Pradesh	1	MoEF
Assam	1	MoEF
Uttar Pradesh	1	MoEF
Maharashtra	2	MoEF
Orissa	1	MoEF
Rajasthan	1	Self sponsored
Afghanistan	1	SAARC
Bangladesh	1	SAARC
Nepal	1	GTF

(MoEF - Ministry of Environment & Forests;
GTF - Global Tiger Forum; SAARC - South
Asian Association for Regional Cooperation)



The officer trainees visited Rajaji National Park from September 22 to 27, 2009 for their Orientation Tour. **Contact: ssen@wii.gov.in**

Department of Science and Technology (DST) Fast Track Young Scientists Programme Expert Panel Meeting, Dehradun, September 30 to October 1, 2009. Department of Science and Technology (DST), Govt. of India, New Delhi has been providing financial



assistance to young scientists in various areas of their interest through fast track research project programme. They have periodical meetings in various parts of the country in different academic and research organisations so as to provide a platform to young researchers and students of the concerned institute so as to have the benefit of interaction with the members of the Expert Committee. For the first time, the expert panel

meeting was held in the Institute. Ten experts from various Indian universities and research institutions along with the Director, Science and Engineering Research Council of DST (SERC-DST) - Dr. Rambir Singh have evaluated the project proposals submitted by the young scientists in Life Sciences category. **Contact: uniyalvp@wii.gov.in**

V-Internal Annual Research Seminar (IARS), September 17-18, 2009 and XXIII Annual Research Seminar (ARS) of WII, Dehradun, September 19-20, 2009. The V Internal Annual Research Seminar (IARS) was chaired by Shri V.B. Sawarkar, Chairman, Training Research and Academic Council. During the IARS, a total of 22 presentations were made in five sessions, which included studies on large carnivores, herpetofaunal studies, human dimensions and development related aspects, avifaunal studies, molecular genetics and forensics, and studies on arthropods. The presentations made by M.Sc. students, research fellows and faculty members of the Institute were based on recently initiated and ongoing research studies. The presentations were evaluated by a panel of judges. The following were adjudged as the five best presentations made and the concerned researchers were awarded book prizes each worth Rs. 1500/-.

Book Awards for Best Presentations

V – Annual Internal Research Seminar

Rank	Name	Topic of Presentation
I	Kausik Banerjee	Ecology of lions with emphasis on the agro-pastoral landscape of Gir.
II	A. Pragatheesh	Impact of a national highway on habitat quality and movement of wild animals in Pench Tiger Reserve, Madhya Pradesh.
III	Shilpi Gupta	Population estimation and food habits of striped hyena (<i>Hyaena hyaena</i>) in Sariska Tiger Reserve, Rajasthan.
IV	Shazia Quasin	Diversity of spiders along an altitudinal gradient in Nanda Devi Biosphere Reserve, Uttarakhand.
V	Abesh Kr. Sanyal	Monitoring moth diversity in Gangotri Landscape, Uttarakhand.



The XXIII Annual Research Seminar of the Institute was conducted at WII. It was also chaired by Shri V.B. Sawarkar, Chairman, Training, Research and

presentations made. Five presentations were adjudged as the best presentations. All five researchers were given book awards, each worth Rs.1500/-.

Director, WII congratulated all the speakers for the excellent work and requested the Institute to celebrate the Silver Jubilee of ARS in 2011 in a

Book Awards for Best Presentations

XXIII – Annual Research Seminar

Rank	Name	Topic of presentation
I	Sutirtha Dutta	Role of environmental stochasticity and habitat management in designing conservation strategy for the Great Indian Bustard.
II	Mukesh	Genetic diversity and admixture analysis of Red Junglefowl with domestic chicken.
III	Sumithra	Social behaviour and duetting in Hoolock Gibbons (<i>Hoolock hoolock</i>).
IV	Mousumi Ghosh	Foraging behaviour and habitat characteristics of breeding leaf warblers in the Himalayas.
V	M. Muralidharan	Effects of anthropogenic changes on the nest sites selection of Olive ridley sea turtles in Rushikulya, Orissa.

Academic Council (TRAC). In total 24, presentations were made in nine sessions. These included studies on large carnivores, avifaunal studies, molecular genetics and forensic studies, studies on coastal and marine biodiversity, herpetofauna, small mammals and primates. The presentations were based on the ongoing research studies and were made by research fellows, M.Sc. students faculty members and a Post Doctoral Fellow of the Institute.

About 270 delegates/participants attended the ARS that included the Principal Chief Conservators of Forests, Chief Wildlife Wardens and other senior officials representing State Forest Departments, delegates representing various NGOs, scientists, wildlife experts, conservationists, faculty members, researchers, M.Sc. students and officer trainees.

A panel including eminent scientists, academicians, conservationists and wildlife managers adjudicated the relevance and quality of research by the

In the Concluding Session, comments on the ARS were made by the experts. Shri S.C. Dey, Secretary General, GTF, New Delhi suggested that the findings of research projects as discussed during the ARS should be compiled and published for dissemination. He also stressed the need for much wider participation of State Forest Department officials in the ARS of the Institute. Shri Vinod Rishi, Former Addl. DGF(WL), MoEF, New Delhi suggested that the published and unpublished information available on natural history of Indian wildlife should be compiled by the Institute. Shri Mahendra Vyas, Member, Governing Body-WII was concerned about the rapidly increasing pressure on wildlife and habitats and stressed the importance of identifying projects to track such change for dissemination of findings through reports so that appropriate actions could be mobilized in the field. Shri Bishwajit Mohanty, Member, Governing Body-WII stressed the need for collaboration with other institutions for short-term and long-term research projects. Shri S.K. Mukherjee, Former

befitting manner. Dr. M.C. Sathyanarayana, Member, TRAC-WII appreciated the Institute's efforts in furthering the use of modern technology (biotechnology, camera traps, satellite telemetry) in wildlife research and requested that the findings of research projects may be made available in WII's website. Shri V.B. Sawarkar lauded the efforts in making excellent presentations. He observed that the probing questions raised and cogent suggestions received from the delegates/participants stimulated intellectual discussion and made significant contribution to the quality of the seminar as well as to the peer review process. He summarised the two-day proceedings and dwelt at length on the importance of the various themes, the quality of research and its direction and attainment of progress. He stressed that the conservation scene in the country was going through an unprecedented crisis. There is an urgent need to understand danger of global warming and the consequent climate change as an opportunity to strongly press for a case

concerning security of natural ecosystems on priority on the basis of emerging trends and by valid projections that could be made. There was a need to shift gears to address the worsening situation outside the Protected Areas as well as inside. He also highlighted the significance of WII's projects to wildlife conservation efforts in the country.

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25th European Conference of Arachnology, Alexandroupolis, Greece, August 16-21, 2009. The European Society of Arachnology supports the study of arachnology, promotes the development of this science and facilitates exchange between



researchers or institutes all over the world. Annual meetings are held in different research institutions and universities of Europe. In the congress,

92 scientists representing 29 countries from all over the world have presented their oral and poster presentations.

Various interesting aspects of spiders have been covered in different presentations by the scientists working on arachnology. Dr. V.P. Uniyal has attended the conference and presented the findings of ongoing DST project on 'Diversity of Spiders in High Altitude Ecosystem, Nanda Devi Biosphere Reserve - The World Heritage Site, India'. The Department of Science and Technology, New Delhi has provided financial support for participation in the conference. **Contact:** uniyalvp@wii.gov.in

संस्थान में हिन्दी पखवाड़े का आयोजन

प्रत्येक वर्ष की भांति, संस्थान में दिनांक 1 सितम्बर 2009 से 14 सितम्बर 2009 तक हिन्दी पखवाड़ा मनाया गया। पखवाड़े के दौरान संस्थान के सभी अधिकारियों व कर्मचारियों के लिए एक निबन्ध प्रतियोगिता का आयोजन किया गया। निबन्ध का विषय था 'जलवायु परिवर्तन के कारण एवं निदान'। दिनांक 1 सितम्बर 2009 को आयोजित इस प्रतियोगिता में कुल दस प्रतिभागी शामिल हुए।

पुरस्कार विजेता हैं : कु0 पदमा रानी – प्रथम पुरस्कार, श्रीमती शशिबाला उनियाल – द्वितीय पुरस्कार, व श्री संजय शर्मा – तृतीय पुरस्कार।

वर्ष 2008-09 के दौरान कार्यालय कार्य में हिन्दी में न्यूनतम 20,000 शब्द लिखने के लिए लागू की गई योजना में विजेता रहे : श्री सुरेश कुमार व श्रीमती साधना वर्मा – प्रथम पुरस्कार, व श्री प्यार चन्द – द्वितीय पुरस्कार।

हिन्दी पखवाड़े के समापन एवं हिन्दी दिवस के अवसर पर 14 सितम्बर 2009 को एक कार्यक्रम का आयोजन किया गया तथा सभी विजेताओं को निदेशक महोदय द्वारा पुरस्कार प्रदान किये गये।

निदेशक महोदय द्वारा संस्थान के शैक्षणिक अनुभाग को हिन्दी में प्रशंसनीय कार्य करने पर एक प्रमाण-पत्र प्रदान किया गया। इस अवसर पर श्री पी.आर. सिन्हा, निदेशक एवं डा0 पी.के. माथुर, वैज्ञानिक-जी ने उपस्थितजनों को सम्बोधित किया। हिन्दी अनुवादक, श्रीमती बलजीत कौर ने सभी को कार्यालय में राजभाषा हिन्दी से सम्बन्धित गतिविधियों एवं नियमों के बारे में बताया। **सम्पर्क:** पी0के0 अग्रवाल
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Species survival in 21st century with special reference to tigers in India

- **R.N. Mehrotra***

As with other species, the genetic diversity of tigers is crucial for avoiding the well-known hazards of inbreeding. It is well recognized that a healthy population can only survive by sharing a sufficiently large gene pool to evolve and filter its way around the environmental factors. Studies have shown that many of the current captive tiger populations in zoos around the world suffer from severe diseases, weakened immune systems, abnormalities, and birth defects.

The Ranthambhore free ranging tiger populations - resident to an approximate area of 400-500 sq km in the district of Sawai Madhopur in Rajasthan - in the past have had good landscape connectivity with other tiger bearing areas of Kota, Karauli, Jaipur, Bharatpur and Sariska. As a result a large gene pool was available to the tigers. However, due to several factors leading to higher demand for agricultural land coupled with expanding urban clusters, the forests around Ranthambhore have been fragmented. Tiger movement both inter-state and intra-state has thus been drastically restricted since the last several years. The source population of tigers is now confined to about 20 to 25 breeding females and about 18 to 20 males. This population has seemingly grown from a small population of five tigers as reported in 1971, when the area was small (150 sq km) and surrounded by several villages. There is a need to develop and interpret a variety of genetic data in order to answer specific questions regarding tiger populations in Ranthambhore. This would be of immense help to develop effective management strategies for the long-term survival of tigers in Rajasthan.

Population fluctuations and the breeding of tigers in Ranthambhore have been recorded over the last forty years. Almost seven generations of tigers have so far not shown any morphological perturbations. Their populations crashed to ten females in 1992 and then again to fifteen in 2005. Remarkably, the total population bounced-back to 45 and 44 in 2003 and 2009, respectively. Such cycles¹ naturally occur among the wild populations of several species. From each generation to the next, weaker genes are filtered out from wild populations either by predation or fights etc.

This holds true for a normal and constraint free population group, where genetic variability is high and a large free ranging habitat is available. However, a range of questions now arise. How large does the habitat need to be? What determines the breeding? Is there a genetic pressure to move on to the next generation? If so, then what are the key determinants of selecting a good mate in the wild? Is it essentially random and opportunistic? Is avoidance of mating between relatives hardwired in the brains of the wild animals? What about inbreeding? What is the scale/index to identify the effects and measure it before it has expressed itself in recessive genes to show morphological variations? Why population crashes occur? Such questions cannot be answered straightaway; however molecular

genetics when applied to wild animal population groups points to possibilities.

The breeding among wild animal populations has always remained an enigma. While some species survive population bottlenecks others do not. A survey of situational studies reveals varying results. Northern elephant seals were hunted to near extinction in the western US by the early 1920s, with less than 20 individuals surviving the slaughter. Despite the low numbers, populations have since bounced back to over 175,000 – thus showing that even



a species on the edge of extinction can rebound. A study, published in the *Journal of Heredity*², estimates that the Hawaiian monk seals were reduced to a total population of around two dozen around 1890. Their genetic diversity is even lower than that of the Mediterranean monk seal, whose population is only 1/5 of the Hawaiian monk seal. The survival of Cheetah³ despite its population passage through a very thin bottleneck has made it lose its entire genetic diversity, yet it has a growing sizable population in the wild of about more than 10,000. Even the *pundits* of genetics have no clear answers for such differential results of survival found among species - some go extinct on losing the genetic diversity due to compulsive inbreeding, while others, like the Cheetah, ride the wave of survival.

Inbreeding and Outbreeding: Results in-depth

Inbreeding depression is of major concern in the management and conservation of endangered species. Inbreeding universally appears to reduce fitness, but its magnitude and specific effects are highly variable because they depend on the genetic constitution of the species or populations and on how these genotypes interact with the environment. Recent natural experiments are consistent with greater inbreeding depression in more stressful environments. In small populations of randomly mating individuals –which are characteristic of many endangered species - all individuals may suffer from inbreeding depression because of the cumulative effects of genetic drift that decrease the fitness of all individuals in the population.

The dusky seaside sparrow, a melanistic subspecies of sparrow that inhabited central and eastern Florida, was listed as endangered in 1966. By 1980 the population had declined to six birds. The possible solution conceived was to breed the sparrow with a larger population group that was genetically closer. Five were brought into captivity to be crossbred with a lighter-colored Scott's seaside sparrow from the Gulf Coast of Florida in an effort to save the dusky. The Hybrid Policy memoranda of the US government did not allow the cross breeding. The dusky sparrow is now extinct.

Out breeding in species has been considered by classical conservationists as a threat that crosses the path of evolution and is said to cause genetic pollution. It is believed that nature has its own ways of having interspecies genetic barriers to guard against genetic mixing in order to keep species distinct. When rarely hybridization does occur naturally as in hybrid zones where the ranges of closely related wild species overlap, the hybrid crosses produced, even though they may display hybrid vigour (heterosis) in the first generation (F1 hybrid), are in the long run less fit than the two parent species which have evolved over hundreds of thousands of years specializing in exploiting their own particular niche in nature.

This belief however does not give enough reasons to explain the natural occurrence of certain hybrid species in the wild. This is demonstrated by the new school of conservationists that many species have developed by natural intercrossing among closely related wild species. Like the red wolf, a flagship endangered species for U.S. Fish and Wildlife Service, are found to derive completely from hybridization between coyotes and an extinct wolf subspecies. The neo conservationists armed with the tool of molecular genetics have found several such examples of cross bred wild populations; in Washington State the northern spotted owl had been crossbreeding with a neighboring subspecies, hybrids between blue whales and fin whales were discovered based on new molecular genetic data.

The contention of restricting intercrosses among wild population exclusively for the purpose of maintaining genetic purity at the cost of losing the species was whisked away by the winds of change that genetics brought. Moreover, the new protagonists further believe in using genetic mixing for repair of damage done by inbreeding. They claim that the likes of dusky seaside sparrow should not be penalized for what happens naturally every day, and in emergency cases intercrossing must be allowed to be used as a tool for species survival.

The Hybrid policy of United States was subsequently revised and it took the U.S. Fish and Wildlife Service several years of debate to create a new hybrid policy. On February 7, 1996, the new policy finally appeared in the Federal Register, under the title "Endangered and Threatened Wildlife and Plants; Proposed Policy and Proposed Rules on the Treatment of Intercrosses and Intercross Progeny (the Issue of Hybridization)". Stephen O'Brien⁵ in "Tears of a Cheetah", describes this issue poignantly in "The Bureaucratic Mischief". Here's an excerpt:

"The political turmoil over the legal ratification of subspecies, intercrosses, and endangered species represents the

tip of the iceberg for a critical but highly contentious conservation issue; When should a subspecies be maintained as pure or when might it be encouraged to intermix with another subspecies? The answer has two tiers. One involves natural gene flow introgression, which we simply observe and document, such as nineteenth –century hybridization between Texas and Florida puma subspecies. The second involves management intervention to hybridize, as was carried out in the 1996 panther restoration experiment of the same two groups.” In this experiment gene flow was augmented to save the Florida panther, after overwhelming genetic, reproductive, medical, and ecological life history data pointed to its imminent extinction.

The New Paradigm

With rapid growth of human populations, large landscapes have been scissored by highways and canals making it more and more difficult for the survival of many species. The gene pools of several species have been continuously shrinking and inbreeding among some species has become imminent. The second option pointed out by O’Brien is critical to our search for management solutions in this rapidly changing scenario of wildlife. Existing inbreeding provides vital clues to understanding how we can allow mixing and when we should intervene to stop.

In India, the rapidly changing landscape and fragmentation of wild habitats in the last decade has put tremendous pressure on defining the conservation strategy for large carnivores. The dangers of inbreeding in isolated meta population of tigers have now put pressures on the conservationists to make a choice and facilitate breeding with other meta population, generally believed to be done to purge the recessive genes and produce a healthy progeny. However, some scientists argue that since different meta populations, separated in time, develop adequate resistance and adaptations that shield them from certain diseases and have distinct immunological strength that relates to their habitat, we therefore need to preserve and protect them against genetic swamping. They oppose all kinds of out breeding and recommend conserving the purity of such population groups rather than rushing for a robust hybrid.

The tigers living in Sunderbans are believed to be distinctly tailor-made in time to survive in their environment as opposed to the tigers of arid regions of Ranthambhore. The divergence of climate between arid and semi-arid regions is deterministic of the sub-species of that region. Outwardly, we may not see any difference between the tigers of Rajasthan and those of east India as they belong to the same sub-species, but certainly a distinct variation has been found to occur in one such study⁴. mtDNA polymorphisms was analyzed in 59 scat and 18 tissue samples from 13 wild populations of the critically endangered Indian tiger (*Panthera tigris tigris*), along with zoo animals as reference. Northern tiger populations were found to exhibit two unique haplotypes suggesting genetic isolation. Populations were assigned to the regions Northern, Northeastern, Western, Central, and Southern India.

Data from Chitwan (Indo-Nepal border) and Nagarhole (Southern India) (Luo *et al.* 2004) was collated. Analysis yielded only six different composite haplotypes. The composite mitochondrial haplotypes are informative regarding geographic population structure. The two closely related haplotypes together had a frequency of 100% in Northern populations (*i.e.* all tigers in Rajaji/Corbett showed one of these two haplotypes), while it was absent in all other regions. This suggests that Rajaji/Corbett harbors a genetically distinct tiger population.



Both, the analysis of molecular variance and the pair wise analyses revealed significant differences among most tiger populations of different geographic areas across India. Genetic analysis of the recently exterminated population of Sariska (Western India) suggests potential connectivity to the extant Ranthambhore population, a scenario further corroborated by historical information on a forest connection among these two areas until 100 years ago.

The divergent features of the meta populations found among the Indian tigers certainly point out that there is merit in preserving these gene pools. Preserving these pure lines of tigers with some currently unknown beneficial properties of their DNAs may be of benefit in the future.

Therefore, it becomes imperative for breeding that the candidate animals of the five different meta populations identified in the study must be put on a monitoring roster for observable inbreeding constituents. Till such time they remain genetically healthy no crosses be allowed.

It will also be necessary to determine a critical level of observable occurrence of recessive expressions of inbreeding among the animals, which should be the deciding factor before any introgression is allowed to take place. In such a situation, decisions on permitting intercrosses must be based on a well crafted threshold protocol that may consider knowledge of heterozygosity, coefficient of inbreeding, evaluation of possible genetic restoration and other factors specific to the habitat, before introduction of a new gene.

While the extent of intervention in dwindling populations is debatable, it is certain that we need to adopt a guarded regime to allow limited intercrosses for genetic restoration. It must be restored to when populations of some endangered species have become so small that they have lost genetic variation and appear to have become fixed for deleterious genetic variants. To avoid extinction from this genetic deterioration, some populations may be allowed to benefit from the introduction of individuals from related populations or subspecies for genetic restoration, i.e., elimination of deleterious variants and recovery to normal levels of genetic variation. We would thus have to collect a database marking the genetic distribution maps of several important and threatened species of wild animals.

However, caution must be observed in the selection of the animals likely to be introduced for such genetic repair of inbred populations. An unfortunate accident that took place over 35 years ago in a National Park in India shows how hazardous it can be for the gene pools of wild populations.

Tara, a hand-reared supposedly Bengal tigress acquired from Twycross Zoo in England in July 1976 was trained by Billy Arjan Singh, a well reputed conservationist, and released to the wild in Dudhwa National Park, in an attempt to prove the experts wrong that zoo bred hand reared Tigers can ever be released in the wild with success. In the 1990s, some tigers from Dudhwa were observed which had the typical appearance of Siberian tigers: white complexion, pale fur, large head and wide stripes. It was subsequently found that Siberian tiger genes polluted the otherwise pure tiger gene pool of Dudhwa National Park. It was proved later that Twycross Zoo had been irresponsible and maintained no breeding records and had given India a hybrid Siberian-Bengal tigress instead. The possibility exists of such genetic pollution in other tiger groups and, at its worst, this could jeopardize the Indian tiger as a distinct subspecies.

References:

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3. "Tears of a Cheetah", Stephen O'Brien
4. mtDNA indicates profound population structure in Indian tiger (*Panthera tigris tigris*) Conserv Genet, 12 March 2008. Reeta Sharma, Heiko Stuckas, Ranjana Bhaskar, Sandeep Rajput, Imran Khan, Surendra Prakash Goyal, Ralph Tiedemann.
5. Rajasthan Forest Department.

Welcome Guests

- ◆ 42 participants (2009-2011 Course Batch) from SFS College, Dehradun, July 10, 2009.
 - ◆ 32 Cadets and Masters from RIMC, Dehradun, July 31, 2009.
 - ◆ A group of IFS Officer trainees (2008 Batch) from IGNFA, Dehradun, August 14, 2008.
 - ◆ 56 IFS probationers (2009-11 Course Batch) from IGNFA, Dehradun, August 27, 2009.
 - ◆ 15 German students accompanied by their faculty from the Department of Tourism, Catholic University, Germany, September 10, 2009.
 - ◆ 20 participants from Central Academy for SFS College, Dehradun, September 11, 2009.
 - ◆ 6 Officer trainees along with two officers (Instructors) from Office of Director, SSB Academy, Srinagar (Garhwal), September 22, 2009.
 - ◆ 47 Forester trainees of Foresters Training Course and Forest Guards (Uttarakhand) 2009-2010 from Forest Training Circle, Haryana, Pinjore, September 23, 2009.
 - ◆ 24 students from Lewis & Clark College, Portland, Oregon (on educational tour to Navdanya), September 25, 2009.
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A group of Professional Foresters belonging to 1957-60 IFS Batch, September 17, 2009.

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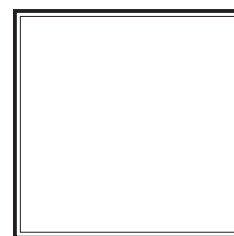
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The views expressed in this newsletter are not necessarily those of the Editors or of the Wildlife Institute of India.

BOOK - POST

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