

GTI
Global Tiger Initiative

BIOLOGICAL & LAW ENFORCEMENT MONITORING AT THE LANDSCAPE AND SITE LEVEL

WILDLIFE CONSERVATION SOCIETY

GLOBAL TIGER INITATIVE

GOAL

Double tiger numbers by 2022.

THE APPR

Policy & Ir

More effe eading to)

Recovery

ASSESSM

To provid ss,

we must have Measures of Progress

A MODEL FOR MEASURING PROGRESS

- Long-term commitment to source sites
- Science-based approach
- Measurable targets
- Scaling up monitoring tools to a national, regional and global level

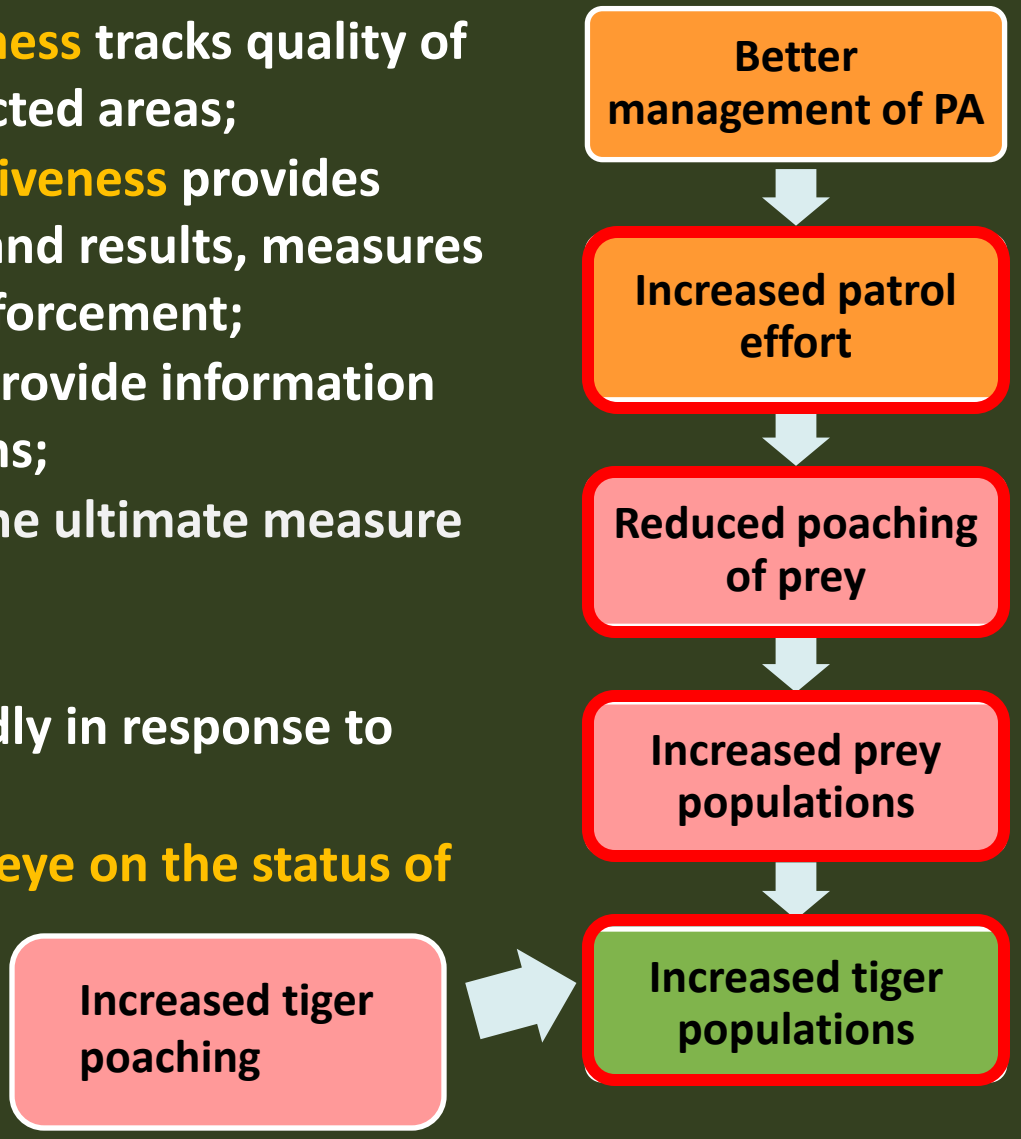
SPATIAL SCALES OF INTERVENTION

- Source sites (core areas): 800 – 5,000 km^2
  - Focus of interventions
  - Optimal tiger recovery sites
  - Scale at which progress will be measured and evaluated
  - Tiger Conservation Landscapes (TCLs): 10,000 – 100,000 km^2
  - Ensure connectivity
  - Ripple effect of successful core-site recovery programs
  - Early-warning threat monitoring

SELECTING MONITORING PRIORITIES

Monitoring management effectiveness tracks quality of management at source sites/protected areas;
Monitoring law enforcement effectiveness provides measures of anti-poaching efforts and results, measures of threats, and can improve law enforcement;
Monitoring Ungulate populations provide information on the effectiveness of interventions;
Monitoring Tiger populations are the ultimate measure of success;

Tiger populations may **decline** rapidly in response to intense poaching -
Therefore, always need to keep an eye on the status of tiger populations



MONITORING TIGERS AND PREY

Agreeing on Best Practices

- There must be accountability for the GTI process to be substantive;
- Accountability requires effective monitoring to demonstrate results and ensure goals are being met (or adapting and adjusting strategies in the face of failure)
- Such a process allows us to learn and improve conservation efforts

MONITORING TIGERS AND PREY

Agreeing on Best Practices

- Accountability Requires:
  - Agreed upon methodologies;
  - Comparability of Results across GTI Countries ;
  - Scientific rigor
  - Transparency;
  - Peer-reviewed and published methods for providing reliable and unbiased population estimates;
  - Adequate sampling intensity, spatial coverage and sample sizes

MONITORING TIGERS IN SOURCE SITES: BEST PRACTICES

- **Objective:** Determine abundance, survival, and recruitment of tigers
- **Tools:**
  - 1) capture-recapture method (camera traps or DNA)
  - 2) minimum count (camera traps or DNA)
- **Indicator:** Tiger numbers, survival and recruitment rates
- **Frequency:** Every year

MONITORING TIGERS IN SOURCE SITES: BEST PRACTICES

- **What do you do with extremely low tiger numbers (.e.g < 5 in a landscape)?**

1. **Don't rule out using mark-recapture approach (Camera trapping with density = 0.5/100 km^2 is possible).**

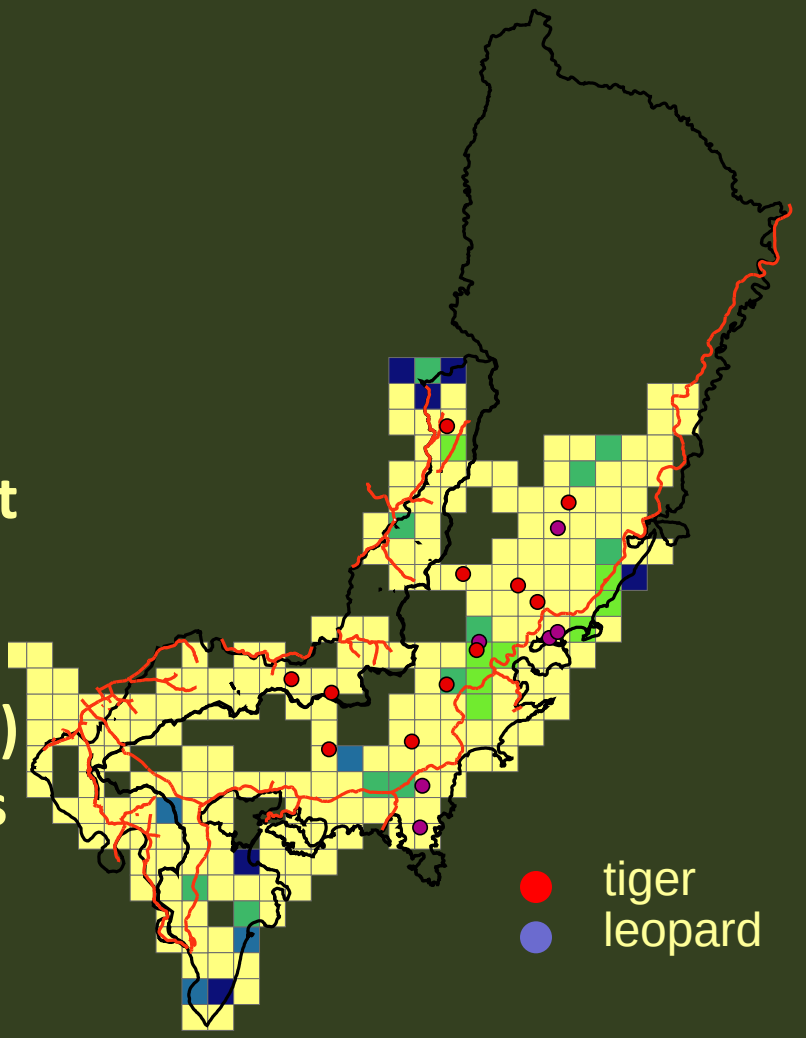
2. **Identification of areas used by tigers is critical at low density.**

3. **Collection of scat (DNA) may also be a viable alternative.**

MONITORING TIGERS IN SOURCE SITES: BEST PRACTICES

- What do you do with extremely low tiger numbers (.e.g < 5 in a landscape)?
- If mark-recapture approach will not work:

1. Attempt Minimum Count estimate:
   Use one method (DNA, photos) but don't combine methods (e.g. tracks, scat, photos).
   2. Limit time frame (e.g., 3 months)
   3. Use all information (scats, tracks photos) for management purposes, but not for population estimate.



MONITORING PREY IN SOURCE SITES: BEST PRACTICES

- **Objective:** Determine abundance/relative abundance of prey species

- **Tools:**
  - **Prey density –**
    - Line Transect sampling
  - **Index of prey density**
    - Occupancy modeling of signs
    - Encounter rate indices using sign surveys

Frequency: Every year

SURVEYING TIGERS/PREY IN SNOW
BEST PRACTICES

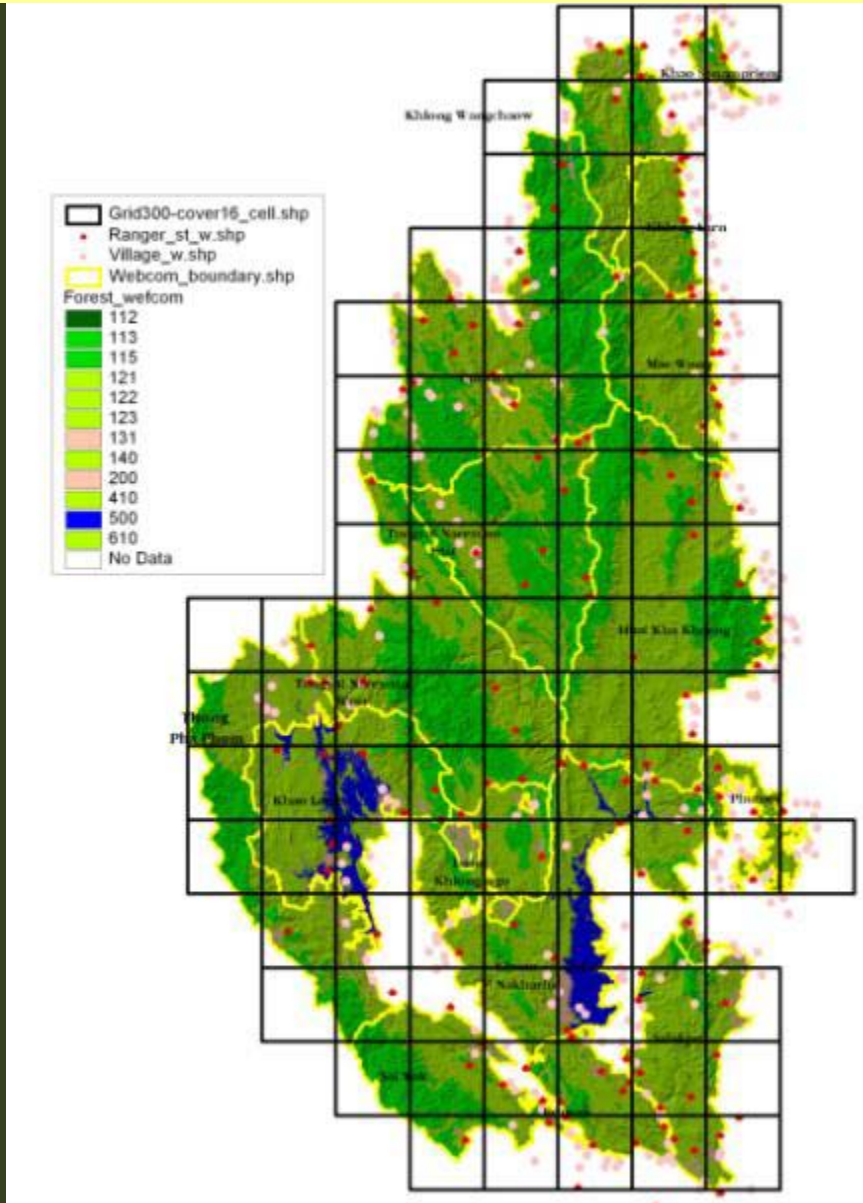
- Surveys in snow (Russia, NE China) provide special challenges & opportunities
- But using scientifically valid approaches that include a measure of detectability should be conducted.

SURVEYING BROADER LANDSCAPES (TCLS) BEST PRACTICES

- **Objective:** To assess the spatial distribution of tigers across a broader landscape

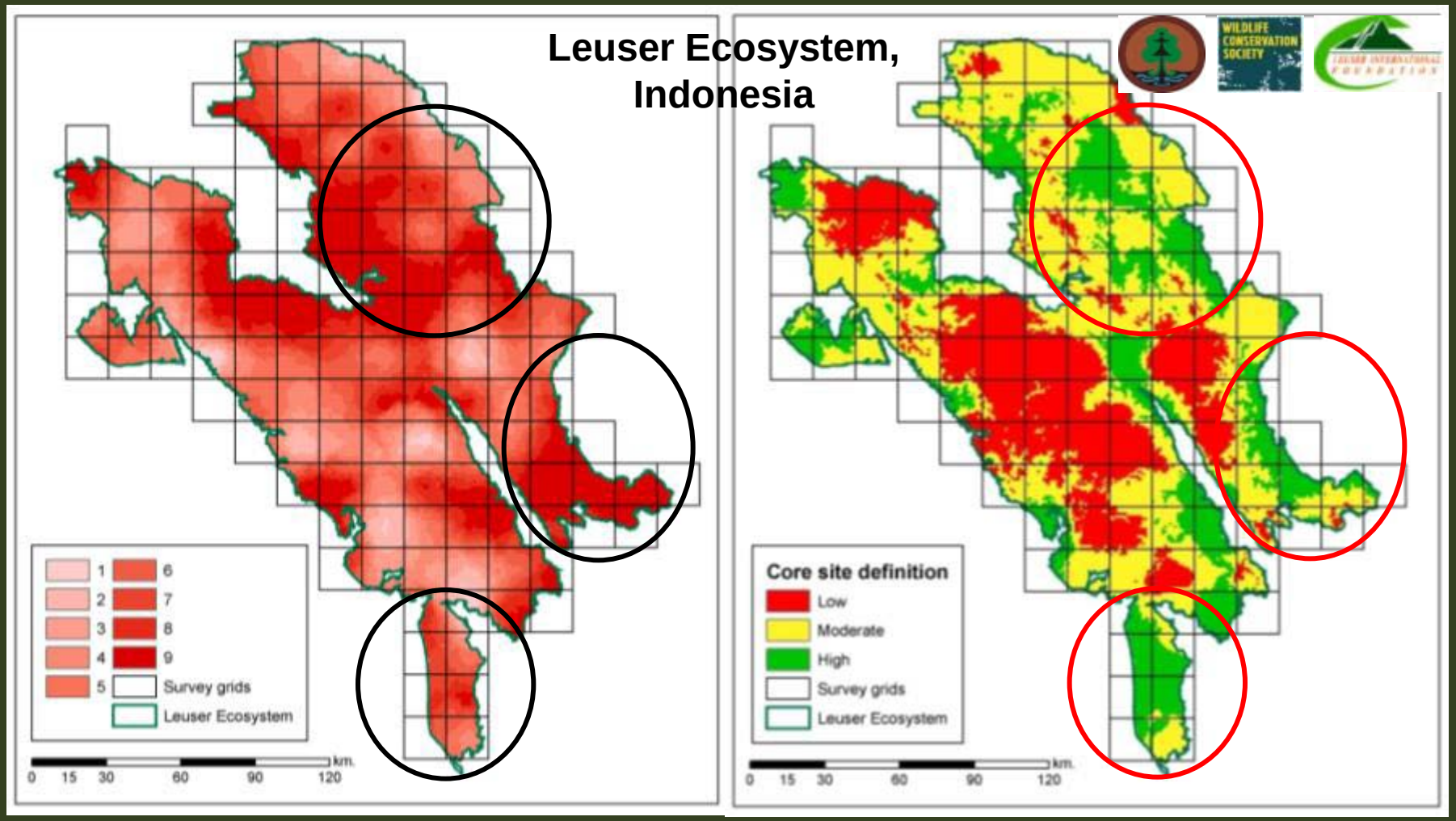
- **Tool:** Occupancy-modeling of detection/non-detection of tiger sign
- **Indicator:** Tiger occupancy

- **Frequency:** Every 3-5 years



SURVEYING BROADER LANDSCAPES

TIGER ABUNDANCE INDEX → POTENTIAL CORE SITES/CORRIDORS



HOW TO SELECT APPROPRIATE METHODS?

See GTI Handout: Scientific Monitoring

Table 1. Tiger prey and monitoring methodologies: objectives, scale, and intensity

Table 1: Tiger and prey monitoring methodologies: objectives, scale, and intensity method

Method code	Metrics of focus	Spatial Scale of Surveys	Intensity and coverage	Frequency and duration	Remarks
Large Cell Occupancy (LCO)	Tiger distribution, relative density & tiger numbers	TCLs are areas typically over 10,000 km2; 50-100 large cells	Cell size of 200 to 2000 km2; Effort walked typically 40 km per 200 km2 habitat	Once in 3-5 years; survey duration of about 3-6 months	Cell size and survey design by experts critical
Photographic capture-recapture (closed model) (PCRC)	Tiger numbers and density as a 'snap shot'; Age-class and	Source areas of 500 km2 or more, with potential for 25 breeding	100 trap-days per 100 km2	Once a year; Survey duration of 30-45 days	Requires dozens of cheap camera traps. Survey design critical

HOW TO SELECT APPROPRIATE METHODS?

Method code	Metrics of focus	Spatial Scale of Surveys	Intensity and coverage	Frequency and duration	Remarks
	sex	females			
Genetic capture-recapture (closed model) (GCRC)	Tiger numbers and density as a snap shot; age-sex; relatedness	Source areas of 500 km2 or more, with potential for 25 breeding females	Intensive sweeps on foot to collect scats in a manner amenable to CR analysis	Once a year Survey duration of 30-45 days	Stringent scat collection protocols, only 1-2 labs can do this analysis
Photographic or genetic capture recapture (Open model) (PCRO GCRO)	Changes in tiger numbers and density; survival rates, losses, recruitment; temporary emigration	Source areas of 500 km2 or more, with potential for 25 breeding females	Same as in the case of PCRC and GCRC	Once a year for 30-45 days, continued across multiple years	Same as in the case of PCRC and GCRC
Line transect Sampling (LTS)	Prey densities and current carrying capacity for tigers	Source areas of 500 km2 or more, with potential for 25 breeding females, done where terrain and access permit	Minimum 20 spatial replicates of 2-4 km length; Temporal replication to ensure 40 detections for each species	Once a year if feasible, if not once in 2-5 years; Survey duration 15-30 days	Distances must be measured with range finders; Design-based placement of transects critical.
Small Cell Occupancy survey (SCO)	Relative densities of prey species; Intensity of habitat use of different parts of a source area	Source areas of 500 km2 or more, with potential for 25 breeding females; where LTS is not feasible	50-100 cells; Cell size of 3-15 km2; Effort typically 4-15 km walked per cell	Once in 2-5 years; Survey duration of 30-60 days	Cell size linked to expected ungulate home range size. Survey design by experts c

Table 1 cont. Tiger prey and monitoring methodologies: objectives, scaleand intensity

HOW TO SELECT APPROPRIATE METHODS?

Table 2. Equipment, manpower, and costs

Table 1 Tiger and prey monitoring costs

Monitoring method code	Major equipment (in addition to these 3-4 vehicles will be needed)	Manpower-technical; Field skills +equipment reading, setting	Manpower-field personnel (tracker, guard, volunteer)	Capital costs US $	Operating costs US $)
LCO	GPS and compasses 10-20	100-200 man-days	200-400 man-days	6000	40000
PCRC	Camera traps 50-100+shell	100-150 man-days	200-300 man-days	18000	20000
GCRC	Genetics lab	100-150 man-days	200-300 man-days	>few million	10000
PCRO	Camera traps 50-100+shell	100-150 man-days	200-300 man-days	18000	20000
GCRO	Genetics lab	100-150 man-days	200-300 man-days	>few million	10000
LTS	Rangefinders , compasses - 25 sets	120-240 man-days	120-240 man-days	8000	15000
SCO	GPS and compasses 10-20	100-200 man-days	200-400 man-days	6000	20000

Getting it Right:
The devil is in the details

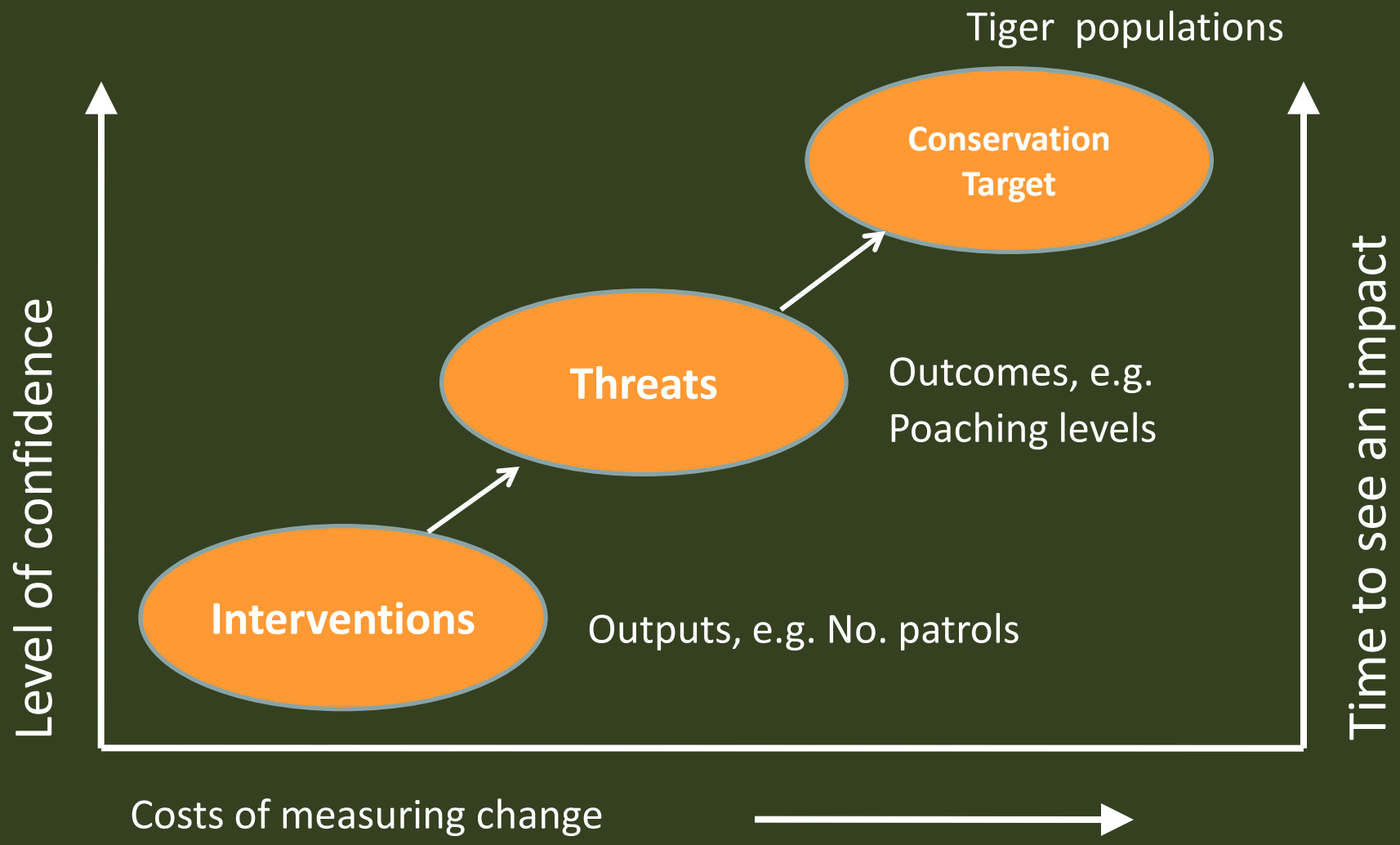








WHAT DO WE MEASURE?



LAW ENFORCEMENT MONITORING (LEM)

- **Improve on-site planning and evaluation of law enforcement performance and threats**
  - **Mechanism to quickly convert data into useful information for LE staff**
- **Measure changes in threat levels over time in response to law enforcement interventions**
  - **Standardized indicators**
  - **Standardized data collection and analyses**
- **Provide incentives for quality performance of inspectors**
  - **Standardized indicators of performance**

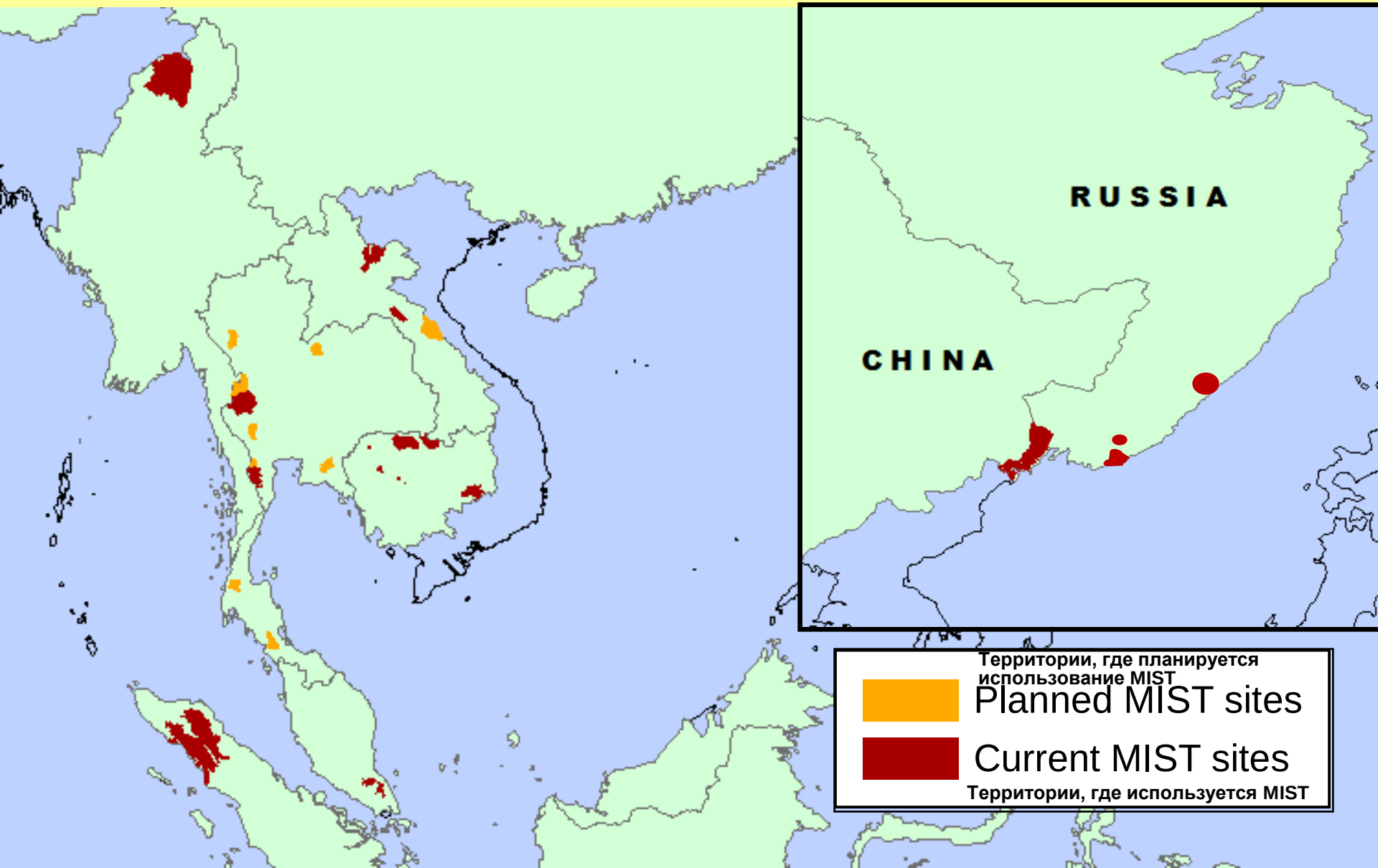
WHAT IS MIST/SMART AND HOW CAN IT HELP LEM?

- A user-friendly spatial Management Information SysTem (MIST)
- Focus on patrol-based data collection

MIST/SMART provides:

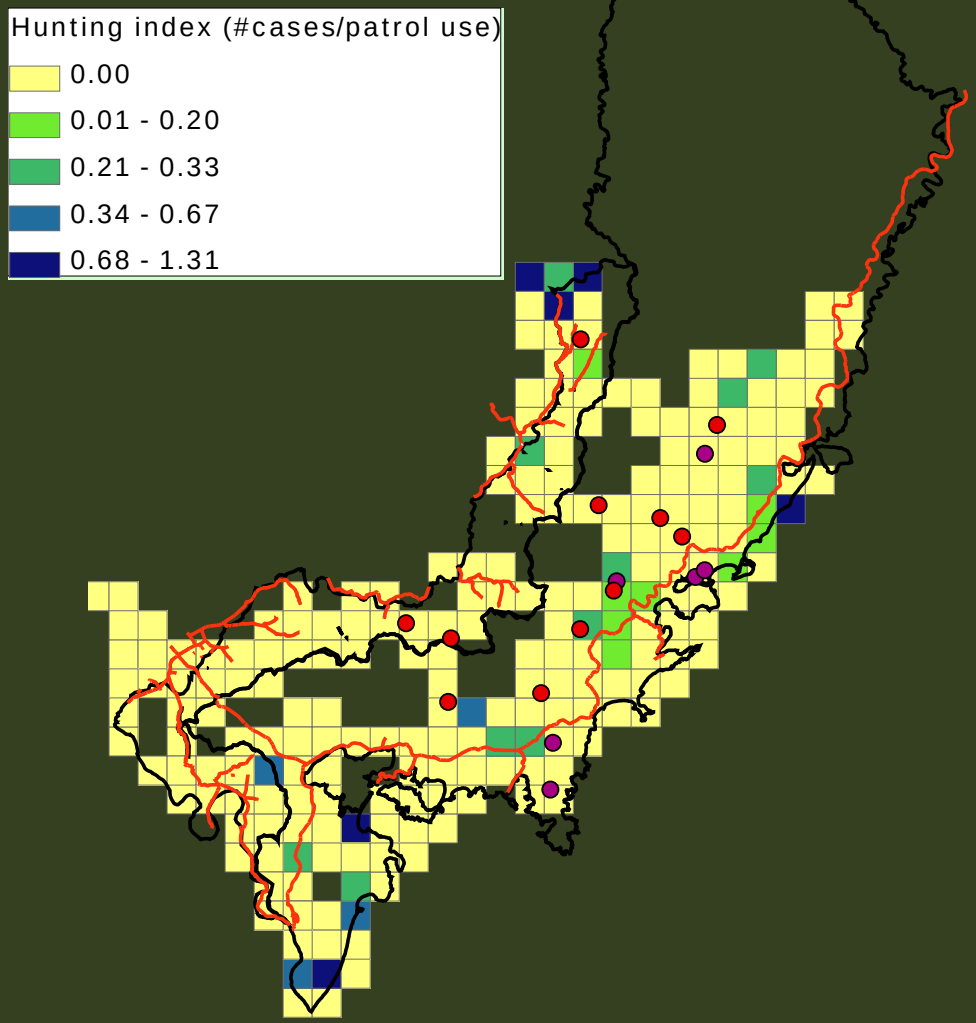
- Accountability for law enforcement performance
- Distribution of illegal activities and key wildlife species for patrol planning
- Standardized indicators for monitoring trends in illegal activities
- A means of rewarding rangers for both effort and results

MIST/SMART SITES IN ASIA



IMPLEMENTATION OF MIST/SMART

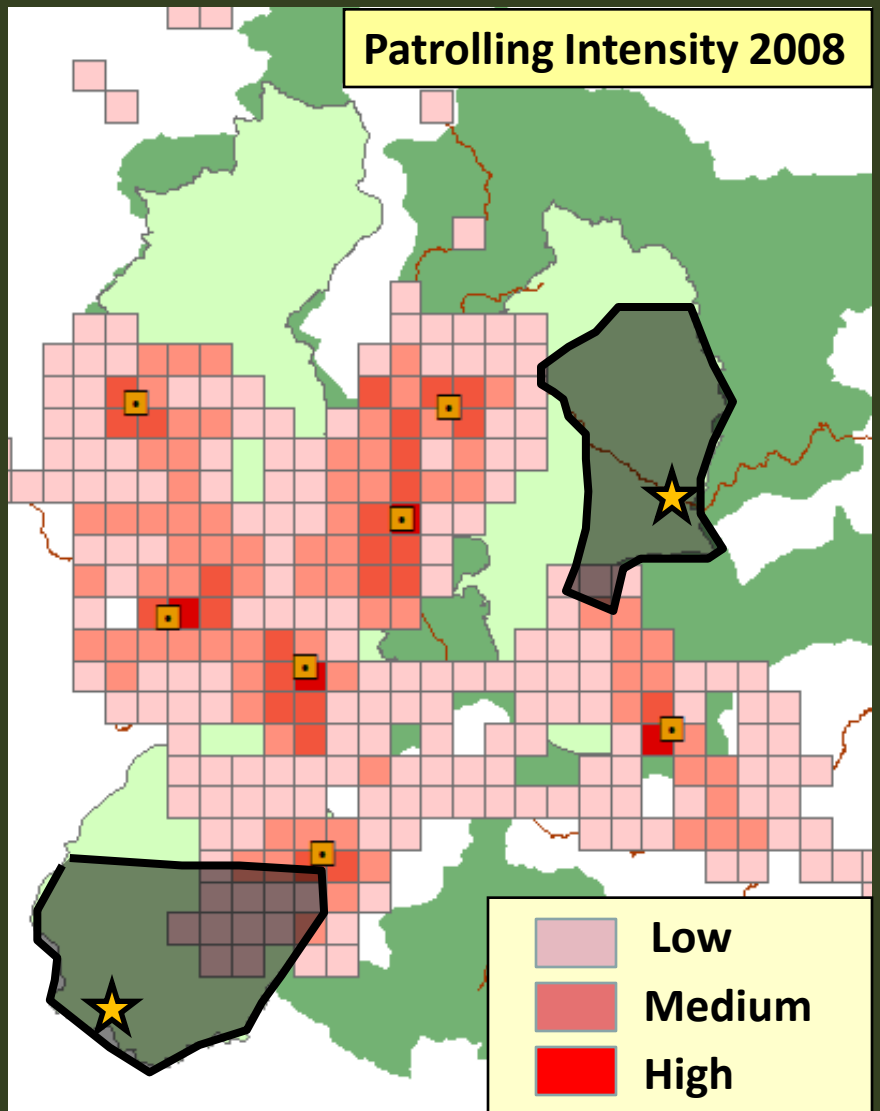
Southwest Primorye, Russia and Hunchun Reserve, China

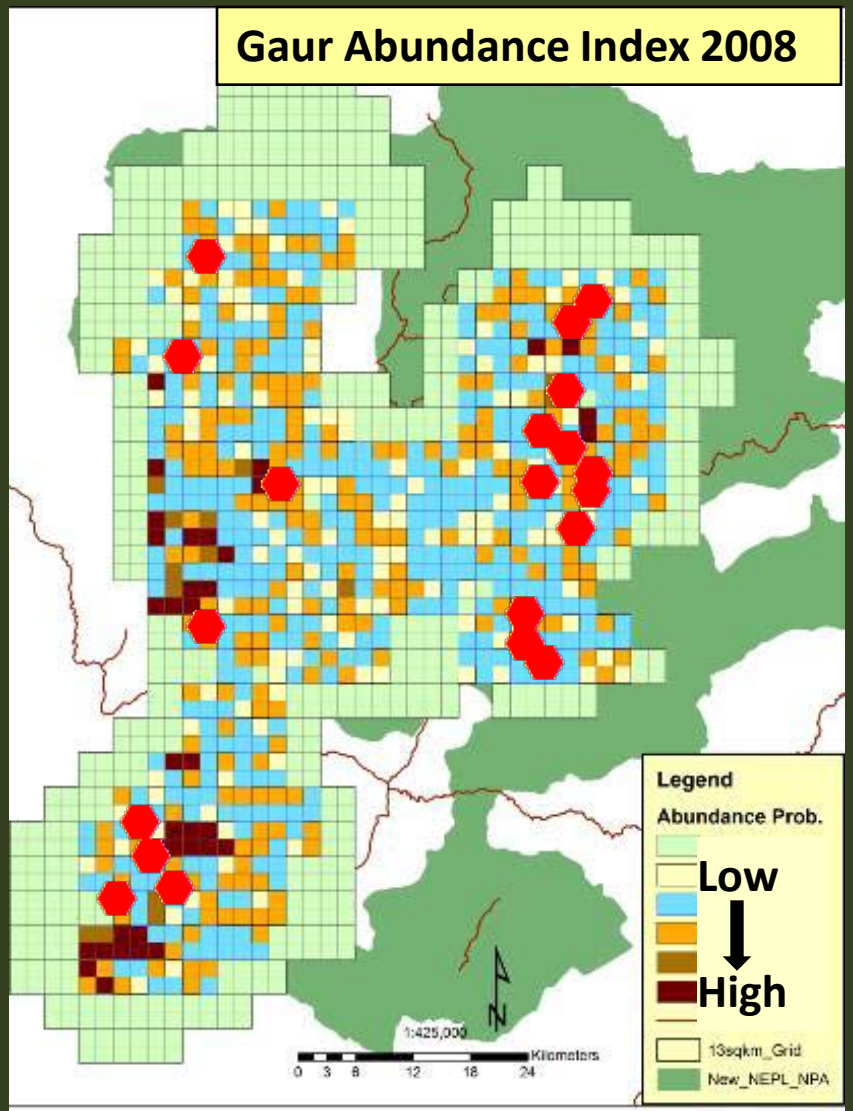


Allows comparisons across sites, across landscapes, across countries, and improves transboundary efforts

INTEGRATING MONITORING PROGRAMS

Nam Et-Phou Louey NPA, Lao PDR





TO IMPLEMENT MONITORING SYSTEMS WITHIN GTI

1. **WCS will collaborate with USGS to produce a guide to biological monitoring protocols for tigers by the end of 2011. We welcome collaboration with all others on this.**

Ecology, 79(8), 1998, pp. 2852–2862

ESTIMATION OF TIGER DENSITIES IN INDIA USING PHOTOGRAPHIC CAPTURES AND RECAPTURES

K. ULLAS KARANTH[1,3] AND JAMES D. NICHOLS[2]

[1] *Wildlife Conservation Society (International Programs), Bronx, New York 10460-1099 USA*
[2] *U.S. Geological Survey, Patuxent Wildlife Research Center, Laurel, Maryland 20708-4017 USA*

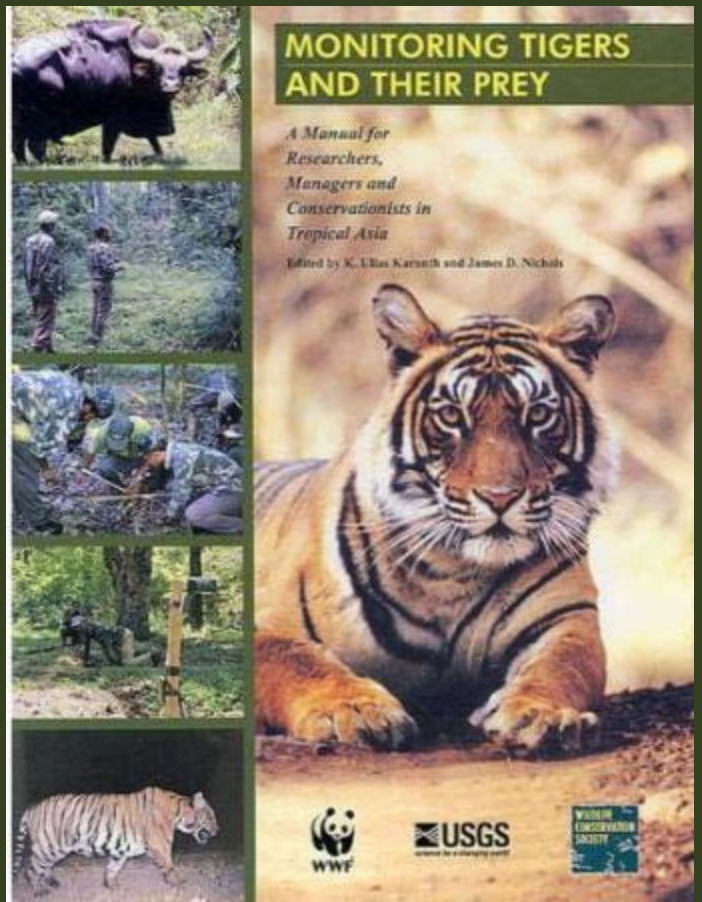
Journal of Applied Ecology

Journal of Applied Ecology 2009, **46**, 118–127 doi: 10.1111/j.1365-2664.2008.01578.x

A hierarchical model for estimating density in camera-trap studies

J. Andrew Royle[1]*, James D. Nichols[1], K. Ullas Karanth[2] and Arjun M. Gopalaswamy[2]

[1]*US Geological Survey, Patuxent Wildlife Research Center, Laurel, Maryland 20708, USA; and* [2]*Wildlife Conservation Society-India Program, Centre for Wildlife Studies, Bangalore, Karnataka-560042, India*



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3. WCS is already working in partnership with multiple parties to produce an updated SMART software to replace MIST and other LEM monitoring programs. Beta versions will be tested starting fall 2011. We believe this will be an improvement to MIST, M-Stripes, MIKE, etc. and will become the “best practice” software for law enforcement monitoring.

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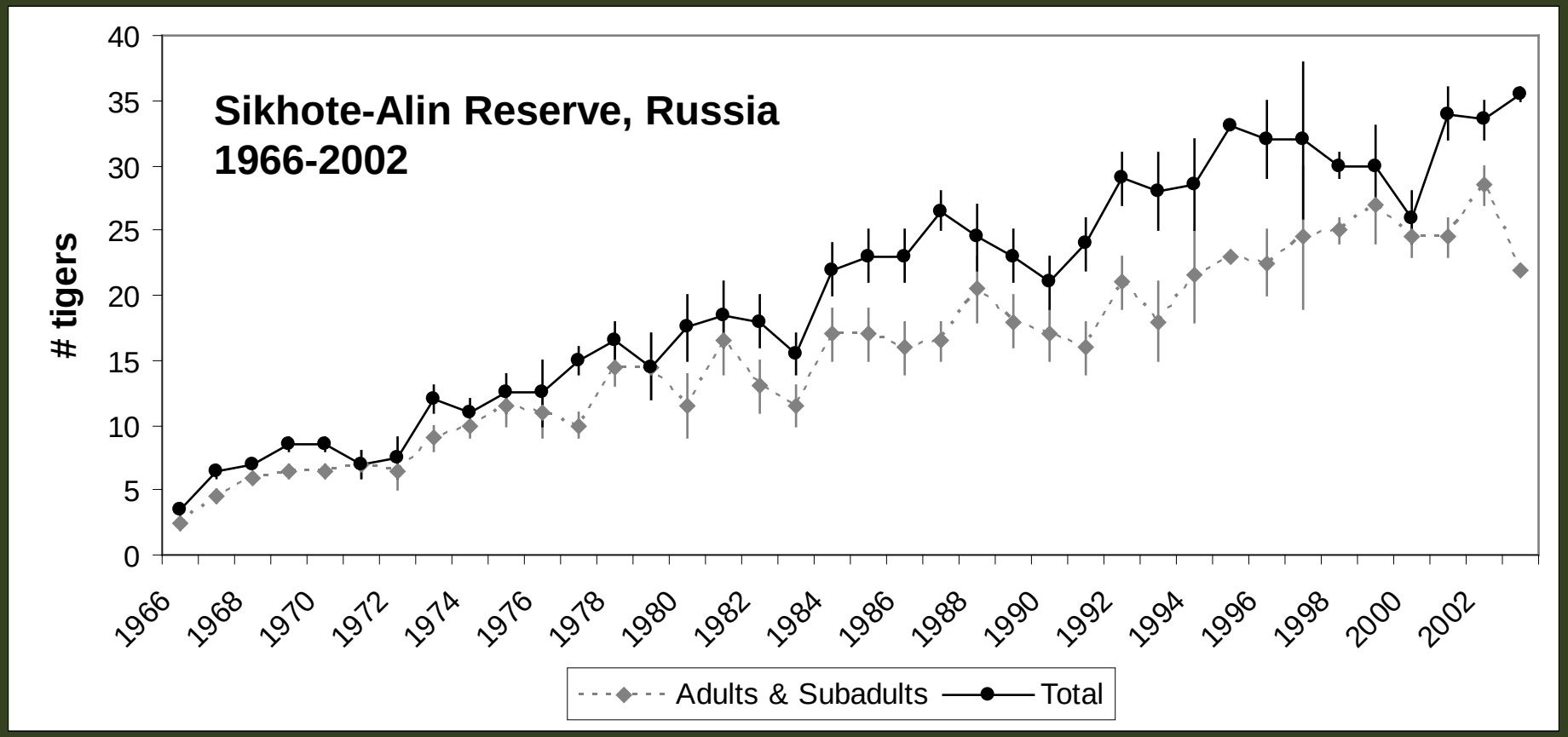
4. WCS agrees with WWF in the importance of producing tools for measuring and monitoring management effectiveness will work in a supporting role to assist.
5. **WCS will continue to work with GTI countries to use best practices in conducting biological and law enforcement monitoring.**

A note of caution: Patience and Perseverance!

Tiger populations will not always respond quickly to your interventions and monitoring – an example



Patience and Perseverance

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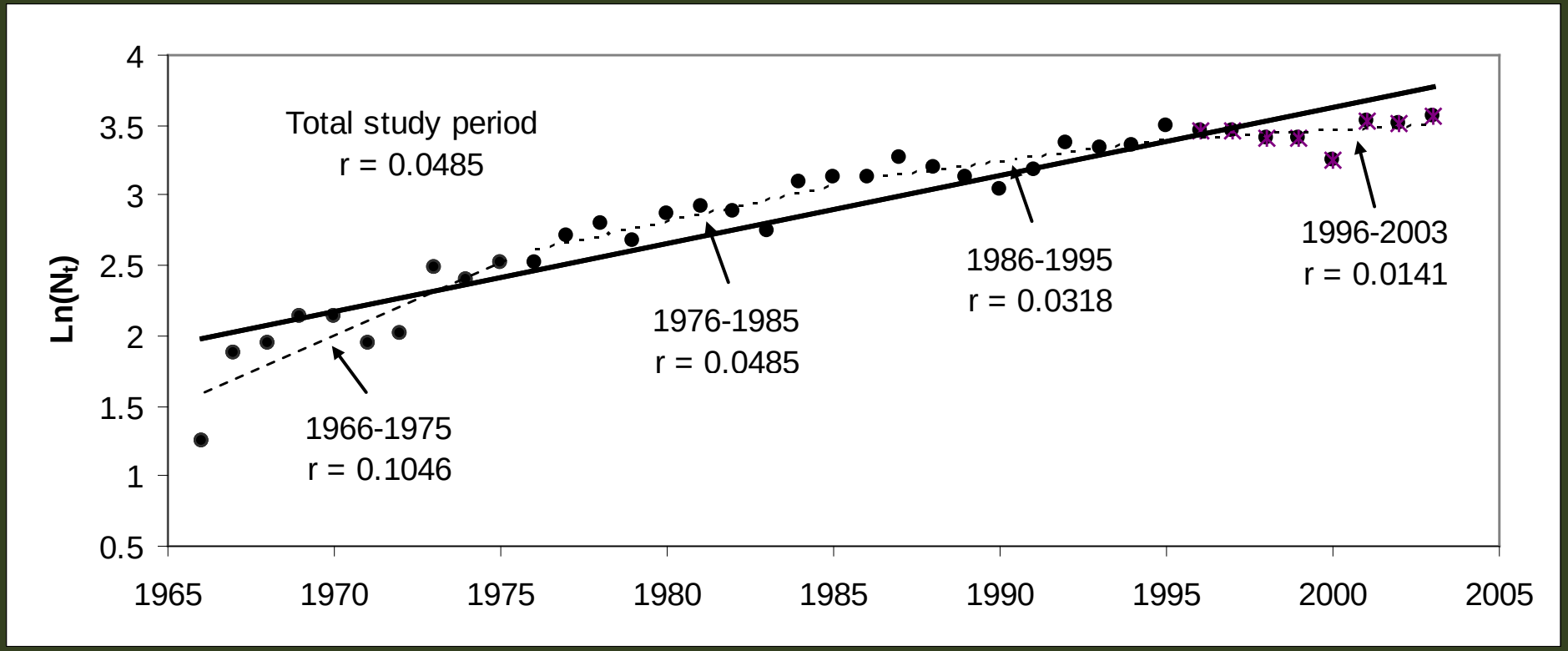


For the 38-year period, the observed rate of increase 4.85% per year.
At this growth rate, the total population size doubled once every 14 years.

2xT > 12 Years

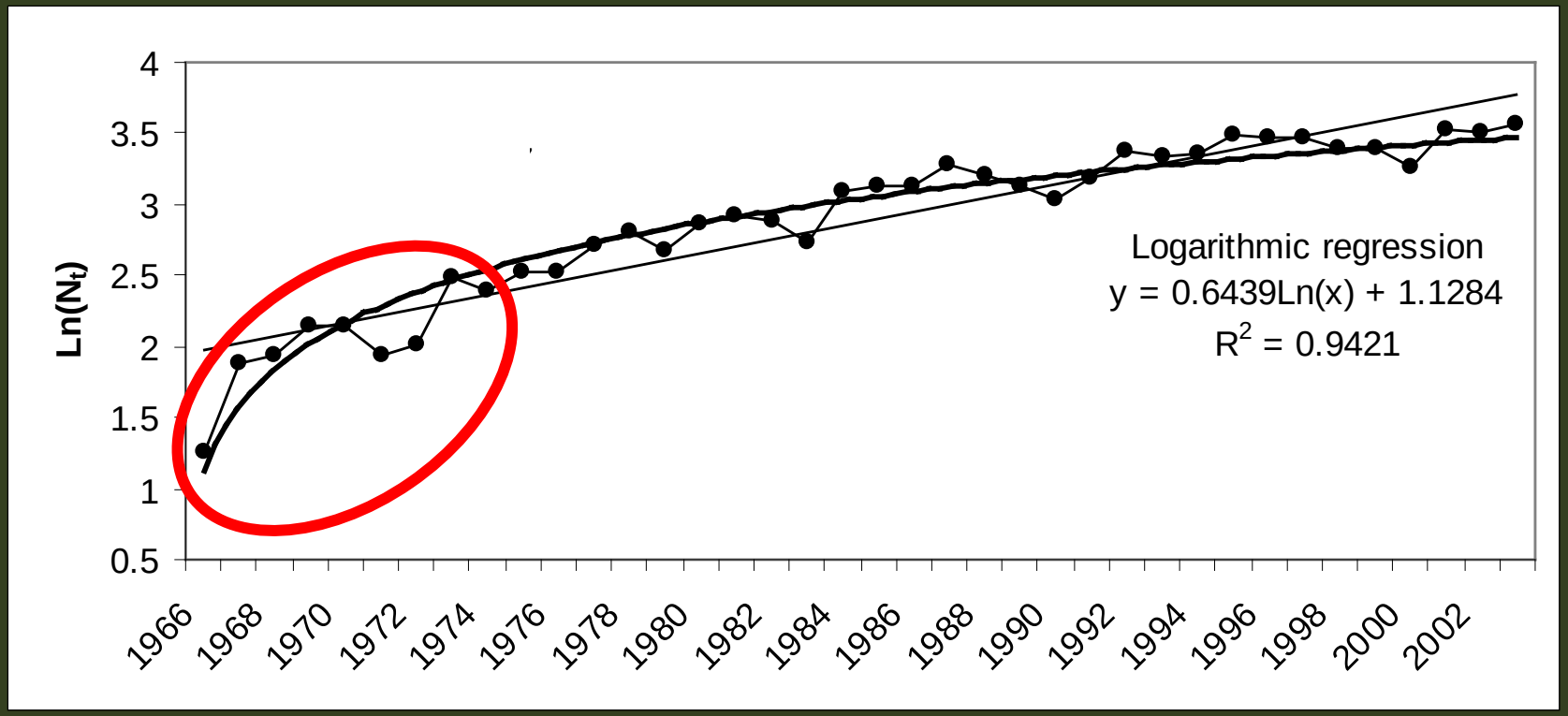
Population dynamics: Is Russia representative of tiger populations elsewhere?

Reproduction parameters	Nepal	Russia
Age at 1rst Reproduction (yr)	3.5	3.5-4.5
Interbirth Int		21.8
Cubs/litter (fi		2.4
Cubs/litter (1		1.3

34% difference

Patience and Perseverance

Doubling of tiger numbers in 12 years…..Is probably feasible in some landscapes, but only for populations low on the growth curve (and assuming prey near K).



Take-Home Messages

- Accountability is critical to the GTI process and for every country's tiger recovery efforts;
- Standardized methods exist that should be incorporated into each country's effort at the site and landscape scales;
- Measures of progress should include:
  - Statistically valid measures of tiger abundance
  - Statistically valid measures of prey abundance
  - Standardized measures of law enforcement effectiveness
  - Standardized measures of management effectiveness;
- We suggest organizing a technical workshop to discuss site-specific monitoring methods;
- Patience and Perseverance are key!


THANK YOU!
WILDLIFE
CONSERVATION
SOCIETY

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GLOBAL TIGER INITATIVE

- **TRCs plan to increase the effectiveness of tiger and habitat management, basing it on:**

  -The application of modern and innovative science, standards, and technologies;

  -Regular monitoring of tigers, their prey, and habitat;

  -Adaptive management practices; and

  -Building capacity of institutions involved in science and training and creating a platform for interactive knowledge exchange at all levels.