Tigers in the 21st Century

Saving the Tiger:

Assessing our Success

Proceedings of a Three Day Workshop

Central Park Zoo - September 14-16, 1999

Edited by
Joshua R. Ginsberg

THE NATIONAL FISH AND WILDLIFE FOUNDATION
SAVE THE TIGER FUND

WILDLIFE CONSERVATION SOCIETY

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Wildlife Conservation Society
The National Fish and Wildlife Foundation

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Foreword

Background

In the last few years there has been ample opportunity to talk about tigers. In February 1997, tiger biologists and conservationists met in London under the auspices of the Zoological Society of London. The proceedings of that conference (Seidensticker et al. 1999[1]) have become the standard reference for the state of play in tiger conservation, but also provided a template for reviewing the problems that are faced in single species conservation overall.

In Dallas, in 1998, the Save The Tiger Fund (STF) sponsored the Year of the Tiger conference. This conference brought together many of those who had attended the London conference, but greatly expanded the participant list to include governmental and non-governmental tiger conservationists and decision makers from across the tiger's range. This meeting served to put tiger conservation on the political map and provided an opportunity for all the players, governmental, non-governmental, donor and recipient, to get together and discuss goals, needs, problems of tiger conservation across the range of the species (Tilson et al. 2000).

In the last few years individual countries including Russia, India, Thailand, Indonesia, Nepal, among others, have continued to focus on their tiger conservation priorities, revising plans, and refocusing implementation strategies.

So why did we hold another workshop?

Recognizing that tigers were disappearing across their range, in 1994 the Wildlife Conservation Society conducted an assessment of the threats facing tigers and an analysis of the information needed to reverse the impact of these threats and secure a future for tigers. With the support of *STF,* WCS, in collaboration with WWF, further defined conservation priorities in the *Tiger Framework*[2] document. Five years into our mission to Save the Tiger, we needed to review our original plans and see what is working for tiger conservation, and what is not. We needed to extend the process, started in many ways at the London Conference, of developing a template, or framework, to evaluate the effectiveness of our actions.

[1] J. Seidensticker, S. Christie, and P. Jackson, eds., *Riding the tiger: tiger conservation in human-dominated landscapes,* (The Zoological Society of London: Cambridge University Press, 1999), p.383

[2] D.Bolze, M. Connor, E. Dinerstein, P. Hedao, G. Hemley, U. Karanth, T. Mathew, D. Olson, A. Rabinowitz, J. Robinson and E. Wikramanayake, *A framework for identifying high priority areas and actions for the conservation of tigers in the wild*, (Word Wildlife Fund - US & Wildlife Conservation Society, 1997), p.72.

To begin to address these questions, in September of 1999, the Wildlife Conservation Society convened a workshop with support from the Save The Tiger Fund, a joint project of the National Fish and Wildlife Foundation and the ExxonMobil Corporation. This workshop brought together WCS staff who work on tiger conservation projects across Asia and representatives from other organizations who have collaborated with WCS to examine a number of issues and activities and to begin to develop a framework that will allow WCS and other institutions to both better assess the effectiveness of our current programs and examine alternative ideas and approaches for new tiger conservation initiatives.

The institutions and individuals who participated in the workshop shared the belief that solid research, planning, implementation of results on the ground, and education are the best hope for the conservation of the tiger. Rather than stir up media attention by declaring a crisis, and decrying the imminent extinction of the tiger, we must celebrate our successes, analyze our failures, and revise and refine our priorities for saving tigers in their natural habitat. We have some clear ideas about how to save tigers, and are conducting activities which have a measurable, positive impact on tiger conservation. But we have not done a sufficient job of capturing lessons learned from these activities.

OBJECTIVES

Our overall objective as tiger conservationists is to have increasing and/or stabilized tiger and prey populations throughout much of their present range. The questions we asked at the workshop included:

- What are the specific activities that accomplish this? (protected areas establishment and management, community development schemes, poverty alleviation, better legislation, better enforcement, etc.)
- What tools do we have, and how effective are they? (e.g. cameras, radiotelemetry, track and sign, training, interdiction, under-cover investigation, education, propaganda)
- Where should these activities be taking place (range countries, market countries and sites within them)?
- How do we know whether our actions are working? (development of monitoring and assessment programs)

There were two objectives for this workshop at the outset:

- to develop an approach/strategy/template that allows us to assess the effectiveness of NGO tiger conservation programs
- to evaluate the tools we have for both measuring and achieving tiger conservation

Neither of these objectives were completely met, but the workshop provided an unusual opportunity for discussion. The workshop has also resulted in some follow-up activities which, due to the delay in producing these proceedings, we have been able to elaborate on here.

Structure of the Proceedings

Development and discussion of methodological approaches to conservation and development of a template to assess effectiveness of our conservation efforts are inevitably intertwined. The workshop, for the most part, did not center on formal presentations, but focused on particular issues and encouraged wide ranging discussions on these issues. While, communally, we know quite a bit about methods and approaches, we are less versed (or experienced), on the whole, with assessing the impact and effectiveness of these approaches.

Discussion 1: Assessing success and setting goals for tiger conservation

Discussion 2: Assessing and reversing the impact of poaching and over-hunting of prey

Discussion 3: Developing a tiger scorecard *(*originally: *Habitat integrity: reversing loss and establishment of use inconsistent with tiger conservation)*

Discussion 4: Training and capacity building

Discussion 5: Alternatives to ecotourism (originally: *Making room for tigers: pragmatic approaches to achieving spatial separation between tigers and local communities*)

Appendix I: Original agenda and participants list

Appendix II: Statements on reintroduction & stockpiling/trade

Appendix III: Tiger database document and discussion

Appendix IV: Scorecard follow-up

Appendix V: Press release and NYTimes article, Jackson letter to the editor

The final day and half of the workshop were curtailed due to a hurricane. As a result, the original focus of Discussion 5 (*Making room for tigers: pragmatic approaches to achieving spatial separation between tigers and local communities*) and Discussion 6 (*Consumption of tiger and endangered species products: evaluating remediation*) were changed and abbreviated. Discussion 5 was focused on looking at the alternatives to ecotourism in engaging local communities in tiger conservation, while Discussion 6 focused on drafting policy statements on *Reintroduction of Tigers* and *Trade and Stockpiling of Tiger Parts* (see Appendix II).

Clearly, in two and a half days we were unable to accomplish all the tasks we set for the participants, but the assembled mass of tiger researchers and conservationists provided spirited debate and allowed us to discuss and debate some critical questions for tiger conservation. We hope that these proceedings capture the essence of these debates and will provoke us to continue, and expand, our efforts to implement some of the ideas and approaches that were discussed.

Acknowledgments

The *Tigers in the 21st Century Workshop* was the result of a collaborative effort of many individuals and organizations noted in the participants list. The workshop, and these proceedings, would not have been possible without the support, financial and programmatic, of the *Save The Tiger Fund,* a Special Project of the National Fish and Wildlife Foundation in partnership with ExxonMobil Corporation. In particular, the Fund's Chairman, John Seidensticker, provided guidance, humor, and the necessary pressure to bring these proceedings to completion. Ed Anhert, President of the ExxonMobil Foundation, provoked the process that led to the Workshop. WCS would like to thank Sarah Garman, Christine Colon, Heather Fener, Yok-yok Hadiprakarsa and the staff of the Central Park Zoo for their assistance, and the many donors, public and private, who have supported the WCS tiger program for the last five years. In particular, we owe a debt of gratitude to Gary Fink who has consistently challenged us to do more for tigers.

Executive Summary

In September of 1999, the Wildlife Conservation Society convened a workshop with support from the Save The Tiger Fund, a joint project of the US National Fish and Wildlife Foundation and the ExxonMobil Corporation. This workshop brought together WCS staff who work on tiger conservation projects across Asia, and representatives from other organizations who have collaborated with WCS, to examine a number of issues and activities, and to begin to develop a framework which will allow WCS, and other institutions, to better assess both the effectiveness of our current programs, as well as examine alternative ideas and approaches for new tiger conservation initiatives.

The overall objective of the workshop was to evaluate the tools we have for both measuring and achieving tiger conservation, and to begin the development of an set of tools that allows us to assess the effectiveness of NGO tiger conservation programs. Fulfilling these objectives required a review of our success, to date, in tiger conservation, but more importantly a considered discussion of the issues facing tiger conservationists.

Assessing Success and Setting Goals

Several sections of the report touch on this issue which was a major theme of the workshop. While there are no simple conclusions, some of the major points of agreement were:

- Success and failure of tiger conservation needs to be evaluated at different temporal (long/short term) and spatial scales: the site; the landscape; the ecoregion or Tiger Conservation Unit (TCU); and across the entire range of the species.
- We do too little to examine and publish our failures. Only through analysis of what didn't work can we avoid duplication of effort and repeating our mistakes.
- Development of a set of standardized methods of evaluation ("tiger scorecards") is needed. A preliminary outline of a scorecard was discussed, and follow-up activities are reviewed and discussed in Appendix IV.

- Data sharing, and development of a systematic way to track data on tigers, prey, and threats is a critical activity. Nonetheless, developing data standards, and getting conservationists to share data, remains a serious problem for a number of reasons.
- Data presented on development of a database of tiger conservation projects, and the funding for these projects, made clear the difficulty of the task of range-wide data synthesis.

Training and Capacity Building

A critical activity of all tiger conservation projects is to ensure that there is a constituency for tiger conservation, and a cadre of conservation leaders dedicated to ensuring the future of tigers, their prey, and the habitats in which they live. This is perhaps easier said than done. While many projects have components of training and capacity building, assessing the effectiveness and impact of these activities is extremely difficult, particularly over the long-term. Some conclusions of the workshop were:

- Mentoring of future conservation leaders is a critical activity. Developing range state leadership for tiger conservation must be better supported.
- Training of government staff in tiger conservation is important, but most training activities are ineffective because skills gained, and lessons learned, are not reinforced after short training sessions. High rates of staff turnover also reduced medium and long-term effectiveness of all training activities.
- Training and educating senior and middle-level management is critical: field-based staff can not effect the changes they need to make unless they have central office support.
- Local language materials are critical to success in training and help ensure longer-term application of principles learned.
- We do an inadequate job of sharing training manuals and materials.

Assessing and Reversing Threats

Threats to tigers are similar across the range of the species: habitat loss; habitat fragmentation; poaching of prey; and direct hunting and persecution of tigers all contribute to the decline of the species. In any particular location, however, different threats may dominate. In Discussion 2 (Assessing and Reversing the Impact of Poaching and Over-hunting of Prey) and Discussion 5 (Alternatives to Ecotourism), we looked at ways to evaluate, monitor and reverse threats. Emerging principles included:

- Involving local communities can greatly increase the probability of success of tiger conservation efforts. However, activities must be linked to conservation efforts (preferably directly) to have a chance of being effective.

- Conflict resolution requires that conservationists and local communities agree on the definition of "conflict." While self-evident, this principle is often overlooked.
- Compensation schemes are notoriously difficult to manage: self-insurance schemes provide local ownership and built-in incentives for enforcement of rules.
- Law enforcement is directly the right and responsibility of governments. While NGOs can provide support, coordination and innovation in anti-poaching activities, the role of NGOs will be determined by the Government.
- Government-to-government exchanges and training have proved effective in developing on-the-ground anti-poaching teams across the range of tigers. NGOs have often facilitated these activities.
- Reversing encroachment on protected areas requires a suite of activities including clear definition of PA boundaries, habitat restoration in buffer zones, alternative management of livestock (e.g. stall feeding), and/or fair and voluntary resettlement packages.

As John Seidensticker notes in the opening essay of the proceedings: "Asia is a big place and saving the tiger is a big task, but I believe that more and more visions and processes are emerging that are site specific and effective and that we can get our hands, heads, and hearts around saving wild tigers and their significant habitats to secure their future for our children and our children's children".

Elements of Tiger Conservation

John Seidensticker, PhD
Chairman, Save The Tiger Fund

It is a pleasure and an honor to be asked to share with you some thoughts on "elements of tiger conservation." It is most appropriate that the Wildlife Conservation Society proposed this workshop, because WCS is doing much for tigers in many of the bioregions where tigers live. The Save The Tiger Fund is pleased that representatives of some of our major partners in securing a future for wild tigers have joined us for this workshop. We are all in the business of securing a future for wild tigers. The time has come to ask how we are doing and, equally important, how do we know how we are doing in our efforts to secure a future for wild tigers and their significant habitats.

As we began operation with the Save The Tiger Fund in 1995, we supported the development and publication of a new vision of how to think about saving tigers on their home ground. We refer to that document as *The Framework Document,* short for *A Framework for Identifying High Priority Areas and Actions for the Conservation of Tigers in the Wild.* Many of you here today are co-authors of this new vision. I love how you did not use the words "plan" or "strategy" in the title. In my mind, the document has been a vision with its powerful images and quantities, evidence and narrative, and it set a new course in saving wild tigers. This vision is grounded in sustainability, landscapes, bioregions, and in tiger ecology. It is promoting activities that result in a reduction in the numbers of tigers killed for consumption and about activities to promote human-tiger coexistence. We are now at the place where we need a tool, a scorecard if you will, a way to measure how we are doing. We are looking for the tools that help us to bridge the fundamental disconnection between the development and formulation of a strategy and its implementation. Thus, this workshop.

The Save The Tiger Fund Council firmly recognizes this need and its value. We have been discussing how we should proceed in developing, testing, and applying such a methodology in our own efforts to secure a future for wild tigers. The Erics - Eric Dinerstein, Eric Wikramanayake - and Arun Rijal proposed a "Tiger Conservation Unit Report Card" at the *Year of the Tiger Conference* in Dallas last year as a next step in following up to the conservation activities and processes suggested in the *Framework Document* you all developed.

The "Tiger Conservation Unit Report Card" is based on the working hypothesis that for tigers to survive over the long-term, populations of tigers and their prey must be managed at a landscape scale that includes core areas of protection, buffer zones, dispersal corridors, and the restoration of degraded lands, coupled with initiatives through which the conservation of tigers directly or indirectly meets the needs of local people. This ecological approach to conserving tigers recognizes not only their genetic distinctiveness across their range but also behavioral, demographic, and ecological distinctiveness. It recognizes the value of tigers as top predators in ecosystems and their role as "umbrella species" for conservation of other species and ecological processes. In short, the report card asks how are we doing in linking up space with adequate prey and other critical resources, including some separation from human disturbances, for about 80 adult reproducing females in each of the primary landscape units or TCUs? And do the local folks feel good about it or at least see some value coming to them from this effort? I am sure we will talk more about this as we move forward in the next days. When Josh and WCS came to the Save The Tiger Fund for partial support for a workshop focused on "assessing our success," we seized on the idea as an idea whose time is now.

I want to acknowledge the wonderful support and sound advice we have had from folks at the National Fish and Wildlife Foundation and the Exxon Corporation who created the Save The Tiger Fund partnership and moved it forward. The Save The Tiger Fund Council has grown in the depth of our understanding of the extent and character of the solutions we must seek to secure a future for wild tigers and how we should approach our investment and facilitation strategy. So thank you Amos, David, Whitney, Ed, Tony, Nancy, Al. And especially to you Jill for asking hard questions: How do we know how well we are doing? What are our ways of knowing? How can we quantify the results of our investment? What part does this play in addressing the overall challenge of securing a future for wild tigers? And how is our investment being attributed?

Peter and Sarah and I had the great challenge and the great pleasure of working with the ideas that so many in this room contributed towards securing a future for wild tigers over the two years following the *Tigers: 2000* Symposium held at the Zoological Society of London in 1997. There was a wonderful tension, as the manuscripts came in and we sought to weave ideas from our 79 co-authors into a vision about how we could create a

future for wild tigers in Asia. Most of you in this room are in this group. As each manuscript came in, the vision became more inclusive. It was exciting as elements of tiger conservation were coming together in new ways. Sir William Bragg noted that "The important thing in science is not so much to obtain new facts as to discover new ways of thinking about them." We were seeking to translate the many different languages of tiger conservation into a common language, the new language of conservation biology. And we sought to identify the right vision. In my remarks here you should find something from everyone. I am reminded of Edward Tufte, the brilliant Yale innovator in information design who tells us that "Assessment of change, dynamics, and cause and effects are at the heart of thinking and explanation. To understand is to *know what causes provoke what effects, by what means, at what rate."* How then is such knowledge to be represented?" That is the task before us in its pure form. Tufte has also offered some important advice that I try to follow at every opportunity. As he puts it: "Talent imitates; genius steals." You all were our teachers in this and we thank you for the magnificent contributions you made in *Riding the Tiger: Tiger Conservation in Human-dominated Landscapes.*

I have emphasized vision, right vision for a future of wild tigers. Visions and strategies that are NOT actionable — do not result in action — are fundamental barriers disconnecting the development and formulation of a strategy and its implementation. This disconnect is frequently caused by barriers erected by traditional management systems. And this disconnect is also the result of a failure to gain consensus about what a lofty vision and strategy — in this case securing a future for wild tigers — really means. Lacking consensus and clarity, different groups pursue different agendas and the results are neither integrated nor cumulative.

There are two aspects of vision we should emphasize. Neil Postman – one of our deepest thinkers - in his recent book, *The End of Education: Redefining the Value of School,* stresses that schooling boils down to two problems to solve. And what does schooling have to do with securing a future or wild tigers you may ask? When all is said and done, I believe at our core we "tiger people" are, must be, educators. Postman believes that the first schooling problem is really an engineering problem. Teaching math or counting the numbers of tigers and estimating their prey with confidence is an example. It is the problem of the means by which we become learned. The other problem we face in schooling in metaphysical. He is quite firm in his belief that without a metaphysical underpinning – a reason for learning — schooling does not work. For school to make sense, the young, their parents, and their teachers must have a vision to serve.

I believe that this paradigm of seeing schooling in terms of its engineering side and in terms of its metaphysical vision helps us to think about the elusive concept we call conservation, in this case tiger conservation. When we say that good conservation is based on good science we are speaking to the engineering side of the equation. On the metaphysical side of this

equation, Postman emphasizes the importance and the power of our narratives, our stories, and our images.

When it comes to tigers, we, as conservation biologists, have two tasks in our quest to keep large carnivores in the neighborhood. We have to tease apart the risks and opportunities, and devise tactics and strategies of coexistence between tigers and people. We have to provide decision-makers with viable alternatives to dead tigers through road maps that make landscapes with tigers worth more than landscapes without tigers. This is the engineering side of the problem. But we must also provide the vision of why this should matter at all to anyone – the metaphysical side of the equation. Stephen Kellert reminds us that "Support for endangered species conservation will emerge when people believe that this effort enhances the prospects of a more materially, emotionally, and spiritually worthwhile life for themselves, their families, and communities. This may not constitute a particularly easy task but it may be unavoidable." As Judy Mills so aptly told me in an e-mail exchange: "The problem as I see it revolves around human needs." Or as Dave Mech puts it, "In the new era of carnivore conservation our aim is to manage carnivore populations at socially acceptable levels."

When we began the Save The Tiger Fund, we focused on the activity – "saving the tiger" — rather than on a result "supporting sustainable wild tiger populations in their significant habitats." This was the source of some confusion with our potential partners and even among ourselves. Through our symposium in London, our conference in Dallas and in our book *Riding the Tiger* we have shifted our emphases from an activity-driven to a results-driven agenda. We are seeking to secure a future for wild tigers in their significant habitats. I have always liked the imagery created by Steve Humphrey and Brad Stith in their "conservation is a three-legged stool" metaphor: "The conservation of species and undamaged habitats is like a three-legged stool. Each leg is necessary but not sufficient. The legs of the conservation stool are sustainable use of natural resources, species recovery, and habitat preservation. Conservation can progress by focusing on each of these, defining their limits, developing improvements and preventing dysfunction." But I now think that we can add a fourth leg to the stool. This fourth leg in the conservation stool is the human dimension because we simply will not progress unless we take this into our formulations.

We have focused the central mission in the activity of tiger conservation into saving wild tigers. Further we see that wild tigers can be symbols of ecosystems in recovery rather than as symbols of ecosystems in decline. This is our strategic objective. Now we must identify the barriers to achieving this and then break these down into technically practical and politically feasible scales. Or as my friend Ullas put this concept: "…vision, persistence, thinking at the right social and spatial scales, and constructive dialogue are keys to the tiger's future." I don't know of a conservationist more committed to bringing good science to tiger conservation than Ullas, but he recognizes fully the

importance of the right vision and knows the tiger will be lost without this vision, no matter how good the science.

I believe that after 30-odd years of seeking to save wild tigers we know there is no one way, no silver bullet. There will be different roadmaps for different bioregions and contexts because such is the nature of the social and natural landscapes of Asia. I do believe that after 30-odd years of trying, we have learned that the solution has to fit the site. But have we translated our vision into shared understanding and commonality of purpose with our partners? Have we communicated strategy, and linked strategy to performance measures? Have we set targets? Do we have a feedback system relative to strategy?

I believe that there are several over-arching principles that can give meaning and purpose to our work and help our work to endure. I am indebted and have stolen these from Bill Shore's wonderful book *The Cathedral Within*:

1. Many people in this room are devoting their lives to securing a future for wild tigers. It is a cause we will never see completed in our lifetime or in any lifetime but this need not diminish our craftsmanship and dedication. We tried to capture this in the title *Riding the Tiger: Tiger Conservation in Human-dominated Landscapes.* Sometimes we are working to repair, to re-create landscapes where tigers can persist. Sometimes we are seeking to maintain and understand changes in landscapes where tigers live and persist today. But it is always a never-ending task. We are in it for the long haul.

   Saving the tiger requires sharing of strengths, the contribution of not just the experts in this room, but of everyone. Ambitious projects such as securing a future for wild tigers can't be achieved by governments, or business, or even religious institutions alone. They require learning to work in partnerships with nearly everybody. They require civic society.

2. Securing a future for wild tigers requires that we build literally upon the foundations of earlier efforts. Where would we be, for instance, without the efforts of the national parks movement? But we have to go further. We have to respect and appreciate these early efforts, go forward, understand how we need to modify our approach to succeed in achieving our vision of wild tigers living in an ever-changing world. So incorporate the work that came before as a conscious and deliberate part of the vision and the process to achieve this vision. Our results will be more flexible and stronger for it.

3. Visions of wild tigers in the future of our changing world have to be sustainable and not dependent on donations, handouts, or

redistribution of wealth. Instead they must depend on creating new community wealth. I believe this is the core lesson from the Chitwan Valley.

4. As I stressed earlier, our narratives must be such that they teach that rather than being JUST a symbol of decline and loss, as tigers are so frequently depicted by our most elegant speakers — we must continue on in our narratives and show that tigers can be stars in our ongoing efforts to implement actions that enable people to live in balance with their natural resources.

Let me speak again from the Save The Tiger Fund perspective. I think we can agree that conservation science is or should be hypothesis driven. As a reader of many grant proposals, I see very few proposals that propose hypotheses about the barriers to achieving coexistence, or consumption reduction, or ways to support the tigers' long-term future in sustainable ecosystems and landscapes. We don't see many proposals that are results-driven. Most proposals are activity-driven. The notable exceptions to this are usually funded within our available resources. But let me go on a bit about proposals that include buzz words such as research, training, education, master planning, and the like – all typically seen in activity-driven projects. In the STF Council meeting we held last week it was decided that in the future we want to see proposals that are results driven. And we want the attribution level clear: Just how much will carrying out the proposed work contribute towards solutions in securing a future for wild tigers? Here are some suggestions for shifting activity-driven thinking to results-driven thinking.

What do we mean by research in tiger conservation activities? I agree that good conservation is based on good science. In tiger conservation we are seeking to understand the ecological and political criteria we need to identify and meet to sustain wild tiger populations. The landscapes of Asia – tiger land – are human-dominated. We seek to understand and encourage landscape patterns and conditions where tigers can persist. Just what are these and what are our ways of knowing?

Rather than the word "training," I like to think in terms of developing effective conservation leaders. Conservation leaders are the critical drivers to securing a future for wild tigers. If you look at where there is progress towards securing a future for wild tigers it is in those areas where we find effective conservation leaders working. These are the men and women who must be the visionaries for a future that includes wild tigers.

Rather than the activity of "education," I like to think in terms of "promoting environmental awareness among the public at large and developing partnerships based on win-win for tigers and people, especially with those people who live near wild tigers.

We have tigers and their parts in trade, sometimes referred to as the poaching problem. Steve and Judy and Ginette and others have begun to refer to this whole class of activities, not by the individual actions involved, but holistically by the intended result: "tiger consumption reduction."

But you have those tigers that are killed for consumption and then there are tigers killed because they threaten personal welfare. Rather than villianize such tigers by calling them "problem tigers" we seek a results-driven approach that the Hornocker group in the Russian Far East calls seeking out the barriers to human tiger co-existence, the vision they call "the coexistence recipe."

Asia is a big place and saving the tiger is a big task, but I believe that more and more visions and processes are emerging that are site specific and effective and that we can get our hands, heads, and hearts around saving wild tigers and their significant habitats to secure their future for our children and our children's children. So let me sum up.

- The endangered tiger is an indicator of ecosystems in crisis.
- Saving tigers is a complex task and requires a holistic approach.
- It isn't possible to separate the interests of tigers from those of humans on any temporal or spatial scale, yet many of our past conservation prescriptions have attempted to do just that.
- So we must move from viewing tiger conservation as an isolated part of ecosystem conservation, to viewing the maintenance of viable tiger populations as an essential component of an integrated system of sustainable ecosystem management.
- Tiger conservation efforts can be accommodated within sustainable landscapes that include areas free of resource extraction rather than entire forest tracts blanketed in sustained use.
- We must continue our search for and eliminate the barriers to coexistence between tigers and humans at the scale of landscapes.
- We must vigorously pursue the reduction of the consumption of tigers with every possible partner and in great haste.
- We must find, encourage and support the future conservation leaders who are the visionaries that see wild tigers in our future.
- Instead of being a symbol of decline and loss, the tiger can be a star in our ongoing efforts to implement actions that enable people to live in balance with their natural resources.

The challenge of saving tigers is at the heart of conservation. To paraphrase Marjorie Stoneman Douglas: Saving the tiger is a test. If we pass, we get to keep the planet.

DISSCUSSION

DISSCUSSION

Discussion 1
Assessing success and setting goals

Measuring Success and Failure

Success (or failure) in conservation is difficult to quantify and often entails intangible elements such as reduction of threat. We defined several directly measurable currencies for tiger conservation:

- tigers
- prey
- suitable habitat

An increase in any of these is clearly indicative of success at some level, while a decrease in any of these measures indicates, at the very least, that threat reduction has been inadequate.

Throughout the workshop the issue of how to measure the number of tigers, and their prey, resurfaced. Ullas Karanth led a spirited discussion focusing on estimation of tiger numbers, and while there was not universal agreement, several take home-messages were clear:

- No method is uniquely suited to tiger conservation. Different questions are asked, and answered, by looking at tiger presence/absence, relative density estimates, and estimation of absolute population size.
- Estimation of tiger numbers can be made accurately across a range of densities. Where possible, researchers should try to use estimation algorithms to make such estimates and not limit themselves to relative estimates where data can provide more accuracy.
- New methods should be published and undergo the scrutiny of scientific peer review.
- All methods must conform to at least one basic scientific principle: they must be repeatable.

In addition to directly measuring tigers, their prey, and the habitat in which they live, other quantifiable measures that could indicate success or failure of a project could include:

- percent regeneration of habitat
- use of an area by tigers

- whether tigers are breeding in an area or not
- assess if tigers are feeding on natural prey
- examine if tigers are dispersing into areas previously devoid of tigers

Accurate quantification of any of these values has proven logistically difficult. While new ideas and developing technology in the field of conservation biology can facilitate monitoring success, the goal of measuring these indicators of success remains elusive for most projects.

While monitoring actual tiger numbers may be important to address some questions (e.g. genetic viability of a population or the impact of poaching), the group agreed that :

- Efforts and funding should focus on monitoring population trends, which are more accurate indicators of success or failure and often provide a more long term perspective of change.
- Trend analysis is also a good way to present information to government agencies responsible for management of tigers and tiger habitat, as well as a way to inform donors of potential success or failure.
- Rather than an absolute number or density, there should be a range of limits of acceptable changes in tiger populations. Any methodology used to monitor changes in tiger or prey densities must entail standardized and repeatable techniques, and should be comparable across sites.

It was emphasized that although success in conservation is always looked upon favorably, failures can be a significant method of monitoring progress. Such lessons learned can be used to make policy decisions in other regional programs.

We do too little to examine and publish our failures. Only through analysis of what didn't work can we avoid duplication of effort and repeating our mistakes.

SCORECARDS

It was suggested that a simple scorecard be developed to keep track of the progress, or lack thereof, in each region. These would entail the use of a standardized check sheet to monitor each Tiger Conservation Unit (TCU) on an annual basis. The results of these would be presented to tiger conservationists to provide a better sense of where things are moving forward and where efforts are falling behind. They can also provide funding agencies and donors with a credible means of judging the conservation effects of their investment.

Several options for implementation of a tiger scorecard were discussed:

- Scorecards might be distributed to researchers and managers and could become a mandatory component of ongoing monitoring efforts.

- Scorecards could be applied to a selection of case studies, an option that would require less work, but would also yield less accurate and detailed information.
- Separate scorecards could be used for reporting new information versus ongoing monitoring.

In order to reduce the possibility of bias on the part of individuals or agencies dependent on grants, and/or fearful of reporting failures, the suggestion was made to employ a team of unbiased biologists to conduct independent audits. It was suggested that new or recent graduates could be recruited to carry out monitoring, however caution was made that evaluators would need some experience in order to do this well.

While the discussion of scorecards was extensive during this session, the results of these discussions have been moved to the reporting on Discussion Session 3 to better consolidate the information discussed at the workshop.

Scale and Timeframe

Scale and timeframe were identified as two important factors that must be taken into consideration when setting conservation goals. The two timeframes determined to be relevant to tiger conservation were:

- short term (an interval from 2 to 5 years)
- long term (10 to 20 years)

Long term goals should have the opportunity to change, but not too often and the length of term should be relative to the spatial scale.

Discussion led to an agreement on four habitat scales which were determined to be appropriate for evaluation:

- ***Site:*** An area containing at least several breeding females.
- ***Landscape:*** A larger area containing several populations of breeding females and the surrounding matrix that provides connectivity between them.
- ***Ecoregion:*** An area encompassing several independent landscapes. For tiger conservation, the ecoregion was agreed to be equivalent to the Tiger Conservation Unit or TCU.
- ***Tiger range:*** The entire area containing all remaining wild tiger populations as of 1990.

Clearly, at different scales these definitions might become unclear (a small TCU could encompass a single landscape, or an extended site where tigers are continuously distributed at low densities might constitute a landscape). However the divisions were thought to have heuristic value at a minimum and perhaps greater value in defining and setting goals.

Setting Goals

There was some discussion on the value of setting goals. It was generally agreed that different goals would be set depending on the time frame and the area of interest and, in particular, the habitat scale at which a given project or set of projects was being implemented.

By combining our two timeframes, and our four spatial scales, the group generated goals for each of the eight possible combinations of time and space (see Table 1). The goals suggested are certainly not a definitive set. This hierarchy of goals is important for each scale/time frame pair.

For instance, at the site level, in the short term, a need exists to identify and protect areas within habitats where females can successfully rear young. Definition of critical areas within a site may also help focus protection and education activities.

Working at the scale of the TCU, if there is sufficient contiguous habitat available, then protecting the integrity of that habitat should be a short term priority. If habitat within a TCU is fragmented, or appears under irreversible threat of fragmentation, then long term efforts might be made to establish or maintain links between smaller areas through protection of corridors and unprotected matrices. If this is not possible, then protection of various separate areas within the TCU should be the goal, which offers the possibility of movement of individuals among these fragments to ensure genetic viability if necessary.

Across the tiger's range, one might choose a different set of goals. In the short term, we might wish to ensure the continued existence of tiger populations in a representation of different habitat types in different bioregions (e.g. S.E. Asia, Indochina, South Asia, Russian Far East). We could decide that we want three replicates of each habitat type. To achieve our goal, in each bioregion we would then identify the three highest priority TCUs which have landscapes representing each of these habitat types.

Of course, this assumes that we can find three TCUs for each habitat type – for rare habitat types (e.g. mangroves) or areas in which tiger numbers are greatly depleted (e.g. Indochina), restoration of tiger populations in particular habitat types might become a long term goal.

Cost of Conservation

Although conservation goals should be independent of costs, they must also be realistic. Thus, once specified, the proposal should include investment targets and a consideration of cost-effectiveness. Trade-offs often need to be made in terms of how much money and effort to invest per area. In some places, the costs associated with protection are higher than others, so decisions

have to be made in terms of the value of monitoring versus other uses of available funds. The priority of investment should relate to factors such as the degree of threat, the level of protection, the area over which protection is or can be afforded, and the degree of connectivity of sites within a landscape. Other factors that come into play in deciding how best to allocate effort involve the quality and dedication of people working in an area and its relative importance at the scale of the bioregion or tiger range.

Population Targets

Population numbers should be specified in terms of the numbers of reproducing females and their territories. Because the territory size for females varies considerably with different habitat types, these size determinants must be specific to each TCU.

In addition, the group agreed that a population target must, in some way, be tied to an estimation of risk. In areas where tigers are secure, lower population targets might be adequate, while in areas where tigers, their prey, and their habitat are being lost, higher population numbers might be required to ensure even short term persistence.

For instance, TCUs with a lower proportion of protected areas should have a higher population target than those with a higher level of protection. Similarly, TCUs with higher risks to tiger survival would require a higher absolute density of breeding females to be of equal conservation value to areas with low numbers of females and relatively low threats. The relationship between degree of protection and absolute numbers of tigers can be depicted as follows (Figure 1).

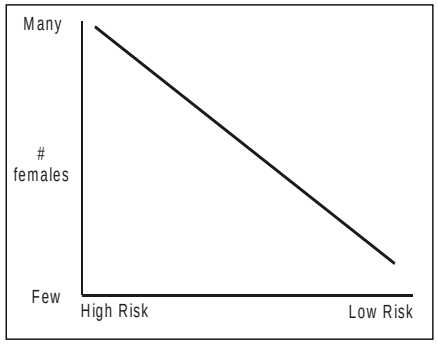

Figure 1

The situation in Myanmar provides an example of an area that has low levels of protection but good habitat and in some places a good prey base. In these areas, two means to achieve the target conservation goal would be to either increase the degree or effectiveness of protection, or set a higher target number for breeding females. In addition to habitat quality and prey density, female home range size and degree of connectivity must also be taken into consideration. Land use practices outside the boundaries of protected areas can also affect the degree of protection within. As these activities change, so does the level of protection.

It was proposed that in order to achieve a minimum population number, the majority of effort should go into either increasing the quality of habitat, or the proportion of effective protection whether through strict protected areas or improved landscape-level management. Approaches to increase habitat quality could include expanding either site connectivity, or ungulate (prey) density. Means to increase protection could include enlarging the size of the protected area and/or the degree of law enforcement, reduction of conflict at areas of key human-tiger interface, or establishment of compensation schemes which effectively reduce conflict.

A final resolution was not achieved on what constitutes an appropriate number of breeding females to set as a target. In some areas (e.g. the Russian Far East), tigers occur at very low densities, but they occur in a contiguous habitat which allows for more or less unimpeded dispersal. In these landscapes, a target of 60-70 breeding females is possible if habitat connectivity can be maintained. In other areas, 60-70 breeding females might be conserved across a landscape, but these populations are highly fragmented with 10-20 females in each sub-population. While connectivity could be a very longterm goal, establishing connections among these sub-populations is unlikely in 10-20 years (our definition of "long term").

In order to achieve the ultimate goal of people and tigers coexisting in the same landscape, conservation efforts of NGOs must be carried out in conjunction with development activities of local governments. A first step is to locate on a map where people are in relation to protected areas and areas that can be zoned for multiple use (e.g. buffer zones). The next step is to determine what activities are being done here and what alternatives can be offered, such as ecotourism (see Discussion 5). Edge areas often serve as magnets for labor, which has associated benefits and drawbacks. One drawback is that these areas can also be a primary site of conflict. It is important to quickly identify conflict areas and determine the causes of conflict. Developing a formal policy of response and determining how and when to provide compensation can help reduce backlash when conflicts arise.

Conducting research on the historical, political and cultural background of the resident communities serves to determine what groups are really local and what rights they have to the area. In-holder resettlement programs must be carried out with the cooperation of the in-holders, which often entails taking the time to learn what they want and attempting to oblige their demands. Direct incentives such as land purchase, is one possible approach to relocation. In these cases, NGOs can serve as land trusts and transfer mechanisms.

In addition to working with local leaders and the middle class, it is important to engage and inform people at all levels. Providing local guardianship, promoting development activities and embarking on education campaigns all help foster support of conservation. Promoting awareness about poaching laws and increasing awareness about conservation value contribute to reducing local wildlife consumption. By combining efforts at all levels, there are greater opportunities for conservation success.

Table 1. Goals at different habitat scales and timeframes

	SHORT TERM (3 to 5 years)	LONG TERM (10 to 20 years)
SITE (an area of several breeding females)	If tigers: then insure tigers Maintain occupancy of tiger habitat. Stabilizing present tiger populations. Stopping loss of tigers	Maintenance of potentially breeding populations of tigers at maximum density. Maintain (at r>1) expanding population. Strictly protected core areas.
LANDSCAPE (site in matrix)	Maintain the potential for there to be dispersal between sites (dispersal may be one way).	Ecologically functioning viable tiger populations. No human intervention (hands-off the tigers, no zoos) required to achieve stable/growing populations. Recolonization of empty tiger habitat.
ECOREGION (Tiger Conservation Unit)	Good prey base. Minimum number of landscapes in each country in the ecoregion including transboundary. Multiple landscape sampling Heterogeneity of ecoregion. Diverse replicates? Should we set a minimum standard? Positive side of setting limits? Setting different number for each ecoregion? Ensure coordination of establishment of protected areas across boundaries. Promote tiger friendly land use practices in each country in ecoregion. Adoption of eco-labeling rules? Benign land use in relation to tigers.	Maintain genetic exchange between tiger landscapes. Multiple landscapes sampling. Heterogeneity of ecoregion.
TIGER RANGE (Global, as of 1990)	Insure tiger friendly politics among leaders and administrators. Reduce consumption of tiger products. No more tiger habitat loss. Enforcement of existing legislation. Maintain ecological diversity of tigers.	Maximize evolutionary potential of tigers. Eliminate tiger consumption. Increase in tiger population across the range. A world in which tigers and people live in peaceful coexistence.

Discussion 2
Assessing & reversing the impact of poaching and over-hunting of prey

Introduction

Poaching tigers and/or their prey is a significant problem when the result is a decline in the number of wild tigers. However, accurate density estimates are difficult to obtain, while high natural variability and large sample error make trends hard to detect. Participants concluded that when the impact of illegal hunting is unclear, it is best to adopt a precautionary approach and take swift action to halt the hunting.

- For the foreseeable future, a zero tolerance approach to hunting of tigers must be adopted range-wide.
- For prey, a zero tolerance stance is easier to adopt and adhere to within the boundaries of protected areas.
- For prey located outside of strict protected areas, some degree of compromise is advisable, often necessary.

Because it is difficult to assess at what level the of hunting of prey is tolerable, several important questions need to be addressed in determining management strategies outside protected areas:

- What is the relationship between hunting and wildlife management?
- Should hunting only be permitted when there is reasonable degree of management?
- How does one distinguish between recreational, subsistence and market hunting?
- How should hunting activities be monitored?

Establishing yardsticks for the sustainable off-take of prey, both in terms of human consumption and impacts on competing predators (including tigers), will vary with habitat, prey diversity, and health of the population(s). Therefore close monitoring of both tiger and prey densities are required in order to detect trends and alter hunting policy and quotas accordingly.

Reasons for Poaching

There are three primary motivations for actively killing tigers:

- Revenge for /remediation of livestock depredation, direct conflict with humans.
- Personal use, as in for amulets and other body parts which are believed to confer power on the owner.
- Sale of body parts both nationally and internationally

The first two activities are usually carried out by people living in communities in and around tiger habitat. The latter is most commonly caused by outside poachers, sometimes acting in concert with individuals in local communities.

In addition, there is a high frequency of incidental tiger mortality resulting from snares and traps set for other species. These traps are usually set to catch ungulates or other tiger prey species to supplement dietary needs and/ or income.

Anti-poaching Patrols and NGO Involvement

Law enforcement is directly the right and responsibility of governments. Whether, where and to what extent NGOs should get involved in anti-poaching activities hinges to a large extent on the government attitude. Often, the local government is too willing to give away the responsibility of enforcement, but without the powers of arrest and criminal conviction for violation of laws, the potential effectiveness and role of NGOs as actors in enforcement activities is an extremely sensitive issue. The role of international NGOs is doubly sensitive.

Despite this sensitivity, all agreed that there are clear roles both for local and international NGOs in anti-poaching activities, and that establishment, support and working for the improved function of anti-poaching activities should be a priority for local NGOs with support from the international NGO community.

What are the roles of an NGO in anti-poaching? Activities where NGOs have played an effective role include:

- providing technical support and training
- ensuring accountability of patrols and information gathering activities
- raising money to support deployment of anti-poaching teams

In order to encourage national governments to pursue anti-poaching and monitoring activities, either acting on their own or in concert with NGOs, it was clear that there need to be incentives and rewards offered, such as funding for equipment, vehicles and salaries. Provision of resources should be linked to monitoring of activities and actual success. Such external monitoring to insure effective use of resources is a clear role for NGOs.

Incentives alone may not solve problems of enforcement. Ron Tilson recounted his experiences in Indonesia: faced with problems of low motivation, limited experience or a lack of equipment for the Indonesian Parks Department to carry out patrols, just providing equipment did not result in an increase in staff efficiency or output.

A highly effective solution was, however, developed by the Sumatran Tiger Project and its government partners through a process of trial and error over the course of 18 months. Success was improved by initiating a number of activities, including:

- using existing anti-poaching teams (GEF funded) that had proven track records of apprehending and prosecuting poachers to train new teams
- engaging Minnesota Fish and Game personnel for training staff in how to approach, arrest and disarm offenders
- providing training in communication skills so that activities of anti-poaching patrols were understood by local communities
- improving the deployment of teams

The anti-poaching program has now been turned over to the Indonesian rangers at a cost of approximately $500 per month. Patrollers are paid by the day in the field, in addition to their regular salaries paid by the parks department. GPS readings are used to show where the teams have gone and to insure they carry out their patrol duties.

Effective anti-poaching was acknowledged to require integration of a suite of activities, many of which are not usually viewed as strictly "anti-poaching." Ron's example raised specific issues and provided a point of departure for discussingthe following components of anti-poaching work: monitoring; information networks; confiscation and amnesty; changing attitudes; education and awareness; developing incentives; dealing with problem tigers; patrol manuals; funding.

Monitoring

Constant monitoring of activities related to poaching is critical to evaluating success. Hence, monitoring and anti-poaching activities can and should be done in conjunction with data collection. Such an integrated approach has been carried out successfully in Bhutan and the Russian Far East. A similar

approach is currently being implemented in Thailand where rangers in Khao Yai National Park are trained in data collection and anti-poaching activities. Data collected by patrol teams may vary with poaching methods and threats (direct or indirect to tigers) and may include: monitoring prey abundance either by random "reccy" surveys; walking permanent transects, or managing camera trap data collection (which will detect both poachers and wildlife); mapping (and removing!) snares; examining the spatial distribution of poaching camps and other signs of illegal activities; noting patterns of human traffic (foot, motorized) in areas of high poaching pressure.

Such monitoring, and changes in activities over time, can be also be used as an index to assess the success of anti-poaching efforts. For instance, in areas where snares are a serious threat, the number of snares collected, and the spatial/temporal arrangement of the snares, can be overlaid with anti-poaching patrol routes to assess the impact of the patrols through time.

A potential problem with combining patrols with monitoring is that patrols may lose or not collect sufficient data useful or essential to management, while monitoring teams may not have sufficient enforcement authority to apprehend poachers. A possible solution would be to create teams that consist of both monitors and enforcement personnel. The monitor team should work ahead of the enforcement agents so wildlife and wildlife sign can be censused without disturbance. Enforcement agents could follow a reasonable distance and survey exclusively for poaching signs. In the event that the lead team encountered poachers, the enforcement agent/s would be immediately available to apprehend and detain.

Confiscation and Amnesty

Actions to reduce the amount of equipment available to poachers can have an impact on the incidents and frequency of poaching. For example, the poisoning of tigers in Sumatra is carried out using widely available and inexpensive poisons. Whenever a domestic animal has been killed, local farmers are encouraged by poachers to poison the kill. The tiger carcass is then retained and sold to the poachers who periodically pass through each village. It is likely that restriction of poison availability could have an impact on the frequency of these events and help reduce the traffic in tiger parts in this area.

Gun buy-back programs, or amnesties, have been implemented in Laos and Cambodia. In some countries however, in can be difficult to implement such buy-back campaigns due to cultural and political reasons, for example in Sarawak. Russia is also a good example where a gun amnesty program would not work, as the majority of adult males own firearms. In these cases it has proved more effective to limit access to gun ammunition both through restricting the sale and increasing the price of ammunition. This, in turn,

makes poaching with guns less profitable. Thus in order to be successful in reducing the amount of poaching with firearms, one must first gather the information necessary to assess whether or not a gun buy-back program would actually be feasible.

Without enforcement, of course, gun buy-backs, or restrictions on ammunition may lead to adopting new hunting techniques, such as snares. In fact, the primary drawback of buy- back programs is that the majority of tigers and their prey are killed with snares rather than guns.

Information Network

A network of informants provides critical information on poaching activities and can help enforcement agents know when and where to move. Such covert operations can effectively scare wildlife traders out of business by increasing the perception (and the reality) that the risks of illegal trading are too high. Informants can also provide information on current trade routes.

Changing Attitudes: Education and Awareness

Interviews have been used extensively to determine attitudes towards tigers and identify the motivations for poaching. Such interviews can also point out divergent perceptions among different members of a community and suggest ways of reconciling conflict. For instance, in Sumatra's Way Kambas National Park, a sample of 700 households revealed that most people did not want to enter the forest, believing that tigers possess magical powers. Respondents also believed that there are more tigers today than there had been 30 years ago. These attitudes were in contrast to the perception of the guards who were under the impression that villagers viewed the park and its contents as a communal resource and entered the park regularly. Subsequent to the survey there have been considerable education and public awareness campaigns which have also helped to foster communication between park staff and members of the surrounding community.

In some cases, a cultural change may lead to a collapse of protection: in the above case, if taboos were indeed observed tigers should have been safe in Way Kambas. When social taboos weaken against hunting in general, or the killing of a particular species with strong powers (e.g. tigers), apparent cultural protection can disappear. It remains unclear to what extent economic changes or the development of markets can motivate people to alter their behavior sufficiently to motivate casual hunters or fishers to turn to tiger poaching. Regularly monitoring the beliefs, attitudes and activities of people living near tigers can help provide answers.

Publicity and information can also help garner public support for enforcement of anti-poaching laws and reduce the potential polarization of the issue. Garnering support for local flagship species can help mitigate this potential backlash. A public awareness campaign that includes disseminating information on what species are endangered and what areas are protected will help reduce the incidence of violators pleading ignorance. Encouraging enforcement on the part of local NGOs or government enforcement agencies can reduce tension.

Clearly, increasing awareness about conservation issues is an important aspect of reducing poaching. While time ran out for this discussion, it was noted that in both Indonesia and India, participation in club events is popular as an inexpensive form of entertainment and family outings. It was suggested that members of local nature societies might be able to help promote environmental awareness in their own communities. Encouraging people to join local nature clubs may also be useful.

Developing Incentives

While incentives for conservation are addressed further in Discussion 4, clearly the costs and benefits of poaching are inextricably linked to the costs and benefits of maintaining a viable population of tigers and their prey. While cursory, the discussion noted that:

- Local involvement in policy can also help foster a sense of connection to conservation on the part of the community.
- Enforcement and ecotourism can provide new jobs and opportunities when profits from visitors are equitably distributed to the community.
- Spatial segregation of land use (core protected/multiple use) must be linked explicitly to different management practices.

These are platitudes, but reality intervenes. Too often, direct benefits from protected areas to local communities are overlooked or not well understood. Hunting in areas outside protected areas may be critically dependent on protected areas as a source population, but such impacts are rarely measured; protected areas may be key watersheds, but this is rarely explained. Even indirect benefits can be ignored: an eye clinic in Ranthambore, or an ambulance service near Sikhote Alin, while funded through the efforts of parties interested in tiger conservation, were not linked directly to the cause and hence were not perceived as benefits of tiger conservation.

- Direct and indirect benefits of conservation (abiding by laws) can only be effective if we increase the perception of these links between conservation and improvement of the human condition, even when they are indirect.

Even mundane actions, such as linking wildlife logos to a service (for example on the side of the ambulance or on the sign for the clinic), can help make the connection direct in the public eye.

For tigers, the value of buffer zones is questionable. While designed to provide a level of protection to areas around core zones, buffer zones must provide community benefit if infractions are to be reduced in the core area. Such benefits should not be channeled to a few individual households but must be distributed among the populace. The benefits of restored areas in buffer zones has in some cases approached the landscape scale. This level of success is the result of legislation that grants local people land ownership and control of benefits. If legislation can be changed to help recycle park revenues to the surrounding communities, it will further both the goals of conservation and development.

Dealing with "Problem" Tigers

When poaching is the result of direct conflict between tigers and people, or domestic livestock, a system of dealing with "problem" tigers is essential to successful enforcement.

Problem vs. Excess Tigers. A clear distinction must be made between excess tigers and problem tigers. The latter may be habitual cattle killers or man-eaters and must be captured and killed or placed in a zoo; the former may be dispersing juveniles or adults who are not active breeders but who, in the process of dispersing, may have a one-off conflict with humans. In Russia, a new program has been implemented that attempts to differentiate between real problem tigers and occasional depredation of livestock. Management decisions are based on the evaluation of a tiger by a trained tiger response team. If the tiger proves to be a problem individual, removal is the only option. Although it has been proposed that sport hunters could be permitted to hunt problem or excess tigers, the general consensus was that this approach should be discouraged for a number of reasons. The response would be linked to availability of hunters and might not be sufficiently expeditious. Furthermore, it would create an environment in which hunting of tigers was perceived as acceptable activity. Finally, it would place an economic incentive of declaring a tiger a "problem" animal, thus increasing the rate at which tigers were removed from a population.

Alternatively, tigers can be relocated if they are not determined to be habitual offenders (or have the potential for such offenses). Relocation programs for problem tigers are difficult to execute although they have tremendous appeal. They are potentially feasible in the Russian Far East for a number of reasons: there is extensive habitat; tiger numbers are historically low (although this may be a result of reduced prey densities); there is a cadre of well-trained and/or interested parties; infrastructure, while in decline, is still good. Across

the range of the tiger, relocation may be more difficult and may not be a viable strategy in many countries. There is considerable cost and risk involved, and success is hardly assured. In addition, the approach can result in relocating rather than solving a problem: if relocated tigers continue to have conflicts with humans, relocation efforts will be blamed. Relocation can also disrupt current tiger populations and lead to mortality, often of the relocated individual who is trying to establish a new territory.

Source-Sink Dynamics and Management Implications. The loss of excess tigers that result from overpopulation within a protected area is not usually a threat to the remaining population in the reserve. In areas where dispersal is difficult or impossible, the loss of the dispersing individual may be a considerable loss to the population at a landscape scale. Because dispersal is an important component to maintaining long term genetic and demographic health, corridors between protected areas should be maintained whenever possible. In some cases, the matrix in tiger habitat outside strictly protected areas can be extremely hostile to tigers and may need to be mitigated, perhaps through compensation for lost livestock or through education and awareness.

Yet it is considerably more difficult to adequately protect and monitor tigers that exist or stray outside the boundaries of protected areas. The problem becomes particularly complex when mortality of tigers outside of reserves exceeds the reproductive capacity of those tigers living inside the reserve. In this case, direct management of tigers in a human dominated landscape can threaten the survival of tigers inside a core protected area. The probability of such an occurrence depends on the size of the source population, the extent of available habitat, and the frequency with which the tigers that move outside the boundaries of protected areas come into conflict with people.

Compensation Programs. Predator compensation has a long and checkered history. In India efforts have met with limited success, although it was noted that the WWF program has been more successful than government schemes (details or reasons for this are not clear). In Nepal, a recent incident in Chitwan involving a man-eater did not provoke the poisoning or other vigilante actions one might expect. Instead, a team was dispatched to capture the tiger which was placed in the Kathmandu Zoo. Compensation was provided to the family out of park revenues and the situation was satisfactorily resolved. In Russia, new approaches to compensation are being initiated centering on an insurance pool created by potentially affected farmers in tiger range.

The use of compensation for tiger depredation has never been adequately reviewed. While some suggested that every country containing tigers must have an equitable compensation policy to deal with problem tigers, the way in which such schemes are effectively organized is unclear.

Manual

There is no central source of information on establishing and maintaining the various kinds of networks and activities required to support activities that lead to a reduction in poaching of tigers and their prey. We need to collect and disseminate information on national and international laws and regulations, methods of monitoring and enforcement, methods of education and outreach, issues related to confiscation and amnesty, and approaches to compensation. In short, a general review of the best practices in these areas is sorely lacking. Such information must be made available to all agencies or individuals involved in enforcement and in a different format to the general public across the tiger range.

It was suggested that a comprehensive manual would be inappropriate as it would address too many issues and too many audiences. One suggestion was to begin by producing a manual focused on patrolling, enforcement and monitoring at a local level. This document would contain sections including: relevant examples of legislation for local reserves, as well as penalties for violation of laws and regulations; information on developing networks of informants; information on community outreach and education related to these issues; arrest and prosecution procedures; and perhaps a section on how to behave when a tiger is encountered. It should also outline basic and advanced techniques on data collection, and what data should be collected from a kill or from poacher signs. Such a manual should be comprehensive and contain criteria for both enforcement and monitoring yet should be simple enough to allow for swift translation into local languages.

Funding

Funding of anti-poaching work can be politically sensitive. Because it places both enforcement officials and poachers at risk of being killed, such activities are often shunned by donors as too politically risky. The question was raised as to whether it would be possible to develop a trust fund for tigers that funds anti-poaching teams, but it was suggested that caution would require clear goals and objectives.

Discussion 3
Developing a tiger scorecard

Background

The main focus of this discussion was to expand on a scorecard system proposed by several WWF staff (Eric Wikramanayake, Eric Dinerstein, with amplification and modification by Steve Osofsky). The original idea of the scorecard was to monitor the status of tiger conservation efforts. Different participants had very divergent ideas about what a tiger scorecard should be and what it should measure. While the following section reflects the workshop discussion, the scorecard idea has been discussed further by a small sub-set of workshop participants. A summary of these further discussions is found in Appendix IV.

The session began with a brief discussion of habitat integrity and habitat quality, which are similar terms that need to be clearly differentiated and defined:

- Habitat integrity is a function of disturbance and is affected by factors such as the degree of fragmentation, proportion of agricultural land and roads.
- Habitat quality, from the perspective of a tiger, is usually a function of vegetative cover, prey availability and water.

Although ecologists have focused most of their efforts on assessing habitat quality, there need to be more standardized means to quantify habitat integrity. The scorecards can be applied to help provide this information.

The initial proposed scorecard categories included the following major areas of assessment:

- landscape issues
- management of buffer zone areas
- management of biological corridors
- research and monitoring
- overall test and grade
- local capabilities for data analysis and display

Scorecards were originally presented as a means to track the effectiveness of conservation programs, but it was later proposed that this format is more appropriate for tracking the conservation status of tigers. This difference in approach is critical, and was one of the first questions addressed in a follow-up session (see Appendix IV).

Although similar to the format originally proposed, the following table incorporates changes made at the workshop:

SUBJECT	Test	Frequency	Grade
Landscape Issues:			
Core areas of adequate size designated within a TCU			
Expansion of reserve(s) (if appropriate)			
Expansion of buffer zones			
Improved connectivity in landscape			
Protection Issues:			
Improved protection of core areas including:			
Presence of anti-poaching field units			
Effectiveness of anti-poaching field units			
Presence of anti-poaching information network			
Effectiveness of anti-poaching information network			
Removal of non-essential roads and trails			
Restriction of access to keystone habitats in core areas (including riparian areas, breeding areas for prey, etc.)			
Removal of domestic livestock from core areas			
Reduction of domestic livestock in buffer zones			
Management of domestic livestock in corridors			
Reduced habitat degradation in core areas			
Incentives and Community:			
Resolution of land tenure issue			
Local awareness of value of TCUs			
Assess and rank compatibility of activities in buffer zone			
Incentive programs designed with local participation			
Incentive programs being implemented			
Improved revenue sharing			
Stall feeding of cattle			
Management of Biological Corridors:			
Corridors exist between core areas			
Study of use of corridors			
e.g. Riparian and ridges (tiger highways) in corridors			
e.g. Gene flow vs. demographic flow through corridors			
Research and Monitoring:			
Prey and tigers monitored			
In core areas			
In buffer zones			
In corridors			
Local Capacity:			
Local scientists and managers trained in data analysis			
Local scientists and managers trained in data display and policy implementation.			

While the specifics of the scorecard remained to be resolved, the suggestion was that each of the above categories would be evaluated and given a score. Consistent guidelines for evaluation would be drawn up, but local circumstances could allow new approaches to evaluation. If new evaluation techniques were employed, managers and biologists should state how a test was conducted and what evaluation criteria were used to provide the annual grade. Once an area has been assigned a score, it would then becomes possible to make informed management decisions. The score would also provide a baseline for comparisons with future surveys, either as part of an ongoing monitoring system or as pre- and post-intervention evaluations.

Scale Issues

There was concern over whether this scorecard is equally relevant at different scales. This led to the suggestion that because different factors are important at different scales and sites, it may be necessary to use different types of scorecards under varying circumstances. The existing scorecard appears to be geared towards the analysis of a large TCU containing protected areas, and although approximately 80% of the questions appear useful across scales, some questions are clearly scale-dependent.

A suggestion was that we could increase the relevance of scorecards by nesting evaluation in a hierarchy of scales, each scorecard focusing on issues relevant to a different scale: site, landscape, ecoregion and tiger range. The Site and Landscape scorecards would include three different sets of questions depending on the amount of knowledge already existing for a given site (nothing known, already surveyed, detailed field work done). Site scorecards would be in the format of a project monitoring document. Scorecards for Ecoregion and Tiger Range would each consist of only one set of questions, relevant to concerns that influence the tiger at that scale.

Some fundamental questions that need to be addressed with the scorecards focus on whether the landscape is functioning to preserve tigers. Additional questions that could be included on the cards are whether corridors and buffer zones are being used and, if so, how? Are tigers successfully dispersing through corridors without being killed? If so, how far do they go? Are there barriers to dispersal? Should the focus on buffer zones be primarily on human or tiger use? Are populations stable and increasing in core areas? What are the relative tiger densities and how should these be tested? Tools such as radiotelemetry, hair samples and camera traps were suggested as appropriate means to answer these questions.

An additional question that should be addressed on the cards was how difficult is it to expand a reserve, and whether it is possible to relocate people to accommodate this. A related question that should be addressed is the degree of boundary defensibility. This is an important concept when considering habitat integrity, but one that seems to have been overlooked

recently. Essentially, areas with easily defended borders that are difficult to infiltrate tend to be biologically stronger than areas more vulnerable to infractions. Also overlooked in the scorecards was whether adequate protection had been provided for corridors and whether there is support for anti-poaching activities.

Definition of scale was debated. While the above categories were accepted broadly, some argued that precedence of the TCU approach mandated a TCU scale. Yet it was noted that in some cases a single TCU may encompass a small, well defined area (a site, e.g. multiple locations in India, Sumatra). In other areas it may include an agglomeration of sites (landscapes, e.g. western Thailand, parts of India and Nepal), while in yet other areas the TCU represents nearly an entire ecoregion (e.g. Myanmar, Cambodia). Revision and resolution of the larger TCUs, and efforts to link smaller TCUs into conservation landscapes may resolve this issue through time.

Further problems of the TCU concept that require resolution included the following points:

- Many tiger reserves in India are no longer functional. There is a need for hard data on whether some TCUs should be written off and, if so, which ones.
- Some TCUs are not accurately delineated and may need to be redefined. It was suggested that survey teams could be deployed to assess TCUs on the ground since ground truthing is essential for accurate results from the scorecard surveys.
- A major difficulty with evaluating TCUs in a uniform manner is that the level of information on each is highly variable, making comparisons difficult. One solution that was suggested was that this could be avoided by focusing on changes within each TCU rather than comparisons between them. While good for analysis of change in a TCU, this makes ranking of priorities among TCUs difficult.

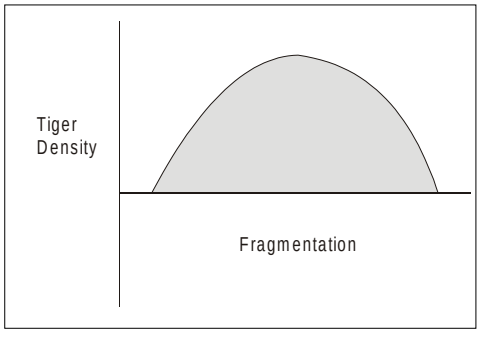

Figure 2. Hypothesis

A concern related to the integrity of the TCUs focused on landscape fragmentation and whether there is a threshold level beyond which tigers will not cross an area. It was noted that fragmentation may improve landscape for tigers, and their density will be highest in areas with moderate levels of fragmentation since these support the highest densities of prey (Figure 2.).

Methods for generating accurate estimates of landscape fragmentation, and what metric to use, were discussed, although no resolution was reached. Although GIS is a powerful tool and can eliminate the need for time

consuming on-the-ground evaluation, it was emphasized that it is of no assistance without data.

Application

The scorecard template will have to be refined, field tested, and revised. Care must be taken to choose the correct people for development and beta testing. Transect lines could be set up for yearly monitoring of tigers and prey and could either encompass the entire tiger range or just selected portions. A common database could then be created to manage the data from scorecard surveys and could be updated annually. A common database available to all researchers would reduce duplication of effort, but must be managed with high quality control in order to be valuable. Discussion of the need for and structure of a database was presented by Eric Sanderson, and a report was made by Sarah Christie on an attempt to produce a project database for tiger conservation activities (see Appendix III).

Development of a tiger scorecard was clearly of tremendous interest, and the discussions (as the above indicates) were extremely wide ranging. A small breakout group (Dale Miquelle, Eric Dinerstein, Kent Redford) was charged with evaluating the idea of a "tiger scorecard" and producing recommendations for action. The group reached the following conclusions:

1. There is a very strong feeling that we need to develop ways of:

    - assessing the effectiveness of tiger conservation programs
    - assessing the conservation status of tigers throughout their range

2. We endorse the scorecard approach as a means of addressing the second of these two targets. Assessing effectiveness of tiger conservation programs themselves needs to be dealt with in an entirely different format. As discussed below, we suggest a nested set of scorecards rather than a single instrument. This set of scorecards need to be developed in a collaborative but focused manner (see below).

3. Further, we greatly appreciate Steve Osofsky's offer of funding for this working group and for beta testing the approach.

4. The set of scorecards needs to include questions that are:

    - parsimonious
    - standardized
    - scaled (multiple choice)
    - threats based

5. Once the working group has developed the scorecard templates, they must be tested by field application and then revised.

6. Care must be taken to choose the correct people for the development team and for the beta testing.

They should be based on the following structure:

SITE scorecard: this scorecard should be based on one of the following, depending on the amount of knowledge of the site:

a. nothing known — only general questions can be asked
b. surveyed — slightly more specific questions can be asked
c. detailed field work — this scorecard would be the most detailed and would be a a project monitoring style of document

LANDSCAPE scorecard: this scorecard would be tied to each of the sites embedded in the landscape. There would be a similar set of three component scorecards:

a. nothing known — only general questions can be asked
b. surveyed — slightly more specific questions can be asked
c. detailed field work — this scorecard would be the most detailed and would be a project monitoring style of document

ECOREGION scorecard: this scorecard would ask questions appropriate for an assessment of tiger status at the level of the ecoregion.

TIGER RANGE scorecard: finally, this level would address concerns that influence the tiger throughout its range.

Discussion 4
Training and capacity building

The primary conclusion of this session, and following discussions, was that there is a critical need to continue to foster and develop strong conservation leadership at the top levels in foreign countries. One approach towards achieving this goal is to target social change agents, or people who are already making a difference and are in a position to influence policy. These individuals are not necessarily in academia and government, but could be affiliated with the media or be public leaders. Where such leadership exists, efforts should be made to facilitate their work by providing a supportive structure through which changes can take place. This structure can be in the form of an NGO, a university system or a government agency. Support also must be lent to assist the government to educate the public and sell their ongoing conservation programs.

In order to determine a region's training and education needs, a gap analysis can be used to identify where gaps exist and how best to address them. Depending on what resources are available, specific programs to address the gaps can be developed and tailored to suit local conditions.

Training of Goverment Staff

It was widely acknowledged that because governments manage resources critical to tiger conservation, every effort must be made to build the capacity of governmental institutions. Many, if not most of the tiger conservation activities include components of training for government staff, but systematic evaluation of the efficacy of these programs is lacking.

Several participants expressed the concern that government training has proven problematic for a host of reasons. These include:

- A high rate of turnover in government staff at the field level.
- A lack of knowledge or appreciation of issues at the higher levels, hence those making decisions may undermine the activities and efforts at the local level.
- An evolving bureaucracy at central offices — staff are frequently re-located and rarely stay within their areas of expertise thus making management problematic.
- A lack of focus of training courses on wildlife conservation issues. Many Asian wildlife departments live within forestry

departments and wildlife is seen as the poor cousin of the financially important forestry sector. Young officers are often hired directly from university but are not given sufficient supervision or job training once hired.
- Where bureaucrats are in permanent positions, there is a serious need for training, but little motivation to make change happen.
- Training is often not followed up with application of training principles to real-life management: hence lessons learned are forgotten, or the link between training and implementation is lost.

Senior Level Issues. In order to break through ignorance and/or apathy of higher level government officials, a number of training activities were suggested. These include:

- Fostering field trips that would take middle level to senior level staff to other countries to observe first hand models of tiger conservation.
- Encouraging longer-term exchanges among mid-level bureaucrats and community leaders to foster a clearer understanding of the work that takes place at different sites and in different nations. In Costa Rica, field courses for such individuals have proven highly effective in changing attitudes. It has also been demonstrated that given some field experience, mid-level members of the local communities can become an important force for conservation (e.g. Nagarahole, India).

Park Managers. Park managers, and those who are en route to becoming managers, need more training than a short course can provide and should be encouraged to have appropriate training, which is longer term. Part of the course should focus on wildlife management issues. In Northeastern China, for instance, officials obtain degrees from the Northeast China Forestry University, but little incentive is given to pursue training in wildlife conservation. At the Wildlife Institute of India, state forest officers must complete a diploma course, but are taught by forest officers who quite often have inadequate wildlife experience. The result is that although India has sufficient funds from international institutions, monitoring wildlife is not carried out by trained biologists. Clearly, in order to create an understanding of field problems, there need to be qualified advisers for the government, and more trained biologists and/or wildlife managers at higher levels of government.

Training Follow-up. Discussion participants were wary of the idea of having a short training course and assuming that this automatically means that things have changed for the better. Most evaluation of training focuses on process measures: the number of courses given, the number of students trained. This is inadequate. A somewhat more subtle measure of training impact might be the number of nationals training nationals, or the number

of students who receive key positions as a result of the training and knowledge they gain.

Although the most powerful measures of the success of training are an increased staff capacity leading to improved park/landscape management (and one hopes an eventual increase in tiger numbers) there are clearly other measures of success. These measures include whether or not there has been an increase in the level of professionalism in the government, whether the training given is being applied effectively, and whether the training has changed attitudes towards conservation both within, and outside the government.

There was overall agreement that it is crucial to monitor and evaluate the impact of training through follow-up and ground truthing of results. It was suggested that a report card system (similar to the scorecard approach) could be developed to help assess the effectiveness of training efforts. Some questions that could be answered are whether trainees are continuing in conservation, what kind of work they are doing and whether they are effective.

Other Training Issues

Training Manuals. A number of excellent training manuals exist and several are available in local languages: e.g. Rabinowitz's *Wildlife Field Research and Conservation Training Manual* which is now available in English, Burmese, Khmer, Thai, Bahassa Malay, Chinese, and Spanish. Training manuals specific to issues related to tiger conservation are lacking. At least two survey methods manuals are in draft form (Karanth and Nichols; D. Smith), while a further manual on pug-mark methods (WWF-India) continues to generate controversy. The WCS Thailand program is currently developing two tiger training manuals: one for training rangers and the other designed for civil servants. While these efforts should enhance future tiger conservation efforts such manuals may suffer from a lack of peer review, conflicting institutional and individual priorities, and a lack of wide availability in local languages.

The sustainability of in-country training was questioned, and doubts were expressed as to whether governments in range countries will be willing to take the lead in making training happen. It appears likely that there will always be a need for NGOs to work in partnership with local universities to guarantee the continuation of training efforts. Perhaps this could be achieved by fostering a public and private partnership to develop a regional leadership and training institute.

Training Alternatives. With high turnover and movement within government positions, providing advanced training to individuals may well produce a cadre of well trained managers, but not in a time frame critical to tiger conservation. While longer term investment, mentorship, and

development of conservation leaders is critical, we clearly need short-term alternatives.

One strategy effectively pursued in a number of circumstances is focusing efforts on developing trained teams of managers and conservationists whose function is site-independent, but who can provide service across a country or region. This strategy has been effectively used for anti-poaching and problem tiger response teams (e.g. Russia), survey (e.g. Myanmar, Malaysia), and conservation education units (many nations).

Another possible strategy links rapid training of a class of individuals (senior rangers, parks managers, etc.) with frequent briefings on important conservation issues. Here, efforts are focused on follow-up training and education, with development of high quality packets of briefing materials providing updates to those who have participated in earlier training.

Another approach could focus on developing a regional workshop geared towards carefully selected directors of government divisions (but not those at the highest levels). The key to such a program would be to determine who is really in charge of setting policy for protected areas and other important issues, and getting them to attend the workshops. This can be difficult but is crucial to influencing the decision making process. In addition, such workshops may foster the trans-national communication critical to the management of many tiger populations.

Project Level Training. The one training component that has proven almost universally successful is counterpart training programs that provide mentoring of locals by national and foreign researchers. Individual projects almost universally sponsor training and education of staff and colleagues. Projects provide development of field craft, scientific analysis, report writing, and project management. Students, counterpart government staff, and national staff of the NGOs/GOs involved in conservation projects frequently are the most direct beneficiaries of such training.

Counterpart training can be difficult, and many projects suffer from three major constraints: 1) not being able to chose the counterparts; 2) training students who are then not permitted to go into the field or for whom field work is not given credit; and 3) training students and staff who then do not continue in conservation activities after participation in a particular project. Despite these issues all agreed that across tiger range, there is a continuing need for investment in on-the-job training in management and research by nationals.

In the short term, many countries will still benefit from expatriate biologists and managers who serve as mentors to nationals. However, in order to achieve long term conservation success, there must be nationals who, once trained, can go on to become permanent regional trainers themselves. By creating

conservation leaders in-country, in theory it could eliminate the need for outsiders and international NGOs.

Formal Education: Funding and Support. Individual projects often pay for the formal training of their staff and colleagues, both at national institutions and often overseas. For many, this is the most direct way to find a place for an advanced degree. There are no specific funds for the advanced training and mentoring of tiger conservation leaders, but some programs exist which can provide support for these activities more generally. The Smithsonian Institute used to offer third world fellowships to fund the foreign education of counterparts in the United States and United Kingdom, but it no longer does so. The Mahendra Trust was developed to fill a similar need and seems to be serving this function. WWF offers an Education for Nature Fund for nationals to train anywhere in the world, and WCS has recently received a matching fund which will eventually establish an endowment of US $8 million to support masters level training of developing country conservationists. Further fellowships are offered by a number of academic institutions (e.g. University of Minnesota; Yale School of Forestry; University of Florida) and agencies (the World Bank, the British Council). However there is no central source of information on fellowship opportunities in conservation, nor is the training of future leaders in tiger conservation a stated priority of any of these programs.

If conservation leaders are to be developed, there must be access to funds. Part of creating an ongoing in-country training program involves establishing a permanent trust that is managed locally and used exclusively for local training. It was proposed that the Save The Tiger Fund could finance a certain number of identified potential leaders for appropriate training, either in or out of the country. If the conservation community agrees that formal education is important, then donor agencies must be similarly convinced that this is a necessary part of effective conservation. While current efforts are laudable, it was proposed that a multi-million dollar fund (perhaps as high as $50 million) would be required to support the demand for advanced training in conservation and follow-up support to allow recent graduates to develop a career in conservation.

Support for such activities appears to be burgeoning, although no fellowship yet exists which directly supports conservationists. Since the workshop, the Gates Foundation has announced the Gates Cambridge Scholarships which will send 225 people annually to Cambridge to study in any field (half are expected to be Americans, but the fellowship is open to all nationalities). It is hoped that the "Gates Cambridge Scholars will become leaders in helping to address global problems related to health, equity, technology, and learning." In addition, the Ford Foundation announced a $330 million commitment to fund an international graduate fellowships program, the Ford Foundation International Fellowships Program (IFP). The IFP will support post-graduate study for Fellows from Africa, the Middle East, Asia, Latin America

and Russia. The IFP will award 350 three-year graduate fellowships annually. Fellows will be selected using several criteria such as leadership potential, academic excellence and commitment to community or national development. The IFP will support studies in "any field that furthers the Ford Foundation's goals of strengthening democratic values, reducing poverty and injustice, and promoting international cooperation." The IFP represents the largest single grant in the Ford Foundation's history.

Regardless of how success is measured, it was concluded that even if there is failure with some students, securing funds for nationals to be trained in the international arena and investing in worthwhile students is essential for good conservation.

Discussion 5
Alternatives to ecotourism

Ecotourism has been proposed as a potential way to assist in providing benefits to local communities who live near, next to and with tigers. While an extensive literature exists on the way in which ecotourism can benefit local communities (and why, often, it does not), the value of ecotourism for tiger conservation is limited. In some areas with a history of protection, where tiger prey and tigers may be easily viewed (e.g. India and Nepal), there are clearly realized and potential benefits of tiger tourism. In other regions where wildlife viewing is difficult, or where the political climate is poor, ecotourism is unlikely to provide any income or benefit to local communities and national governments. In these locations it is necessary to identify alternative uses of protected areas, and their corridors and buffer zones, in order to generate revenue and support for conservation.

Extractive Activities. In many countries, and at many sites, land on the edge of a reserve has been placed in the hands of local farmers who are permitted to collect forest products and manage the land in support of conservation. Provision of tenure rights linked to use compatible with tiger prey and tigers (e.g. agroforestry including teak, rosewood or damar production) means that buffer zone activities may effectively increase habitat for tigers by discouraging more intensive land use.

Similarly, land use in partially protected and/or production areas may lead to more effective stewardship, particularly where strong state-led management is lacking. In production forests across Asia, timber leaseholders are responsible for the management of their lots. Increasingly, effective management plans for wildlife are becoming part of broader management plans, linking production to sustainability of both timber and the wildlife that supports the forests.

Regulated extractive activities (non-timber forest product-NTFP collection including fruits, mushrooms, sap, and more traditional materials such as firewood, construction materials, thatch, or hay for stall feeding) may also result in better management of a tiger landscape if these activities are directly linked to conservation. In theory, and at times in practice, having local people become guardians of a reserve or landscape may make it easier to promote appropriate long term changes in a number of activities not directly linked to extractive activities (for eg. improved livestock husbandry, land stewardship, law enforcement and a willingness to preserve one's natural heritage).

Trade-off Plans. These activities involve working with local communities to ensure greater protection of watershed or forest resources by allowing other non-permitted uses of land at either a small scale (farm conversion) or larger scales (hydro-power plants, mining, agro-forestry). Due to the associated risks, this approach is usually considered undesirable unless the trade-off can be secured, or if the development activity is going to move forward without such a trade-off.

Hunting Concessions. Another controversial approach involves establishment of hunting concessions as part of a broader landscape for tiger management. These leases can be managed to improve prey base for both tigers and hunters. In some cases, such hunting concessions can be used to empower local tenure of wildlife resources, and thus directly benefit indigenous communities. Subsistence and/or hunting for meat more generally has been linked to safari hunting as a conservation tool across much of southern Africa. These strategies are being employed in the Russian Far East where institutional hunting has been in place for decades. The general consensus however was that across most of the tiger's range, habitat is too fragmented and human population densities too high to make such activities viable.

Conflict Resolution. Tigers come into conflict with people by killing both domestic animals and humans. While a tiger seen moving through the area may not be considered a conflict situation by a conservationist, many people who live day-to-day with tigers would see the presence of one as a conflict in and of itself, whether or not that tiger kills a domestic animal or a neighbor. Hence, before conflict can be reduced, a mutually agreeable definition of conflict must be determined. By developing such definitions, and by managing land as appropriate and inappropriate for carnivores, a clear understanding can be developed on how to deal with tigers across a landscape of different types of use.

In areas zoned for tigers, alternatives to killing or capturing a tiger should always be sought. In some cases, a tiger can be frightened off using noise and fireworks, while behavioral modification using shock collars and enclosure wire might be effective when the tiger lives in close proximity to people. Taste aversion and the use of lithium chloride, which has no taste but induces vomiting, can lead to negative associations with feeding on livestock in some species, but has not been tested on tigers.

While compensation schemes can help mitigate crisis situations in the short term and at the site level, long-term coexistence with tigers has to be dealt with on a landscape or TCU scale.

When tigers appear in areas where they may pose a threat to humans and their livelihoods, a tiger may become a "problem animal" – that is, an animal causing problems for people. If a problem animal must be removed, the two main options usually involve killing it or sending it to a zoo. Zoos have difficulty dealing with wild caught tigers because although they are of

considerable value for breeding as founders, there are severe limitations on space for housing captive tigers.

Relocation to another area is appealing but problematic from a conservation perspective and is therefore not recommended except in unusual circumstances.

Encroachment. The problems of encroachment into protected areas, constriction of tiger habitat and having tigers move into human dominated landscapes were discussed briefly. Clearly, as natural habitat surrounding protected areas becomes degraded, there is an increase in pressure on the few remaining resources that remain within a protected area. Preventing encroachment, and reversing it, are critical to tiger conservation.

Possible solutions to encroachment which were mentioned include:

- Offering incentives such as schools and wood lots in exchange for agreements not to enter a reserve.
- Defining and adjusting boundaries of non-use areas (including reserves) to include natural barriers to both people and tigers (such as rivers and mountain ranges), even though most such boundaries do not effectively keep a clear separation between tigers and humans.
- Offering fair and attractive resettlement packages to move people who have settled in areas outside of reserves.
- Restoring areas outside reserves to supply the materials being extracted from the reserves. Such restoration may have multiple benefits.
- Placing fences to physically separate tigers and people. Fences are problematic not only because they are expensive and have to be maintained and monitored, but also because local people perceive them as exclusive and objectionable. They are also relatively easy to breach if and when people choose to do so.

APPENDIX

APPENDIX

Appendix I: Agenda

The following agenda outlines the initial intentions of the workshop. During the course of the workshop several programmatic changes were made as a result of an adaptive shift in focus agreed on by participants. A natural disaster (a hurricane!) also curtailed the workshop and forced a reorientation and compression of the last two sessions. We have included the agenda to reflect the original outline of the workshop, while the proceedings themselves better reflect the work that was accomplished. Agenda items which were not formally covered in the workshop due to time constraints have been marked with ***.

Day 1: Tuesday, September 14

8:30 Welcome and introductions (Ginsberg)

8:45 Overview of the Workshop (Ginsberg)

Session 1: Developing an Evaluation Strategy for Tiger Conservation Activities

9:00 Perspectives on Tiger Conservation (Schaller)

9:15 Elements of Tiger Conservation (Seidensticker)

9:40 **Discussion Point 1**: Methods of Evaluation: Assessing Success in Tiger Conservation (Karanth, Rabinowitz)

Question: How can we measure success\failure of tiger conservation interventions using ecological data on tigers\prey\habitats?

Question: How can we measure cost-effectiveness of conservation interventions to "save tigers"?

Question: Can we use ecological data on tigers/prey/habitats to develop a measure of cost-effectiveness for our conservation strategies?

10:20 Coffee Break

10:40 **Break out session # 1: Methods of Evaluation: Assessing Success in Tiger Conservation**

Oak Room
WCC Room
Board Room

11:40 Reporting out, Session #1

12:30 Lunch

13:00 **Discussion Point 2:** Assessing and reversing the impact of poaching of tigers and legal/illegal overhunting of their prey (Galster, Lynam, Quigley)

Question: How does one assess the biological impact of poaching and overhunting of prey?
Question: What actions can be taken to reduce poaching and overhunting of prey?
Question: How does one assess effectiveness of anti-poaching/hunting regulation efforts?

13:40 **Break out session # 2: Assessing and reversing the impact of poaching of tigers and legal/illegal overhunting of their prey**

Oak Room
WCC Room
Board Room

14:40 Reporting out, Session #2

15:10 Coffee

15:30 **Discussion Point 3:** Habitat Integrity: Reversing Loss and Establishment of Use Inconsistent with Tiger (Miquelle,Dinerstein,Sanderson)

Question: What uses are/are not consistent with tiger conservation?
Question: How do we assess impact of project activities on changes in land use?
Question: How does one assess effectiveness of anti-poaching efforts?

16:10 **Break out session # 3: Habitat Integrity: Reversing Loss and Establishment of Use Inconsistent with Tiger**

Oak Room
WCC Room
Board Room

17:10 Reporting out, Session #3
18:10 Drinks, Yale Club
20:00 Dinner Evergreen Shanghai Restaurant, 10 East 38th Street between Madison and Fifth (just off Fifth Avenue). 212 448 1199

DAY 2: WEDNESDAY, SEPTEMBER 15

8:30 **Discussion Point 4:** Training and Capacity Building (Lynam, Kinnaird, Tilson)

Question: How does one defining training needs for tiger conservation?
Question: How do we integrate training and conservation activities?

9:10 **Break out session # 4: Training and Capacity Building**

2 Groups in WCC Room
1 Group in Board Room

10:10 Reporting out, Session #4

10:30 Coffee

10:45 Open Discussion: Data management and sharing of spatial information: Databases (Sanderson, Dinerstein, Redford)

Sub-topic: How can/should we develop shared data fields?
Sub-topic: What data/analyses are needed?
Sub-topic: Where are databases stored -who owns the data?

11:45 *** **Discussion Point 5: Making Room for Tigers: Pragmatic approaches to achieving spatial separation between tigers and local communities (**Dinerstein, Tilson, Karanth)

Question: How does one determine the best strategy for engaging local communities?
Question: How do we measure success in community involvement?

12:30 Working Lunch:

Break out session # 5: Making Room for Tigers: Pragmatic approaches to achieving spatial separation between tigers and local communities

Oak Room
2 groups in WCC Room

13:45 Reporting out, Session #5

***14:15 Open Discussion: Funding, NGO coordination and cooperation (Ginsberg, Hemley, Christie, Phemister, Bagley).

Sub-topic: Role of the GEF in funding single species conservation: (Reese)
Sub-topic: How do major funders coordinate, create synergy
Sub-topic: Are NGOs sharing lessons learned?
Sub-topic: Dealing with social activist NGOs: their dreams, our reality.
Sub-topic: Who is tracking projects and activities?
Sub-topic: How can NGOs work together to effect government policy?
Sub-topic: Too much, too fast? Assessing the benefits and damage caused by multilateral-aid and large-scale NGO interventions

15:00 Coffee Break

***15:15 **Discussion Point 6: Consumption of Tiger and Endangered Species Products: Evaluating Remdiation** (Hemley, Zhang, Mills)

Question: How do we measure rates of consumption and monitor changes in these rates?

Question: What measures (direct, surrogate) can we use to evaluate effectiveness of programs aimed at reducing consumption?

Question: How do we link field activities to consumption?

16:00 **Break out session # 6: Consumption of Tiger and Endangered Species Products: Evaluating Remdiation**

Oak Room
WCC Room
Board Room

17:00 **Reporting out, Session #6**

17:15 **Open Discussion: Data Management: Integrating Data Across Projects and Activities** (Lynam,Galster, Seidensticker)

Sub-topic: Biological data and Anti-Poaching: How to cross fertilize

Sub-topic: Anti-poaching and Communications Strategies in the field

Sub-topic: Integrating data and activities on anti-poaching and trade

19:00 **Drinks,** Yale Club

20:00 **Dinner,** Ipanema Restaurant (Brazilian) 13 West 46th Street just WEST of Fifth Avenue. 212 730 5848.

DAY 3: THURSDAY, SEPTEMBER 16

8:30 **Open discussion: Gathering reliable data: distribution, relative and absolute abundance of tigers and their prey** (Karanth, O'Brien, Dobson)

Sub-topic: How critical is knowing numbers to conservation strategies: developing a consensus on total counts ("censusing") and sampling.

Sub-topic: How do we set goals and optimize methods for given levels of manpower, skills, resources, spatial scale, and tiger/prey abundance.

Sub-topic: Field techniques, equipment, statistical methods and applications: What do we have now and what more do we need?

10:00 **Press Briefing** While everyone is invited to attend the press briefing, only a few short presentations will be made. A schedule for the briefing will be distributed to you in the briefing documents, and those who need to make presentations will be contacted.

10:00 **Working groups can also meet in:**

Oak Room
WCC Room

12:00 Working Lunch: Bringing together the information: definition of strategy

13:30 Formation of Working Groups Topics to be decided by workshop participants.

Oak Room
WCC Room
Board Room

15:30 Reporting of final results

16:30 Closing remarks

Participants

Ed Anhert, Exxon Corporation (ExxonMobil)
Eric Dinerstein, WWF
Fred Bagley, USF&WS
Chris Carbone, Institute of Zoology, Zoological Society of London (ZSL)
Cheryl Chetkiewicz, WCS
Sarah Christie, ZSL
Gary Fink, WCS
Steve Galster, Global Survival Network (WildAid)
Joshua Ginsberg, WCS
Ginette Hemley, WWF-US
Lixin Huang, American College of Traditional Chinese Medicine Practitioners
Peter Jackson, NFWF-STF Council, IUCN Cat Specialist Group
Margaret Kinnaird, WCS
Ruth Laidlaw, WCS
Tony Lynam, WCS
Judy Mills, TRAFFIC-East Asia
Dale Miquelle, WCS
Tim O'Brien, WCS
Steve Osofsky, WWF-US
Dave Phemister, NFWF-STF
Howard Quigley, Hornocker Wildlife Institute
Alan Rabinowitz, WCS
Madhu Rao, WCS
Kent Redford, WCS
John Robinson, WCS

Appendix II: Statements from the workshop

Statement on Reintroduction of Tigers

The primary threats to survival of tigers across their range are habitat destruction, loss of prey, and poaching. Alleviation of these threats should be the primary focus of tiger conservation.

Reintroduction, at the present time, is not considered a necessary component of tiger conservation across most range countries. The methods for successful reintroduction of tigers have not been developed, and reintroduction of tigers should not be conducted where there exists the potential for tiger populations to recover naturally.

Statement on Trade and Stockpiling

Commercial trade in tiger body parts from captive-bred/raised tigers can be detrimental to tigers in the wild. Past experience with other endangered species of commercial value shows that trade in parts and derivatives from captive animals can serve as a cover for trade in illegally-acquired parts and derivatives.

Appendix III: Database document and discussion

The precarious state of the tiger in the wild precludes the possibility of trade in tiger parts and derivatives for the foreseeable future. Therefore, stockpiling of tiger parts and derivatives is inappropriate and should be prohibited.

Two database projects were discussed at the workshop. The first was a presentation by Sarah Christie, ZSL, on a database of tiger conservation projects in the Russian Far East. This database was constructed as a first effort at producing a similar global database for tiger conservation. Included in this report is a more detailed version of the report which was produced in the month following the workshop.

Discussion of the work exposed a number of issues that need to be addressed in developing such a database. These include:

- Getting data for such a database is difficult – even institutions that wanted to provide information did not always do so.
- Reasons for less-than-perfect participation included a lack of staff time, variations in fiscal years making reporting difficult, and a lack of current information about projects easily available, thus requiring a separate effort to fulfill the database request.
- Some institutions, and governments, did not want to participate. Cultural and individual variation in data sharing are a problem.
- Names, and naming of projects, makes tracking funding difficult. What a donor and an implementing agency call a project may vary widely. Even an implementing agency may change the name of their projects frequently.
- An individual willing to chase data, reformat reports, and generally shepherd the process is critical to success. Project databases may be useful for many people, but they do not appear to be so universally useful that participants consistently submit information.

Much more detailed information is available, including a copy of the database, and can be obtained by contacting Sarah Christie directly.

The second database project discussed was a proposal by Eric Sanderson, WCS, to develop a database of tiger point observations. The proposal was relatively contentious. A number of issues arose which were both unexpected and revealing about the way in which such a database is developed:

- Data ownership is a critical issue – many people who were happy to share information bridled at the thought of sharing hard-won point location data.
- Data ownership was not always clear – when collaborative projects are developed, particularly when that collaboration occurs between a government and NGO, access to data is not clear.
- Data ownership and access to the data were hotly discussed. While Sanderson has dealt with many of these issues in developing a point location database for jaguars, concerns persist about who has access to which data, at what resolution, and for what purposes.
- The management of the database was perceived as a power issue, with some arguing for joint ownership and management, others arguing for a dispersed database structure, etc.
- Concerns were expressed that such a database would help focus poaching activities in areas where tigers persist. Conversely, some argued that poachers had far better information on tigers than the conservationists.

In summary, while there was clearly an agreement that such a database could be useful for planning at a national, regional, and global level, the reality was that those present were not so strongly in support of the project as to overcome the perceived and real problems.

The ZSL/WWF Global Tiger Projects Database[1]

Sarah Christie, Zoological Society of London

Introduction

Investment in tiger conservation by NGOs worldwide has grown considerably over the last decade and is now running at about 6 million dollars per year. Yet up until the present the global tiger conservation community has had no answers available to the simplest questions on how much money is being spent; where, by whom, on what – let alone on whether or not the efforts that are being made to save tigers are working. We need to be cost-effective if we are to continue to enjoy the support of funders and governments in our efforts to save not only the tiger but the landscapes in which it lives and in which it is so effective both as an indicator of ecosystem health and as an umbrella species for fund and awareness-raising. We need to be cost-effective if we are to succeed.

Perhaps one reason this information is not currently available is that until quite recently the many organisations working in tiger conservation have tended to regard each other primarily as competitors rather than collaborators. While it would be naive not to acknowledge that the various conservation agencies will always compete to some extent for funds and projects, it would also be unrealistic to imagine that any one agency, no matter how large, can succeed in conserving either species or landscapes without working as part of an integrated and holistic programme in partnerships with others. The tiger will only be saved if we can all work together, combining our different skills and experience in pursuit of our common goal. Since Tigers 2000 in London in 1997, the first time for a decade that tiger conservationists from around the world had got together to share ideas and information, there have been a number of gatherings of tiger people (most notably the Year of the Tiger Conference in Dallas in early 1998) which have produced increasing numbers of partnerships and collaborative projects.

Pilot Project in Russia

One such gathering was a meeting of all western agencies involved in tiger conservation in Russia, held in Washington in late 1998 (and followed up later by a meeting including both Western and Russian agencies held in the Russian Far East). In Washington all parties agreed that we very much needed a central compilation of data on what was being done by whom, how much it was costing and who was paying for it. The Zoological Society of London undertook this task and WWF US provided a small grant to cover costs. This first pilot project covered only Russia and queried only the western agencies. It would be useful to be able to add Russian governmental spending, and any other incountry expenditure, to the data in due course, perhaps from a conservation database the Russian NGO Phoenix is intending to compile.

[1] This report is an edited version of a report presented by Sarah Christie to the WWF Global Tiger Conservation Strategy meeting in Anyer, West Java, September 2000. The report represents an elaboration of the report presented by Christie in New York, which focused entirely on the Russian Far East. We have included this report to ensure that it receives the widest possible distribution.

Data collected were broadly the following:

- Project title
- Location – TCU number(s) and country(ies)
- Objectives
- Activities (see separate list below)

- Years of operation
- Funding and sources of funds, by year
- Collaborators
- Project descriptions (as attached Word documents)

Sources of the information entered are also recorded, along with notes on necessary cross-checking. In consultation with the group that met in Washington, a form was drawn up to collect this information for Russian projects. Getting people to fill this in made squeezing blood from stones seem child's play, but nevertheless the necessary Russian data were extracted from everybody except, unfortunately, WWF. This meant that the original summary reports circulated at the time contained only that WWF expenditure reported by the WWF US branch and by other agencies involved in joint projects. However, that gap has since been filled and we now have reasonably accurate data on overall tiger funding in Russia from 1991 to 1999 (see Figure 1).

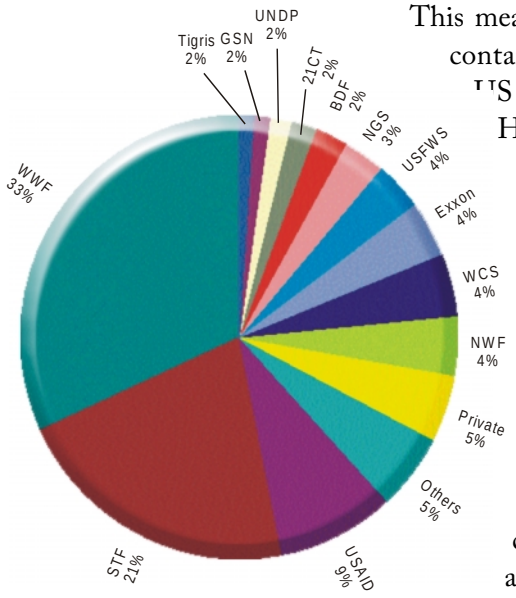

Figure 1: Tiger funding sources* in the Russian Far East, 1991–1999. **See acronym*

Figure 1 covers 49 projects funded and/or implemented by at least 68 agencies. Despite the recent abolition of the Federal Committee for Environmental Protection, tiger conservation in Russia is surely further advanced than in most range states, and this can be attributed in part to the way in which so many different agencies have collaborated, particularly on the antipoaching teams. It should be noted here that GSN (now WildAid) has been responsible for coordinating funding contributions from a great many smaller agencies and so deserves more credit than their modest 1% of direct funding indicates on this figure (but see Figure 5).

Global Data Collection

As this Russian pilot project was judged a success overall, WWF-US and ZSL agreed to take the work forward on a global basis in 2000, this time with a more substantial grant of $16,000 (both grants are included in the database, as Project 34). At this point most agencies queried have responded at least partially, and the funding data are fairly complete for all projects so far reported between 1998 and 2000. India is the area of least confidence as things tend to be complicated there and cross-checking will take some time. There are still some queries to resolve on the 1998–2000 period, further data for 2000 and pre-1998 to collect where possible, and project descriptions, activities and incountry collaborators to be added in many cases, but at this stage reasonably accurate overall

funding information on global work 1998–2000 can be given. But before looking at the information so far collected, it is pertinent to briefly discuss a few relevant questions.

Project Activity Checklist Selection. There was considerable email discussion on these among the original Russia-based group, who tried to keep in mind that the list might need to serve globally as well as in Russia. Inevitably, the number of categories got larger the longer the discussion went on. Each project can be entered as "Major", "Minor", or "None" in each activity category. Note that entries here do not necessarily mean the project has created a tangible *benefit* in that area; these are *activity* entries.

- Networking – *creating links and partnerships, sharing information and ideas*
- Planning – *resulting in a tangible plan such as a National Strategy or Action Plan*
- GIS habitat – *GIS mapping of habitat type and/or land use layers*
- GIS tigers/prey – *GIS mapping of tiger and/or prey layers*
- GIS poaching – *GIS mapping of poaching and/or hunting layers*
- Survey – *one-off surveys of tigers and/or prey*
- Monitoring – *longterm monitoring of tigers and/or prey*
- Education – *environmental education for schools, hunters, govt agencies, businesses, or the media*
- Advocacy – *political lobbying aimed at policy-makers*
- Awareness – *media campaigns aimed at the general public*
- Conflict resolution – *resolution of human-tiger conflicts (attacks on humans, livestock depredations)*
- Gene pool – *genetic studies, genome banking, zoo breeding programmes, etc.*
- Land use – *land use changes implementation – land/lease acquisition, gazetting PAs, etc*
- PA support – *direct support for PA management – day-to-day running of reserves etc*
- Habitat restoration – *habitat restoration – regeneration of degraded areas*
- Capacity human – *capacity building through staff training and career development support*
- Capacity material – *capacity building through equipment and supplies*
- Transboundary – *transboundary initiatives – eg. surveys, meetings, plans*
- Economic incentives – *provision of economic incentives for local people to co-exist with tigers*
- Hunting management – *support for hunting management (hunting leases, hunter education)*
- Law enforcement habitat – *enforcement of laws against intrusion inside habitat – eg patrolling*
- Law enforcement trade – *enforcement of laws on tigers and their parts outside habitat – antitrade*
- Consumption reduction – *working with the TCM community*

This list seems to have stood up well to data entry both inside and outside Russia. The only changes that currently seem desirable are two additions:

- Trade research – *collection of information on the nature and extent of trade in tiger parts in an area*
- Ecological research – *additions to the body of scientific knowledge on tigers and how they live in their environment*

These will be added over the next few months. Comments and suggestions are welcome.

Data Sources. Agencies queried so far are listed below; only those in italics have not yet responded. It is clear that expecting people to fill in forms for this project is unrealistic and information is now instead being requested under the simple headings shown above, or compiled from existing sources such as the STF and USFWS annual reports and WCS and WWF internal data, with gaps then filled in by phone and email questions and cross-checking with the various collaborators.

Multi-governmental agencies funding development projects in tiger areas, such as the World Bank, are not included in this list as there is consensus to treat such projects separately from tiger-specific work.

Data concerns. There are various factors affecting the quality and consistency of data collection and these are briefly covered below.

- 21st Century Tiger
- Care for the Wild
- Cat Action Treasury
- David Shepherd Conservation Foundation
- Flora and Fauna International
- Florida University
- Global Tiger Forum
- Global Tiger Patrol
- Hornocker Wildlife Institute
- IUCN/SSC Cat Specialist Group
- *Minnesota University*
- Save The Tiger Fund
- *South Lakes Wild Animal Park*
- Sumatran Tiger Project (2001)
- *The Tiger Foundation*
- TigerLink
- Tigris Foundation
- UK Government DETR
- USFWS Rhino-Tiger Fund
- WildAid (cover many other agencies' funding)
- Wildlife Conservation Society
- *Wildlife Protection Society of India*
- WWF
- Zoological Society of London

- *Confidentiality.* This has not been a significant problem to date – no-one has yet refused access to their data*. A number of files have been supplied in confidence, though, and in order that nobody's trust is betrayed the major agencies will all see their own data for checking before the finished product is made available to all contributors. Establishing this database involves a good deal of work, but continuing it will be considerably easier and it would be regrettable if that became impossible due to some careless indiscretion. Only two real issues of confidentiality have so far arisen; one agency part-funding one project does not want the size of its contribution known, which has meant that the total funding for the project has been assigned to the implementing agency rather than individual amounts credited to each funder (all the funders are still listed as such but have entries of zero with explanatory notes); and there is one undercover trade investigation currently underway for which all details including funding are confidential. This has been entered as a project but without any further information until such time as details become available.
  **Since the presentation was given one minor agency has actively refused to share funding information.*

- *Definition of a project.* This can differ between agencies; contribution of a jeep to Manas National Park in India or Department Tiger in Russia might be a "project" to a small UK or Netherlands NGO, but in the global context is a piece of a larger whole. Provided that the person doing the data compilation is sufficiently well acquainted with tiger conservation to be able to untangle this sort of thing, it isn't a problem. Consistency is the key.

- *Fiscal year and exchange rates.* There are at least three different fiscal years in use by the different agencies. This may lead to some inconsistencies with agencies' own records, but the overall totals will be accurate. Most funding is supplied in US dollars and this is the basic unit of the database, but WWF funding is compiled by WWF International in Gland and is given in Swiss francs, while some UK NGOs record expenditure in sterling and all figures sent in by TigerLink are in rupees. In such cases best guesses have been made at appropriate exchange rates for the relevant years and this may lead to minor discrepancies with the original records.

- *General conservation projects with benefits for tigers.* Inevitably, there are some projects recorded that are not tiger-specific, for example village conservation agreements in the buffer zone around Kerinci in Indonesia or generalised support for wildlife trade law enforcement. For the moment, a figure of 30% of the funding for habitat-based projects and 50% for trade-based has been entered except where specific percentage information is supplied by the implementing agency. There is no doubt that anything that protects the integrity of tiger habitat or increases wildlife law enforcement capability is of great use to tiger conservation, but it does seems that we should not actually record all such funding as tiger funding. Any comments on this policy would be gratefully received.

- *Multi-million-dollar development projects,* eg. GEF, UNDP, EU. Controversy exists over how beneficial these may be for the survival of the tiger. No such projects have yet been logged, but the intention is to record brief details in a separate table so that they can be viewed at will by anyone accessing the data without the possibility of confusion with tiger-specific projects. Again, comments are welcome.

- *Government expenditure.* The picture will not be complete without information on incountry funds supplied, for example running costs for relevant protected areas and contributions to scientific monitoring activities such as those carried out by the Russian authorities. TigerLink have provided a figure of 7 million for India in 1999; clarification of this, and information for the other range states, are being sought.

- *Western NGO staff time and overheads outside range states.* These have not been included as only two of the western agencies supplied relevant figures.

Global Results to Date

Projects. Close to 200 projects have so far been logged of which 180 are or were operating between 1998 and 2000. Work is being carried out in 22 Level I, 7 Level II, 11 Level III and 9 Level S TCUs.

Funding. The data are only global in extent between 1998 and 2000 and are weakest in India where the situation is the most complex – in some instances there are detailed costs for jeeps and uniforms supplied to staff in a Project Tiger Reserve, while at the other end of the spectrum the yearly overall figures for WWF's Tiger Conservation Programme total hundreds of thousands of dollars and have supported activities in many TCUs, but specifics are not yet entered. To a lesser extent, similar considerations apply in Thailand, Malaysia and Cambodia where recent field and interview surveys have covered multiple TCUs. Efforts will be made to refine these data, but at the present time it is not possible to easily extract funding totals for individual TCUs in all parts of tiger range and so this has not been attempted here.

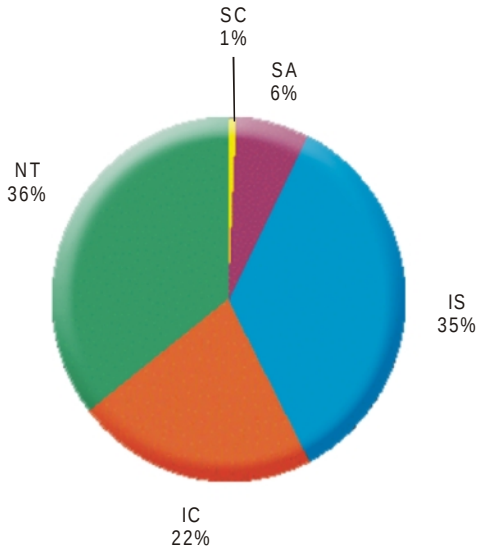

Figure 2: Relative funding for the five bioregions 1998–2000 (NT = Northern Temperate; IC = Indochina; IS = Indian Subcontinent; SA = Southeast Asia; SC = South China)

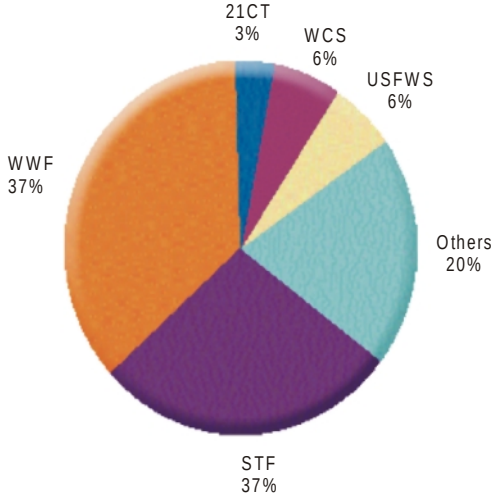

Figure 3: Funding sources* worldwide 1998–2000.
*see the acronym definitions p.67

Total funding seems to be running at between 5 and 6 million dollars a year in 1998 and 1999, with rather more than 2 million dollars so far recorded for 2000 (no WWF 2000 data in yet). Leaving expenditure outside range states or with global applications to one side, the money is split between the bioregions as shown in Figure 2.

Clearly Russia is receiving a very large share in proportion to the number of tigers there, though many would argue that this has been money well spent, at least in relative terms. Russia has perhaps the most effective antipoaching teams of any range state, a long history of scientific monitoring and an advanced habitat planning process, as well as the advantages of the largest remaining contiguous tiger habitat in the world and relatively low human population density.

As Figure 3 shows, WWF is the largest contributor globally, followed by the Save The Tiger Fund. Between them, these two agencies provide more than half the total funding for tiger projects worldwide. For simplicity all WWF contributions have been lumped together; the major contributing branches are Germany, the Netherlands, the UK and the USA.

Implementers. A total of 80 agencies are listed as implementers between 1998 and 2000. Of these, the largest expender of funds is once again WWF, followed by WCS and WildAid (including money spent as GSN prior to 1999). Totals in Figure 3 include expenditure of each agency's own funds, where relevant, as well as grants received. Once again all WWF expenditure has been lumped, but the largest expenders were, in descending order, India, Russia and Indochina.

Gaps. Of the Level I TCUs, a few stand out as having no, or very little, current investment. Gunung Leuser is the most obvious; it is the 10th largest TCU in all with

the 5th highest PA content, yet there is no specific tiger conservation work there at all. The fact that it is currently in a war zone may of course have some bearing on this. There is the big EU-funded Leuser Ecosystem Management Project, in which ZSL has some involvement and which does have funding allocations for tigers and it may prove possible to get some work going in some selected areas in the future.

TCU No	*Name*	*Country(ies)*
31	Kanha-Pench	India
62	Arakan Yomas	Myanmar
72	Pegu Yomas	Myanmar
99	Nam Thiun Nakai/Vu Quan	Laos/Vietnam
101	Phu Kheio/Nam Nao	Thailand
145	Gunung Leuser	Indonesia

Other major TCUs in Indochina and Indonesia have relatively little investment compared to the Indian subcontinent or the Russian Far East, but things are gearing up fast in most of these. Kerinci, as one of the largest TCUs in the world and the second largest in terms of PA within it, is also worthy of note; there is so far only the FFI Tiger Protection Project, funded by 21CT and the STF, and WWF's village buffer zone initiative. Kanha stands out in India as having received less external support than the other Level I's. Though there is little recorded expenditure in the Sunderbans, it is not included here as there are at least four major new initiatives currently under discussion. Myanmar and Laos remain relatively untouched by tiger conservation work, though WCS, WWF and WildAid are all beginning to explore possibilities in these countries.

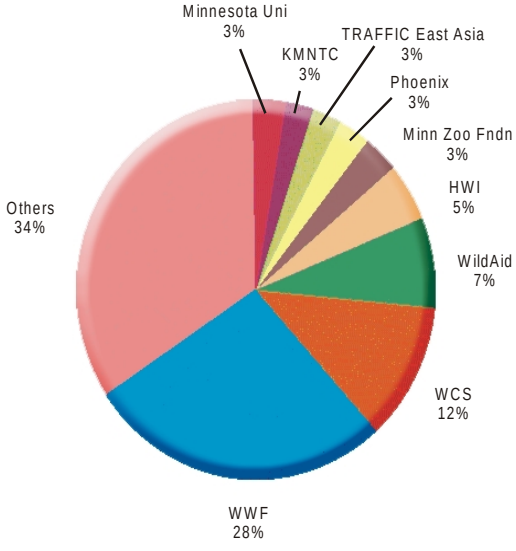

Figure 4: Implementing agencies* share of tiger funding 1998-2000. *see the acronym definitions p.67

Activities. There are not yet sufficient entries in this part of the database to enable any meaningful analysis, partly because priority was given to entering funding data in time for presentation at the WWF GTCS meeting, and partly because sufficient information for accurate data entry here is not yet available for all projects. This will be addressed over the next few months.

Further Development

Work on adding to, refining and checking the data will continue until early 2001. Major agencies will be asked to check their own data prior to distribution. At the time of writing, the database had the beginnings of a user-friendly data extraction interface, which is being produced by a professional Access designer. This will be further developed before distribution, so that it will be possible for inexperienced users to interrogate the

database. The finished product (or as finished as is possible) will be available on CD to all contributors before summer 2001. Clearly it is desirable to build on the foundation so far established and continue with this work, and ZSL and WWF US will discuss possible future directions with a view to doing so.

Acknowledgments

I would like to thank all those agencies who provided information; in particular David Phemister of NFWF and Fred Bagley of USFWS for their early and relatively complete data returns; getting these projects fully entered early in the process meant that there was time (just) before the WWF GTCS meeting to put in all the data that came in at the last minute. Special thanks are due to TigerLink for data on India which could not have been collected independently in the available time frame (though this will of course be cross-checked as far as possible), and to Peter Jackson and John Seidensticker for their patience in answering my phone and email questions on a wide variety of issues. I am also grateful to John Seidensticker for his invaluable guidance on the thinking behind the collection of information and the approaches to data analysis. WWF US and the Zoological Society of London between them have provided the time and resources necessary to carry out the work.

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21CT	21st Century Tiger; a partnership between London Zoo and Global Tiger Patrol, based at the Zoological Society of London, UK.
BDF	Barbara Delano Foundation, USA.
DETR	Department of the Environment, Transport and the Regions, UK.
EU	European Union.
GSN	Global Survival Network; now known as WildAid and based in Bangkok, Thailand.
FFI	Flora and Fauna International, UK
KMNTC	King Mahendra Trust for Nature Conservation, Nepal.
Minn Zoo Fndn	Minnesota Zoo Foundation
NGS	National Geograhic Society, USA.
NWF	National Wildlife Foundation, USA.
Phoenix	Phoenix Fund, Vladivostok, Russia.
STF	Save The Tiger Fund; a partnership between the National Fish and Wild-life Foundation and ExxonMobil, Washington, USA.
Tigris	Tigris Foundation, the Netherlands.
UNDP	United Nations Development Programme.
USAID	United States Aid for International Development. and Wildlife Service, Washington, USA.
WCS	Wildlife Conservation Society, New York, USA.
ZSL	The Zoological Society of London, London, UK

Proposal for a Database of Tiger Point Observations

Eric W. Sanderson, Wildlife Conservation Society

Despite vast expenditures for research and conservation of the tiger, there is no central source for current, range-wide tiger distribution information. It is impossible to easily answer simple questions like where do we find tigers now and where are we looking for them, without resorting to expensive meetings gathering researchers together from across the tiger's range. As a result, it is impossible to systematically evaluate how well tiger conservation units, range nations, or any other geographic entity are accomplishing their stated goals of conserving tigers. It is impossible to know the status and extent of tiger research. It's impossible to know what we still don't know about tigers, how the status of tigers in the wild is changing as result of conservation efforts, or where we need to direct our efforts next.

To help satisfy these needs, a simple database of tiger point observations was proposed, based on a similar database WCS facilitated recently for jaguars (Sanderson et. al, in press). The database would consist of the minimum set of information to identify where tigers were observed, when they were observed, who observed them and how the observation was made. Every researcher who put data in would get the full dataset back through annual CDROM distributions of data. Every data point would be attributed to the researcher who contributed it. Researchers would be further rewarded with public letters acknowledging their contribution to their parent institutions and through an annual published report. Unsuccessful tiger surveys, which often go unreported, could contribute valuable negative information about tiger distributions and researchers would receive credit for their efforts. Moreover an annually updated map of tiger observations might encourage further research and efforts to save the tiger.

Although some of the assembled tiger experts expressed support for this idea, a number of others expressed strong concerns about the database. The major obstacle foreseen was how to encourage individuals and governments to look past personal, institutional and political concerns and disagreements to share data for the sake of the tiger. Many researchers base their careers on their observations and it is essential to give them full acknowledgment for their contributions. Others were concerned about how to handle data of poor or questionable validity or collected with methods which are not universally accepted. Further safeguards would be required to insure that the data is not misused by those who actively wish to harm the tiger, while still having a fair and transparent means of sharing data with those working on the tiger's behalf. Still others wondered where we could find funding for such a long term effort.

Despite these formidable obstacles to the tiger database, a small cadre of tiger researchers agreed to create a prototype database based on WCS data to illustrate the utility of such an endeavor. These researchers include Ullas Karanth (WCS–India), Dale Miquelle (WCS–Russia), Tony Lynam (WCS–Thailand), Margaret Kinnaird (WCS–Indonesia), Ruth Laidlaw (WCS–Malaysia), Joshua Ginsberg and Eric Sanderson (WCS–New York.)

Sanderson, E.W., Chetkiewicz, C-L. B, Rabinowitz, A., Redford, K.H., Robinson, J.G., Taber, A.B. In Press. *El Jaguar en el nuevo milenio. Una evaluacion de su estado, deteccion de prioridades y recomendaciones para la conservacion de los jaguares en America*. (Medellin, R. A., C. Chetkiewicz, A. Rabinowitz, K. H. Redford, J. G. Robinson, E.W. Sanderson, y A. Taber, eds.). Universidad Nacional Autonoma de Mexico/ Wildlife Conservation Society. Mexico D. F.

Tiger Database: Suggested Standard Fields

Eric W. Sanderson

September 10, 1999

Goal: Develop set of standard data to record tiger observations. **Minimum set in bold type**.

Database Fields

1. Time
   - **a. Date of Observation**
   - b. Hour of Observation (local time)
   - c. Estimated Date of Tiger Presence (if different from 1a)
   - d. Estimated Time of Tiger Presence (if different from 1b)
   - e. Comments

1. Location*
   - a. Minimum resolved feature: point or area.
   - **b. Latitude of Point or Centroid of Area**, where observation was made (expressed in decimal degrees, to 3 decimal places)
   - **c. Longitude of Point or Centroid of Area**, where observation was made (expressed in decimal degrees, to 3 decimal places)
   - d. Positional accuracy (as measured by a radius from the point which will include the true location of the point in 95/100 instances, i.e. 95% probability)
   - e. Geographic Name of the Location
   - f. Estimated Latitude of Tiger Location (if different from 2b)
   - g. Estimated Longitude of Tiger Location (if different from 2c)
   - h. Estimated Positional Accuracy of Tiger Location (defined by 95% probability, given 2f, 2g)
   - i. Comments

2. Observer
    a. **Full name**
    b. Contact Information
        1. Address
        2. Phone
        3. Email
    c. Institutional Affiliation
    d. Project or Expedition
    e. Report or publication citing observation

3. Observation method
    a. **Method**, selected from list of defined, standard methodologies: tracks, scat, other sign, camera trap, capture, remains, vocalization, radiotrack, satellite tracking, live sighting, 2nd hand report, 3rd hand report
    b. Comments

4. Tiger
    a. Possible to identify individual?
        1. If 5a is true, tiger identity [is there any kind of central clearinghouse for this kind of information?]
        2. If 5a is true, identification method
            a. age
            b. sex
            c. comments

5. Habitat Type
    a. Select from a list of standardized habitat types which apply to within a home range sized radius from the observation location: Tropical Dry Forest, Tropical Moist Deciduous Forest, Tropical Moist Evergreen Forest, Subtropical and Temperate Upland Forest, Mangroves, Degraded Forests, Scrub, Grasslands, Cleared/Agriculture, etc.
    b. Comments

*need provision to record coordinates in other coordinate systems with sufficient information to convert to latitude/longitude at later date.

Appendix IV: Scorecard follow-up

Tiger Scorecard Working Group
Bronx Zoo, New York
January 21, 2000

In attendance:
Joshua Ginsberg, WCS
Kent Redford, WCS
Madhu Rao, WCS
John Seidensticker (via conference call at 11am), NFWF-STF
Eric Dinerstein, WWF
Steve Osofsky, WWF
Jeff Shryer, USFWS
Cheryl Chetkiewicz, WCS

Executive Summary

A meeting was convened at WCS on January 21, 2000 to make a plan for developing the scorecard. The meeting was attended by Joshua Ginsberg, WCS, Kent Redford, WCS, Madhu Rao, WCS, John Seidensticker (via conference call at), NFWF-STF, Eric Dinerstein, WWF, Steve Osofsky, WWF, Jeff Shryer, USFWS and Cheryl Chetkiewicz, WCS.

In the meeting we sought to develop a framework for proceeding with both the development and implementation of a tiger scorecard. The questions we tried to address were:

- What is the purpose(s) of a scorecard?
- What levels of analysis should it include?
- How should the scorecard be designed?
- How should the charge to the team read?
- Who would administer the scorecard?

While we all agreed on the need for assessment in tiger conservation, there are clearly a number of divergent opinions on the purpose of the scorecard which stem from the core issue of whether the scorecard should be used for assessing programs or the conservation status of tigers. Some see this as a project tool to improve and assess project success; others see the scorecard as a way to track activities and action at the TCU level; some argue the scorecard will allow us to better set priorities among sites/landscapes.

Issues of scale are critical to this discussion. The meeting participants spent much of the day discussing issues of scale, how scale affected the questions asked, and how questions could be nested to answer different questions at different scales. While much remains to be

done by the team which drafts the prototype scorecard, we feel progress was made in defining the goals of the scorecard and how these goals could be met.

Meeting Summary

The meeting got underway at 10:50 am with informal introductions and review of package. Package included: the agenda; questions for critical components scorecard and example provided by Jeff; summary email by Kent Redford from breakout group at September 1999 tiger meeting; copies of proposed modifications to TCU scorecard made by Eric Dinerstein and group during the September 1999 tiger meeting; and the report from Dale Miquelle on monitoring in the Russian Far East.

Steve also provided some additional materials for consideration that may be useful in discussions, particularly at the site-level, including: PIP Scorecard Analysis for Chingaza; performance monitoring of USAID Environmental Programs; critical components matrix from the WWF Asia Pacific species retreat; questions that need asking; and threats to forest protected areas.

Kent reviewed the agenda and emphasized the need to answer five questions as listed, establish a timeframe, and talk about the next steps and who would carry it forward. Josh made a few comments to set the stage for the meeting. Basically, we were looking for ways to assess how we are doing with tiger conservation. What we hoped to achieve was a rough plan or design for the scorecard and an executable plan for taking the design forward.

Jeff indicated that it would help him if he understood why assessing tiger conservation was a concern that needed to be addressed to begin with. Josh used this to bring up a second point about what we consider success to be? There are two thoughts: one that tigers are going extinct and two that we are working to slow the decline. We are essentially starting with a species and conservation situation where decline is the rule. Is slowing this the success? We have a number of projects on tigers some of which don't incorporate monitoring and are addressing different issues such as habitat loss, poaching, etc. Eric emphasized that donors also wanted to know if activities that they were funding are actually getting us toward the goal of tiger conservation and if not, why not.

There was some general discussion about methodologies at this stage. An emphasis on getting trends rather than absolute numbers. In addition, some mention of the types of methods and the potential issues around using any one over the other was mentioned and it was felt that we should develop a scorecard that does not dwell on these issues. Prey density may be a useful index that is easier to measure than tigers specifically and could be one of a suite of items to help us understand what is a healthy Tiger Conservation Unit (TCU). But, we need a system that will be used and that is both robust and simple.

What is the purpose of the scorecard? One approach is to determine what question the scorecard needs to "answer." Without a doubt, the general public/donors want to know how many tigers there are.

This always poses a dilemma for conservation scientists working with tigers since it is not an easy measure. Jeff provided an example of the approach that he uses as a wildlife manager. Wildlife is considered a commodity and habitat management is how the commodity is produced. Management actions and indicators of success revolve around the production of desired habitat conditions to perpetuate this commodity.

The group brainstormed on 5 things that could be considered indicators that taken together could be used to provide a sense of whether tigers were doing better in a given TCU, stable or mixed, or going down (Box 1).

Box 1

Scale	Weighting	OPTIMAL CONDITIONS	THREATS	Trend	Target	Desired	Solns.
Site		Prey Species	Hunting of prey/disease				
Site		Strictly Protected Core Area	Habitat destruction				
Site		Big Area (Habitat dependent)					
Site		Suitable female/cub habitat					
Site		Tiger Abundance	Poaching				
Landscape		Well managed buffer					
Landscape		Public support					
Landscape		Conservation leaders					
Landscape		Dispersal – connectivity					

The other columns in Box 1 were not discussed at this stage.

It was emphasized that this is a descriptor of states but is currently metric-less. These are the vital signs that can be measured but we need to measure what is normal (status) and then monitor it over time (persistence). Monitoring provides some flexibility toward changing these metrics.

The discussion then moved into whether we are doing this exercise to measure trends or some desired state. Do we want a scorecard that is based on a site and area specific expectation? Any measuring tool is not useful without some point to compare. In general, it was felt that in some places, scales are relevant and perhaps we should be designing several scorecards for certain audiences and scales.

Since John Seidensticker joined us on the telephone at 11:30 am and wasn't privy to the majority of the discussion, following are his answers to particular questions posed.

What is the purpose of the scorecard? He felt that the Tiger Framework document laid out a vision for priorities in tiger conservation, but that the scorecard begins the dialogue on the what and why of tiger conservation efforts and helps to develop a consensus for what tiger conservation can be. He suggested that rather than come up with some general scorecard, we should develop it in an area we know quite well and then produce a simpler tool that could be more widely applied. Scorecard could also provide a link between areas. John mentioned that the Sundurbans, Chitwan, and possibly Russian Far East would be suitable test TCUs/sites.

What question should the scorecard answer? John mentioned that we have been developing a shared vision of where we are going, but now needed a tool to change the vision into a strategy that we can work on. He used India as an example to highlight this where their strategy for tigers has never evolved beyond the reserve system, but it is/was failing. But we need to ask what it is in the landscape that allows tigers to persist. What are the elements we need to preserve? We can't throw barriers around forests and hope that it works. He emphasized that we couldn't rely on a single metric, for example, in Nepal.

At what scales are you seeing the scorecard being useful? John felt that the TCUs are appropriate because they capture bioregion habitat and help bring some cultural and environmental variables together across this scale. We need to be aware of the cultural differences and variation between tiger areas.

John was asked about the optimal conditions for tigers. He mentioned: consistent source of water; no depredation; no human disturbance; no livestock. He felt that there needed to be core spots acting as refugia that are free from human disturbance with available source water. Different cards for different kinds of habitats.

John also mentioned that in developing the scorecard we need to think and understand about the ecological processes by which systems have evolved. In some cases, man makes those systems e.g., Way Kambas which has been cut over 3 times creating good habitat for prey and consequently tigers. This also helps with our thinking about recovering or restoring habitats.

The group mentioned two critical aspects to consider with the scorecard: status versus persistence. These may be similar metrics at the site or across tiger range, but there are critical differences between the two and should be asked at each scale.

Discussion focused on the 4 scales at which scorecards should be considered:

1. Site
    - Nothing known (e.g., satellite image, access, walk through, villagers, etc.)
    - Adequately surveyed (at least once)
    - Detailed field work
2. Landscape
3. Ecoregion
4. Tiger Range

There was some discussion about the meaning of site since this was felt to be an amorphous structure and difficult to define for comparison. People provided their definitions including a place where you do conservation work on the ground; small; < 1,000 km2; and, legally defined protected area. The Nature Conservancy defines a site as one with a certain number of individuals (target species).

CONSENSUS ON THE DEFINITION OF SITE: single protected area (PA) or a TCU of < 1,000 km^2 without a single protected area.

CONSENSUS ON THE DEFINITION OF LANDSCAPE: block or cluster of habitat blocks that are linked for effective dispersal of tigers for a total area of > 1,000 km^2; has to include PA. It was noted that this is a similar definition to TCU.

These were developed because it isn't clear how big an area is needed to support a viable population of tigers and the group wanted to include a PA and/or the incentive for creating a PA in the definition.

Ecoregions - It was mentioned that this scale was needed to fit with current tools developed.
Bioregion - Refers to two or three ecoregions such as the Russian Far East.
Tiger Range - Current and potential range of tigers in Asia.

To address at next meeting: What question(s) did each of these levels ask that the other's didn't.

Group discussion then moved into the quality and quantity of information available at a variety of scales e.g., RFE and how do we accommodate this variation?

One suggestion was to create a matrix of questions with data (X) for each (Box 2).

How is the scorecard intended to be used?

Box 2.

Coarse Fine

	Site a	Site b	Site c
Question 1			X X X
Question 2		X	X X
Question 3	X	X X	X X X
Question X			

One thought was that the scorecard would be an audit. At the Dallas meeting it was very obvious that something was needed given the many status reports on tigers. The scorecard may function to help you consider what you should be thinking about as you develop plans for each TCU, etc.

Need to answer the question, who is implementing this exercise and for whom? Who is the user and the requester? This information should be given to donors and the scorecard should be used to guide specific responses.

Is the scorecard to be used to assess a potential site for intervention or the quality of the site? Some group members felt that the areas had already been prioritized and what we needed was an indication of what is deficient. Some members felt that it could be used for project evaluation. In this case you would use categories that you would expect outside reviewers to consider, or what your project reviewers would ask in terms of specifics about the project.

It was mentioned that it was critical to decide whose scorecard this is, who applies it, and who the report is going to be made available to.

In general, there were 3 uses for the scorecard that were mentioned:

- Site assessment for intervention
- Assessment of current intervention
- Setting priorities among sites/landscapes – a report card of sorts

The scorecard exercise could do several things:

- used to assess what you do and don't know – results then dictate what you do at that site
- across sites – may have nothing more than the results from 3 sites
- at the higher level – can sample here and answer some questions about tiger conservation at that level

In general, the ultimate reason is to determine how your investment is working. Donors desperately want answers to these questions and want to track how activities are working. Also, there had to be transparency and openness in the process and availability to all.

Individual organizations can have self-assessment, but need an independent measure. A spot check and independent tiger team was suggested, for example, 3 people visit 5 sites.

Josh felt that WCS is going to work in developing the scorecard and apply it to WCS tiger projects and wanted a mixed model with multiple organizations involved in the process.

A process was also suggested.

I. Develop a scorecard – field people and others meet outside of office
II. Send to field staff for comments – electronically
III. Putting it out broadly – following organizations/draft/comments please
IV. Beta test with experts – three sites

V. Iteration – disperse through STF/NFWF (others?) and have a workshop and team evaluation

Jeff emphasized and reiterated that disparity exists regarding what constitutes tiger conservation success - - what is success and how can it be measured? We need to be open and honest with stakeholders having an interest in this issue. We should get their comments in drafting a common methodology that donors, news media, etc. can use to independently assess tiger conservation success. The scorecard could be the measuring stick to do this. He mentioned that we would have accomplished a great deal by getting all interested parties to agree on how future success will be measured. This has generally not been done for wildlife except for a relatively few species subject to approved U.S. Fish and Wildlife Service recovery plans.

A preliminary list of folks for the process was drawn up:
Jeff*, Steve* , Judy Mills* , Eric W., Anup, Nasir, Cheryl, Josh*, Ullas, Margaret and Tim, Tony, Alan*, Dale, Ruth, John S.*

* core subset for team to draft the scorecard

Appendix V: Press release and NY Times article

While the workshop was not a media event, various aspects of the workshop were well covered by the press. This appendix includes the workshop press release, an article resulting from the workshop by Natalie Angier which appeared on the front page of the New York Times *Science Times* section, and a response to that article by Peter Jackson, a participant at the workshop. We have included the complete letter that Peter wrote, rather than the abridged version published by the Times, as it goes into greater detail about Peter's concerns (many of which, we are sure, are shared by other participants and tiger conservationists).

PRESS RELEASE:

HOPE STILL BURNING BRIGHT FOR THE TIGER

Contact: Stephen Sautner John Delaney Wildlife Conservation Society ssautner@wcs.org 718-220-5197 September 24, 1999 In the early 1990s, some tiger authorities flatly predicted that the world's largest cat would vanish into extinction by the year 2000. Now, after years of relentless conservation efforts, a panel of experts revealed last week that not only have tigers survived, but populations of these wild cats are actually increasing in some core areas. The new findings were released at a workshop held from Sept. 14-16 by the Wildlife Conservation Society (WCS) and the Save The Tiger Fund (STF).

According to the workshop's participants, a combination of better science, increased public awareness, and collaboration among conservation groups and governments has contributed to an upswing in tigers — particularly in the Russian Far East, Nepal, and areas in India, Bhutan and perhaps Sumatra.

"While there are setbacks, and many populations remain imperiled, we are succeeding at saving the tiger," said Dr. Joshua Ginsberg, director for WCS's Asia programs. "We must now move forward, analyze what has worked, what has not, and apply these lessons to key tiger populations across Asia."

The group cited the elimination of hunting of tigers and their prey in and out of protected areas as most crucial to saving them. Recent advances in tiger counting techniques, including the use of "camera traps," have allowed biologists to conduct more accurate surveys of tiger numbers and distribution to assess what's working.

While success is being realized across the range of the tiger, model programs in key core areas have served to demonstrate how tiger conservationists are winning their battles. For example, a model developed in India's Nagarahole National Park by

WCS conservationist Ullas Karanth, which incorporates anti-poaching, education, scientific research, and media outreach, has been expanded to three other reserves in the southern state of Karnataka. Now called the Karnataka Tiger Conservation Program (KTCP), the program has received significant funding from the Save The Tiger Fund and WCS. KTCP has shown that even in human-dominated landscapes we can find space for tigers to survive.

The workshop was funded by the Save The Tiger Fund, a partnership of the National Fish and Wildlife Foundation and the Exxon Corporation — which has given a total of $9 million toward tiger conservation. The meeting included 38 tiger conservation professionals from: WCS; World Wildlife Fund; Global Survival Network; Hornocker Wildlife Institute; American College of Traditional Chinese Medicine; Sumatran Tiger Project; Zoological Society of London; IUCN Cat Specialist Group; U.S. Fish and Wildlife Service; TRAFFIC East Asia; and Tiger Action Fund from India. Also attending was WCS board member Gary Fink of Minneapolis, who recently pledged a second half-million-dollar matching gift to renew WCS's efforts to save tigers across Asia.

"No one can save the tiger alone — it takes everyone working together," said Ginsberg. "The workshop has helped illuminate these insights and has moved us to new levels of cooperation."

The workshop's participants also reported a significant reduction in the illegal trade of tiger parts for traditional Chinese medicines, due to better enforcement of international treaties, more sophisticated anti-poaching operations, and outreach programs to local communities.

They warned however, that tigers are still endangered — particularly across much of Indochina and Southeast Asia — and if present trends continue, they will be lost in many areas. Tigers have already declined by 95 percent from a century ago. Conservationists hope that recent commitments by governments, conservation groups and funders in Myanmar, Cambodia, Thailand and Malaysia will foster tiger recovery in this region.

Besides the continuation of current protective measures, future efforts must be directed toward "transfrontier" areas — border areas between nations that are often undeveloped. These regions may prove to be among the most important refuges of wildlife in the coming years, the groups said. A formal report from the workshop is forthcoming.

Improbably, the Tiger Survives

By Natalie Angier
October 12, 1999, New York

In an old Vietnamese myth about how the tiger got its stripes, a man tries to show the great cat who's boss by lashing it to a tree and setting the tree on fire.

But the tiger is so powerful and so inured to pain that it strains against the flaming rope until it breaks free, its brush with extinction evident only in the black marks seared on its fur.

So, too, it turns out, with the real tiger.

As recently as the early 1990's, researchers were convinced that the largest and most sumptuously pelted of the world's cats, an animal more feared, revered, fetishized and lionized than the lion itself, was about to go up in smoke.

Once the tiger abounded throughout Asia, from eastern Turkey to the Sea of Japan, from Siberia in the north to Indonesia in the south.

But humanity's expanding numbers, and its lust for land, tiger body parts and the prey on which the tiger feeds, had taken such a huge toll that by 2000, many biologists gloomily predicted, the wild tiger would effectively be extinct.

But now, like a furred phoenix rising or a creature cognizant of its nine-lifetime warranty, the cat has come back.

Far from disappearing, the tiger in some parts of its range is practically thriving, its numbers measurably greater today than just a few years ago.

Though conservationists who have long battled to save the tiger warn against complacency and emphasize that the tiger is still endangered, they admit to an unusual sensation these days: optimism.

"We're all encouraged, which is very different from how we felt five or six years ago," said Ginette Hemley, vice president for species conservation at the World Wildlife Fund. "We won't be able to save the tiger everywhere, and we've learned that we cannot ever drop our guard again, but in some areas there's been some real progress."

Researchers and conservationists from around the world gathered last month in New York for a three-day conference called "Saving the Tiger: Assessing our Success," held under the aegis of the Wildlife Conservation Society, which runs the Bronx Zoo.

At the meeting, researchers presented data indicating that tiger populations are better off now than they were earlier this decade in eastern Siberia, Nepal and some areas of India.

For example, in the Ranthambhore forest south of Delhi, popular among ecotourists eager for a glimpse of tiger, a 1993 census found at most 20 tigers left in the region's 318 square miles.

The latest tally, which has yet to be officially released, suggests that the figure has doubled and is still rising.

Even in countries where biologists feared that the tiger was doomed, including Sumatra, Burma, Thailand and Cambodia, scientists at the meeting reported encouraging signs of resilience.

"We had such a surprise," said Dr. John Seidensticker, the curator of mammals at the Smithsonian Institution's National Zoological Park in Washington.

"We thought Sumatra was a loss, but it turns out that even with its enormous political turmoil, which is often accompanied by increased poaching, there are pockets where survey data show there are good levels of tigers, more than we expected to be found."

The tiger is by no means faring well everywhere.

In the mangrove swamps of Bangladesh, where biologists had thought tiger populations were relatively healthy, new survey results indicate fewer than the predicted number of cats.

And across its entire range, the tiger is still quite scarce.

Dr. Peter Jackson, the chairman of the Cat Specialist Group of the World Conservation Union in Switzerland, estimates that there are 5,000 to 7,000 tigers left in Asia. Nobody knows how many tigers dwelt on the continent originally, for there were no efforts to track tiger populations until about 1972, but the number a century ago was probably at least 10 times greater than today.

Nevertheless, that the mighty tiger is holding its own in many pockets heartens biologists and offers a refreshing counterpoint to the dirges in conservation circles, with their bleak refrains of a world peopled solely by weedy species like squirrels, crows, roaches, rats and people.

The biologists attribute the tiger's recovery to several factors.

For one, many Asian countries have begun cracking down harshly on poachers, who in the early 1990's were killing tigers willy-nilly, mostly to obtain tiger bone, a popular ingredient in traditional Chinese medicine.

For another, conservationists have succeeded in gathering critical information about tiger biology, hunting practices and reproduction rates to advise governments on how best to save the great cats.

That advice varies from region to region, but one theme predominates: the best way to save the tiger is to save the tiger's prey: the deer, wild cattle and wild pigs that tigers eat, said Dr. K. Ullas Karanth, "like hamburgers."

"If you manage the prey species well, the tigers will take care of themselves." said Dr. Karanth, a conservation zoologist for the Wildlife Conservation Society, who is based in Bangalore, India.

To guarantee that there will be enough prey to support tigers, he added, a country must set aside some places where humans are not allowed to hunt, and hence where prey animals can always find haven to breed.

"For a while, it was very popular to talk about 'sustainable use,' the idea that you could have human use of a tiger habitat and still have tigers," Dr. Karanth said.

"But our prey data have shown that we need to have nested within these sustainable use areas some truly protected places."

Asked if it was likely that protected areas could be set aside for the long term in countries as populous as India, Dr. Karanth said: "I'm 51 now. When I first started going into the Indian forest, at age 18 or 19, I thought soon there would be no more forests.

But there are more protected areas and more tigers now than when I had given up hope as a young man."

"If you can do it in India," he said, "you can do it anywhere in the world."

Nor do people living in the tiger's range need to be convinced of the cat's worth, Dr. Seidensticker said, or told why saving the tiger is the right thing to do, morally, ecologically and economically.

"I remember talking to a Government official in Bangladesh a number of years ago, who said to me: 'You don't have to tell me that we should save the tiger. Of course we should save the tiger. Just tell me how we can do it,'" Dr. Seidensticker recalled.

In India, he said, the tiger is considered a national treasure, and not for nothing do other countries in the tiger's domain call themselves, sometimes wistfully, "Asian tigers."

That the tiger hangs on suits its metaphorical heft, which, like the fortissimo timber of its roar, has carried far, wide and deep.

The powerful Hindu goddess Durga rode a tiger mount, while Siva, the god of destruction and reproduction, sat on a tiger skin.

In the Chinese calendar, every 12th year is the year of the tiger, and it is considered a lucky, powerful year to be born (that means you, 1998 babies).

The Romans loved the tiger, identifying with its deadly might, and brought them from Turkey as mascots.

The Emperor Nero kept an entire stable of them, and Bacchus, the god of wine, was depicted in mosaics as riding a chariot drawn by tigers.

William Blake mused in a seditious nursery rhyme about the "tyger, tyger, burning bright, in the forests of the night." Many other tigers have infiltrated children's consciousness, as Winnie the Pooh's strong, foolish friend Tigger; cartoon Calvin's stuffed animal, Hobbes, and a well-known spokesbeast for Sugar Frosted Flakes.

The symbolic value of the tiger is flamboyant enough that, several years ago, a shareholder stood up at a corporate meeting for Exxon, which long urged drivers to put a tiger in their tank.

The tiger has been so accommodating as logo and sound bite, the shareholder said, that it's time to give something back to the tiger.

As a result, Exxon, with the National Fish and Wildlife Foundation, began a Save the Tiger fund in 1995 that will dispense $9 million over eight years to various tiger preservation programs, to which conservationists, ever strapped for cash, responded "Gr-r-eat!"

For all the tiger's cultural presence, the animal proper is devilishly difficult to find in the wild.

It lives largely in dense forest underbrush, where its striped pattern keeps it well camouflaged, so well that at least one renowned tiger researcher admits he has never seen a tiger in the wild. Other tiger biologists have spotted their subjects repeatedly, yet they say it always feels as good as the first time.

"Even finding their tracks is exciting," Dr. Jackson of the Cat Specialist Group said.

"And when you see the tiger itself, it's an awesome sight."

Only in the Sunderbans, a swampy forest that straddles India and Bangladesh on the Bay of Bengal, do people hope not to see tigers.

Living in the Sunderbans are about 250 tigers notorious for being man-eaters, and every year they kill a dozen or so people who venture into the forest to collect wood or fruit. Recently, people have had some success in preventing attacks by wearing hats with eyes painted on the back, for tigers rely on the tactic of surprise, ambushing their prey from behind.

Apart from the Sunderbans, though, tigers have learned, after centuries of being hunted, to shy away from human beings.

They prefer meatier meals in any event, the better to support their massive bodies.

Tigers vary in size depending on where they live and what subspecies they are. The largest tigers are the Siberian males, which may be nine feet long and weigh more than 500 pounds. The smallest tigers are the Sumatrans, with males of 250 pounds and females 50 pounds lighter.

Coats also vary from one subspecies to the next.

Siberian and Himalayan tigers live in cold climates and relatively open spaces, and so they have long, thick, relatively light-colored fur, while the tigers that live in the tropics have short, dark fur.

Every so often a Bengal tiger is born with almost white fur, the result of a recessive genetic trait. These rare specimens have an otherworldly glow and a magician's reputation.

Whatever the hue, all tigers have an almost magical capacity for hunting.

An adult can pull down a wild bull two or three times its size, puncturing the prey's throat with canine teeth bigger than your index fingers. Tigers, which have extraordinarily keen vision, can hunt by sunlight or darkness, and researchers have been surprised to find tigers hard on the trail in the heat of midafternoon, when many creatures are taking siestas.

A tiger is a semisolitary cat, living and hunting alone most of the time, but not averse to occasional congregations.

Young males disperse at adolescence, but a daughter will often continue to live near her mother for much of her life, inheriting the mother's territory when she dies.

Females are not the only doting parents.

Recently, males have been observed eating, playing and traveling with their cubs.

They have reason to look after their young: an interloping male will often try to kill the resident cubs, his hope being that, by doing so, he will put the mother tiger back into heat and have a chance to mate with her. And tigers do mate and breed readily, which is why, scientists say, they can rebound from near-extermination when given half a chance.

In seeking to allow tigers to take care of themselves, conservationists have joined forces lately with purveyors of traditional Chinese medicine.

One reason tigers hit bottom in the early 1990's, researchers said, is that the explosive growth of the Chinese economy led to an equally strong demand for products used in traditional Chinese medicine.

Tiger bone has long been a staple item in preparations to treat arthritis, rheumatism and other muscular aches and pains.

Rather than excoriate traditional Chinese medicine as superstitious hogwash — an approach doomed to fail, given the enormous popularity of Chinese medicine — conservationists have approached experts in the discipline to see if there were alternatives to tiger bone that could be promoted. They have discovered, through examining traditional texts, that one option is to substitute the bones of an Asian rodent called a sailong, which is common in China.

One way to make sailong bone desirable might be to charge more for it than tiger bone ever commanded. It worked for fake fur, didn't it?

Reply by Peter Jackson:

Natalie Angier's review of the tiger situation (NYT 12 Oct. 1999) presents a more optimistic view of the tiger's future than I consider is justified, although the headline, "Against All Odds, a Great Cat Survives" is true.

I participated in the Wildlife Conservation Society (WCS) workshop where the enormous progress made in scientific research on the tiger in this decade was the main theme. That certainly is a hopeful aspect. However, conservation is basically politics: governmental decisions on land-use, legal protection of wildlife and its implementation, reconciliation with economic development etc. Overall, the conservation situation of the tiger is far from satisfactory.

Except in the Russian Far East there is no sound evidence of an increase in tiger populations throughout its range in 14 Asian countries. The tiger's future in the Russian Far East certainly looks brighter, because the population is virtually unfragmented and poaching and illegal trade appear to have declined markedly as a result of the operations of anti-poaching brigades, and possibly because of a reported shift of interest by mafia groups from tigers to drugs, which are easier to handle and more profitable.

Indian censuses, whose pug-mark counting methodology and estimates have been widely criticised, reported a peak of 4,334 in 1989, compared with 1,800 in 1972, but the estimates have since been in the region of 3,750, while the Director of Project Tiger is on record as saying he thinks there are no more than 3,000, and that 200-300 tigers have been poached annually in the 1990s.

The example of an increase in the tiger population in Ranthambhore National Park in India, is misleading. Ranthambhore is a smallish, isolated reserve, which was reported to have only 14 tigers when Project Tiger was launched in 1973. Official censuses subsequently indicated the population rising to 44 by 1989 - the conditions in Ranthambhore are conducive to quite accurate estimates. A 1993 census, after the discovery of poaching in the reserve, reported 36 tigers, but experts on the area, who carried out their own survey, suggested fewer than 20. The 1997 census reported 32 tigers. Since tigers reproduce well, the population appears to be growing again under reinforced management. But that is not representative of what is happening elsewhere.

Apart from the Russian census, the most efficient estimate has been in Nepal, indicating a population maximum of around 200. This does not represent any increase in tiger numbers, but rather a certain stability following a serious decline. Furthermore, the population is split into three isolated sub-populations, two of which are small and vulnerable.

Estimates from other parts of tiger range have not been systematic. A questionnaire survey in Cambodia indicated about 700 tigers - over three times as many as previously reported. But WCS researchers say their camera traps have not revealed many tigers there, while those who organised the questionnaire survey declare that the camera-trapping so far has been carried out in areas where tigers were not reported as numerous. Who knows what the situation really is?

Poaching and the illegal trade in tiger and other wildlife products are as difficult to assess as the drug trade, because they are just as clandestine. Although there may have been some decline since the mid-1990s, I doubt if it is very marked. Skins and bones are regularly seized in India, Nepal and Russia, and are to be found in local markets throughout SE Asia. Sumatra was the major source of tiger bone in the past, and the trade is clearly continuing in a country experiencing great turbulence.

As threatening as poaching of the tiger itself, is poaching of critical tiger prey species (principally deer and wild boar, which are widespread). Prey species hey are just as much food for people as for tigers. Without natural prey tigers turn to livestock, and face human persecution, an existing situation in many parts of tiger range.

Of crucial importance to the tiger is habitat, and in India, which probably has around two-thirds of surviving tigers, the situation is grave.
Population pressure on forest resources and land is intense, and, as a result, the tiger population is heavily fragmented. Equally alarming is the way in which industry and commerce are encroaching on wild habitat, especially for mining, as many protected areas are rich in minerals. There is clear evidence of official connivance in handing over supposedly protected land to business interests in ways which appear to be manipulation of the Wildlife Protection Act.

To sum up, the tiger's situation is grave. Only strong and dedicated action by governments, with enhanced field staff, will save the tiger - along with strong support from the scientific community, as well as the general public. Protection of the great cat, its prey and its habitat are the crucial factors. The tiger, as a top carnivore, depends on a pyramid of species, animal and plant, and is a flagship for wildlife and natural habitat; its conservation is beneficial to the world and its people.

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Mission

WCS - International saves wildlife and wildlands by understanding and resolving critical problems that threaten key species and large, wild ecosystems around the world.