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14. ABSTRACT This workshop was motivated by global concerns of wildlife crime, including poaching, wildlife trafficking and associated environmental crime in countries around the world; these international problems are leading to the extinction of species and the destruction of ecosystems. The goal of this workshop was to bring together leading researchers from computational and social sciences, conservation biology as well as criminologists, who are focused on wildlife crime, as well as practitioners and other interested researchers. We expect such an interdisciplinary gathering to improve our understanding of wildlife crime, as well as provide shed light on how					
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Report Title

Final Report: Workshop on Wildlife Crime: An Interdisciplinary Perspective

ABSTRACT

This workshop was motivated by global concerns of wildlife crime, including poaching, wildlife trafficking and associated environmental crime in countries around the world; these international problems are leading to the extinction of species and the destruction of ecosystems. The goal of this workshop was to bring together leading researchers from computational and social sciences, conservation biology as well as criminologists, who are focused on wildlife crime, as well as practitioners and other interested researchers. We expect such an interdisciplinary gathering to improve our understanding of wildlife crime, as well as provide shed light on key challenges and interdisciplinary research opportunities in this area, with the ultimate aim of improving wildlife security. The workshop was held in Washington DC, July 1-2, 2014, at the Washington DC office of the University of Southern California.

Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

<u>Received</u>	<u>Paper</u>
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TOTAL:

Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

<u>Received</u>	<u>Paper</u>
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TOTAL:

Number of Papers published in non peer-reviewed journals:

(c) Presentations

Number of Presentations: 0.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

TOTAL:

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

(d) Manuscripts

Received Paper

TOTAL:

Number of Manuscripts:

Books

Received Book

TOTAL:

Received Book Chapter

TOTAL:

Patents Submitted

Patents Awarded

Awards

Graduate Students

NAME

PERCENT SUPPORTED

FTE Equivalent:

Total Number:

Names of Post Doctorates

NAME

PERCENT SUPPORTED

FTE Equivalent:

Total Number:

Names of Faculty Supported

<u>NAME</u>	<u>PERCENT SUPPORTED</u>	National Academy Member
Milind Tambe	0.00	
FTE Equivalent:	0.00	
Total Number:	1	

Names of Under Graduate students supported

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: 0.00

The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00

Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00

Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense 0.00

The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields:..... 0.00

Names of Personnel receiving masters degrees

<u>NAME</u>
Total Number:

Names of personnel receiving PHDs

<u>NAME</u>
Total Number:

Names of other research staff

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Sub Contractors (DD882)

Inventions (DD882)

Scientific Progress

Combating wildlife crime is a critical environmental issue that demands a swift and intelligent response. Tigers, along with many other endangered species, are in danger of extinction from poaching. The global population of tigers has dropped over 95% from the start of the 1900s. Over the course of 2011, South African rhino poaching reached a rate of approximately one death every 20 hours, and that rate increased in 2012. Species extinction can destroy ecosystems and weaken the communities and economies that depend on those ecosystems. Indeed, wildlife crime, including poaching, wildlife trafficking and associated environmental crime is an international challenge, threatening countries around the world. Understanding this challenge and providing potential solutions to help wildlife crime enforcement, requires an interdisciplinary perspective.

To take steps towards addressing this challenge, we held a cross-disciplinary workshop at the Washington DC offices of the University of Southern California on July 1-2, 2014 concentrating on an interdisciplinary perspective on wildlife crime. The purpose of this workshop was to bring together leading researchers from both computational and social sciences with expertise in domains relevant to wildlife crime, as well as conservation biologists and criminologists focused on wildlife crime. The workshop also brought together key practitioners. Our goal was to encourage the development of synergistic theory and methods that go beyond what individual disciplines currently apply.

In this regard, the workshop focused on a range of questions including but not limited to:

- 1> What are three of the top barriers facing effective resolution of wildlife crime? What do we anticipate the top 3 barriers being 5 years from now?
- 2> Is there a geographic region of the world that would benefit most from and be receptive to interdisciplinary approaches for resolving wildlife crime?
- 3> How can the academy play a more substantial role in helping to resolve wildlife crimes?
- 4> How can open-source software streamline data management and analysis in protected areas?
- 5> How important is the modifiable areal unit problem (MAUP) to spatial analysis of wildlife crime incidents and simulations of agent behavior? Do higher resolution models produce better predictions? Can high resolution data collection be done more efficiently with remote sensors?
- 6> What is the interdisciplinary language of wildlife crime? Can common terminology be agreed upon to facilitate a more uniform approach to the scientific study of this phenomenon?
- 7> What computational techniques are useful for modeling and analysis of wildlife crime? What role does agent-based modeling and computational and behavioral game theory play in this context?
- 8> What are some research challenges in constructing such computational models? How do we validate these computational models?

This is just a sampling of the types of questions that were of interest.

Workshop Format

The 2-day workshop was held July 1-2, in Washington DC, at the Washington DC offices of the University of Southern California (USC). Staff support was provided by USC. There were 35 participants. The list of participants included:

The workshop speakers, schedule and agenda included the following:

Workshop on Wildlife Crime: An Interdisciplinary Perspective

Dates: July 1-2, 2014

Location: at the office of the University of Southern California, 701 Pennsylvania Avenue, N.W., Suite 540, Washington, DC 20004

Website: http://teamcore.usc.edu/people/thanhng/Workshop/WildLife_Workshop.html

The panels listed are related to the preceding presentations, and may include more than just the presenters.

Day 1: July 1

- 8:30 AM: Workshop check in, coffee, breakfast
- 9:10 AM: Brief introductions; overview remarks to scope the workshop and frame big-picture questions

Theme: Law enforcement in the field, SMART Patrols

Session chair: Mahendra Shrestha

- 9:30 to 10:15 AM: Presentations I: Three presentations, no questions:

Speakers:

- Mahendra Shrestha, Smithsonian Conservation Biology Institute (10 to 12 minutes)
- Rob Pickles, Panthera (10 to 12 minutes)
- Anak Pattanavibool, Kasetsart University and Wildlife Conservation Society (20 minutes)
- 10:15 to 10:45 AM: Panel I: Presenters from Presentation I + Barney Long
- 10:45 to 11:05 AM: Break

Theme: Wildlife traffic and trade, US Policy

Session chair: Jessica M. Graham

- 11:05 to 11:50 AM: Presentations II: Four 10-12 minute presentations, no questions:
 - o Crawford Allan, TRAFFIC North America
 - o Peter Clyne, Wildlife Conservation Society
 - o Bill Magrath, World Bank
 - o Jessica Graham, US Department of State
- 11:50 AM to 12:20 PM: Panel II: Presenters from Presentation II +
- 12:20 PM: Lunch

Theme: Artificial Intelligence in Patrols and Wildlife Protection, UAVs

Session chair: Bo An

- 1:30 PM to 2:15 PM: Presentation III: Four 10-12 minute presentations, no questions:
 - o Milind Tambe, University of Southern California
 - o Chris Kiekintveld, University of Texas at El Paso
 - o Carla Gomes/Bart Selman, Cornell University
 - o VS Subrahmanian, University of Maryland
- 2:15 to 2:45 PM: Panel III: Presenters from Presentation III +
- 2:45 to 3:15 PM: Break

Theme: Intelligence-led policing, Wildlife crime, Technology

Session Chair: Andrew Lemieux

- 3:15 to 4:00 PM: Presentation IV: Three 10-12 minute presentations
 - o Andrew Lemieux, NSCR, The Netherlands
 - o Will Moreto, University of Central California
 - o Stephen Lee, U.S Army Research Office
 - o Gary Roloff: Michigan State University
- 4:00 to 4:30 PM: Panel IV: Presenters from Presentation IV +
- 4:30 to 5:30 PM: Open discussion
- 6:00 PM: Dinner*

Day 2: July 2

Theme: Poaching motivation, Modeling and Mapping

Session chair: Meredith Gore

- 8:30 AM: Coffee+breakfast
- 9:00 to 9:45 AM: Presentation V: Three 10-12 minute presentations
 - Meredith Gore, Michigan State University
 - Julie Viollaz, CUNY John Jay College of Criminal Justice
 - William Casebeer, DARPA
 - Liz Bennett, Wildlife Conservation Society
- 9:45 to 10:25 AM: Panel V: Presenters from Presentation V + Nicole Sintov
- 10:40 AM: Coffee + Breakout groups
- 12:15 PM: Breakout group reports over lunch?
- 1:00 PM: What is the way forward? Action items?

Conference on "Conservation, Computation, Criminology" C^3?

Technology Transfer