Exploring environmental DNA for Barcoding Analysis of Sumatran Rhino in Way Kambas National Park

Priyambodo[1], Elly L. Rustiati[1], Yeyen Kurniawati[1], Chicka R. Putri[1], Danisworo Zulkarnain[1], Zulfi Arsan[2], Giyono[2], Aprilia Eva Widiawati[2], Sukatmoko[3], and Eko A. Srihanto[4]

[1] Biology Department, FMNS, Universitas Lampung,
[2]Sumatran Rhino Sanctuary, Way Kambas National Park,
[3]Way Kambas National Park,
[4]Lampung Veterinary Invertigation Center,

Introduction: Rhinos in the world

Ceratotherium simum

Estimated Population:
~18,000
DECREASING

IUCN Status:
NEAR THREATENED

Rhinoceros unicornis

Estimated Population:
>3,600
INCREASING

IUCN Status:
VULNERABLE

Diceros bicornis

Estimated Population:
~5,630
INCREASING

IUCN Status:
CRITICALLY ENDANGERED

Rhinoceros sondaicus

Estimated Population:
74
STABLE

IUCN Status:
CRITICALLY ENDANGERED

Dicerorhinus sumatrensis

Estimated Population:
<80
DECREASING

IUCN Status:
CRITICALLY ENDANGERED

www.rhinos.org

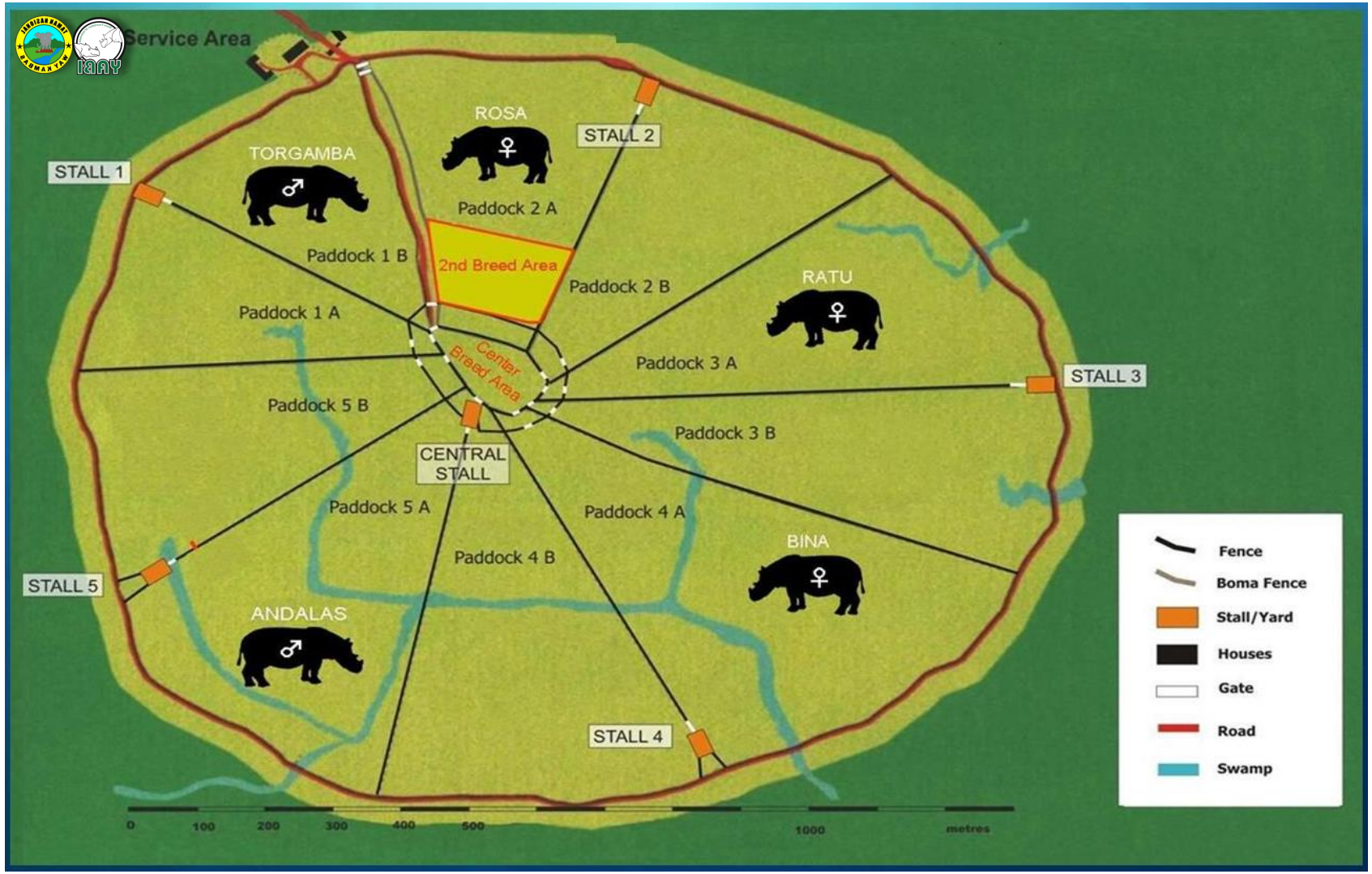
Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

Introduction:
SRS Way Kambas Nat. Park and the 7 sumatran rhinos

Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

2nd ULICoSTE 2021
UNIVERSITAS LAMPUNG INTERNATIONAL CONFERENCE ON SCIENCE, TECHNOLOGY AND ENVIRONMENT

Introduction:
SRS Paddock System



https://news.mongabay.com/2019/12/sumatran-rhino-captive-breeding-indonesia-way-kambas-srs/

Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

Introduction
Rhino's behavior: wallowing

The sumatran rhino (*Dicerorhinus sumatrensis*) spends a large part of its day wallowing. When mud holes are unavailable, the rhino will deepen puddles with its feet and horns. One 20-month study of wallowing behaviour found they will visit no more than three wallows at any given time. After two to 12 weeks using a particular wallow, the rhino will abandon it. Typically, the rhino will wallow around midday for two to three hours at a time before foraging for food.

Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

Introduction:
Rhino's wallow → source of eDNA

The Sumatran rhinoceros puddle is one of the sources of environmental genetic material left behind. Hoogerwerf (1970) stated that the puddle not only serves to wallow, but also serves as a place to drink and urinate.

Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

Introduction
Types of Rhino's puddle/wallow

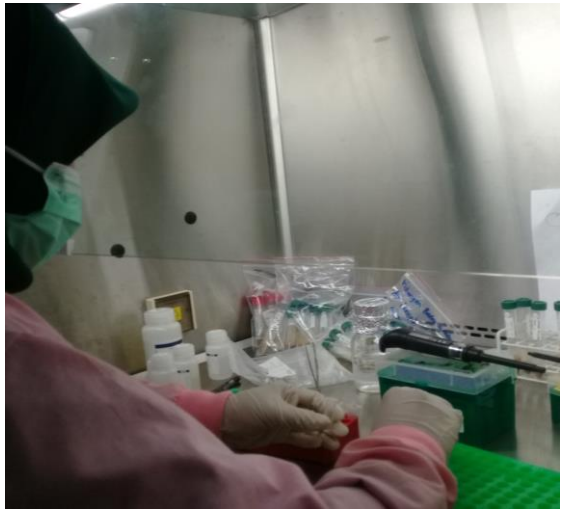
Active Puddle

Abandoned/inactive Puddle

Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

Introduction: Materials and Methods

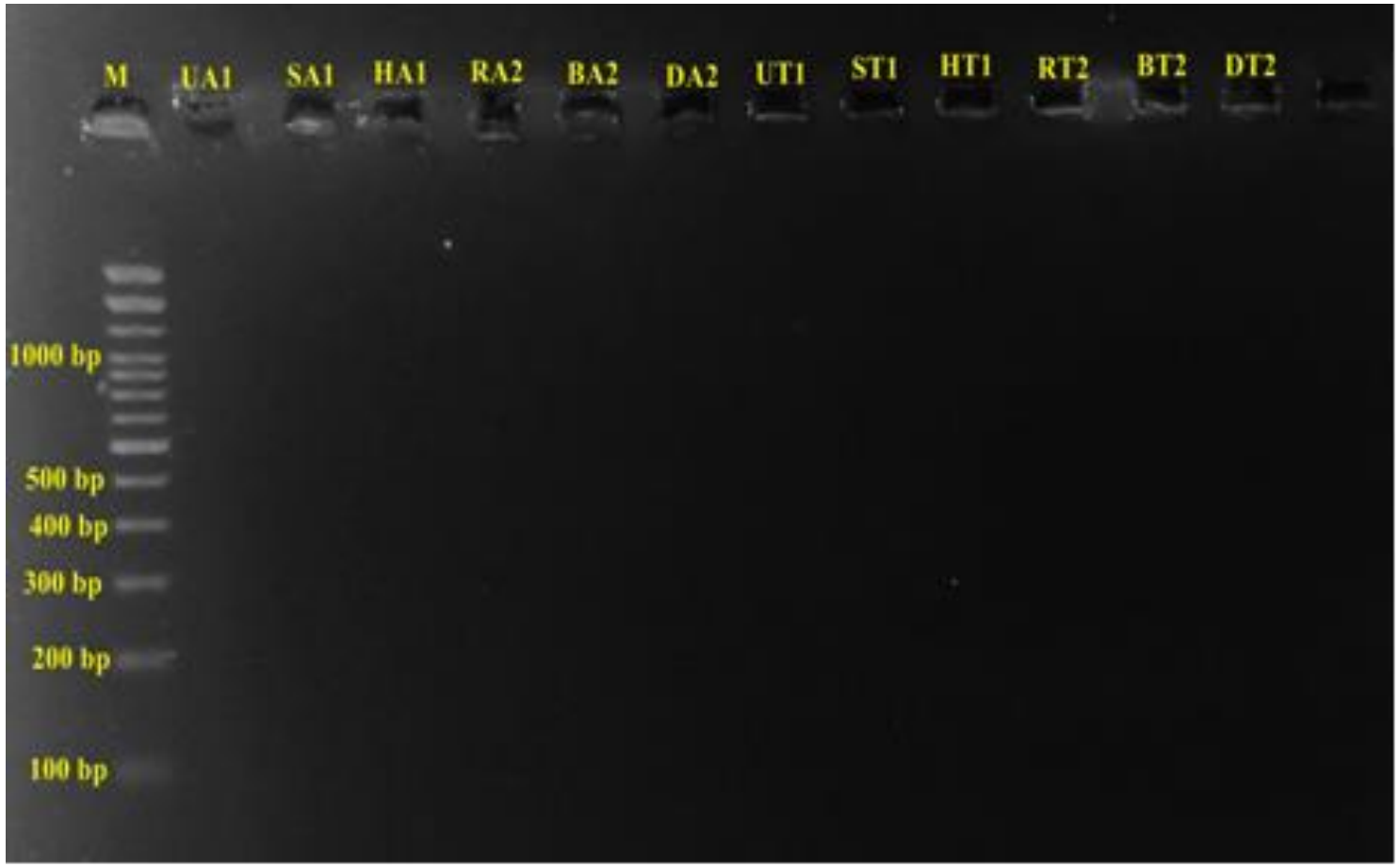
- Collecting the source of eDNA from the puddle/wallow of sumatran rhinos



- DNA extraction
- DNA amplification
- Qualitative test of extracted DNA

Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

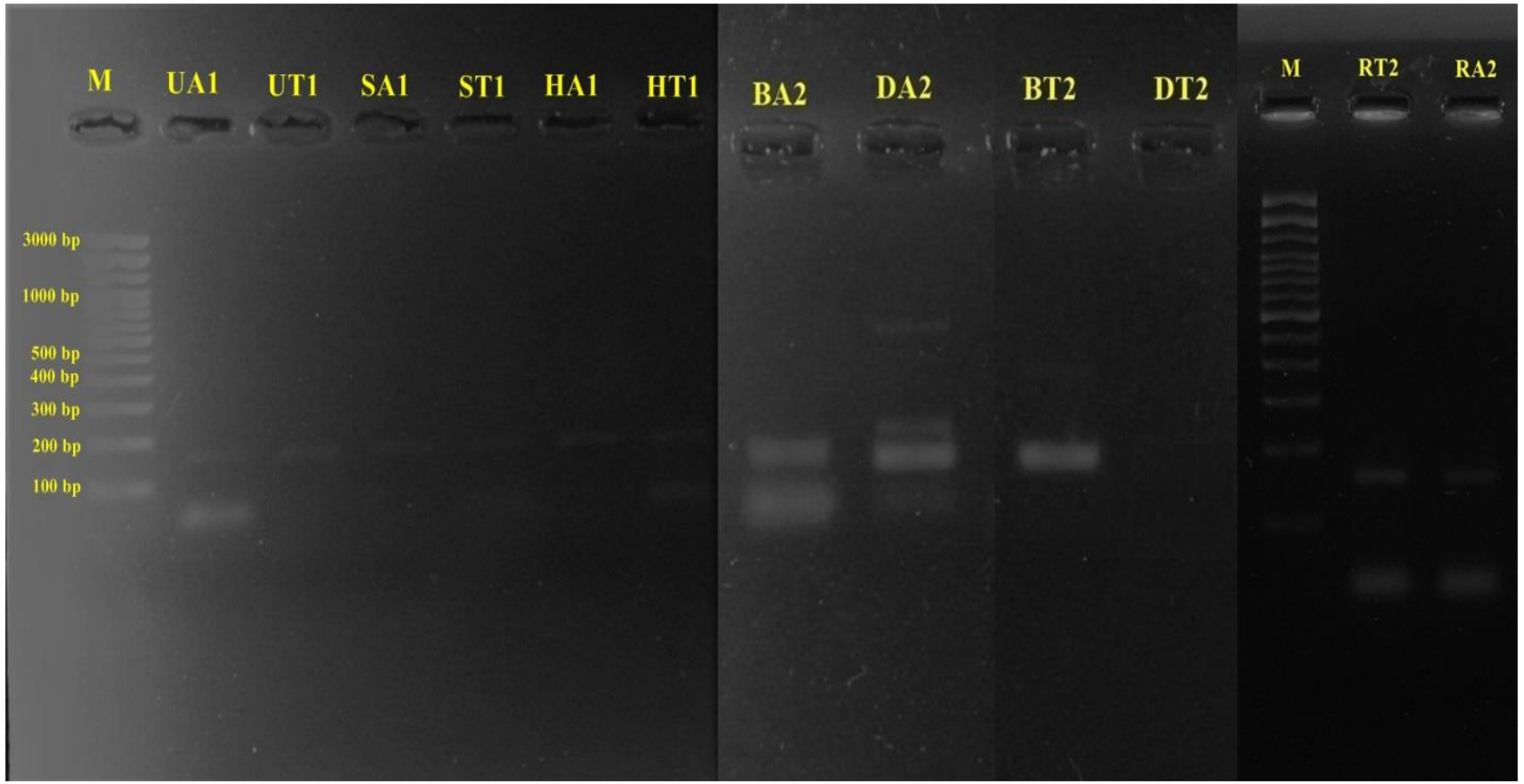
Results and Discussion



No DNA band showed on digidoc visualization from raw extracted DNA samples.

Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

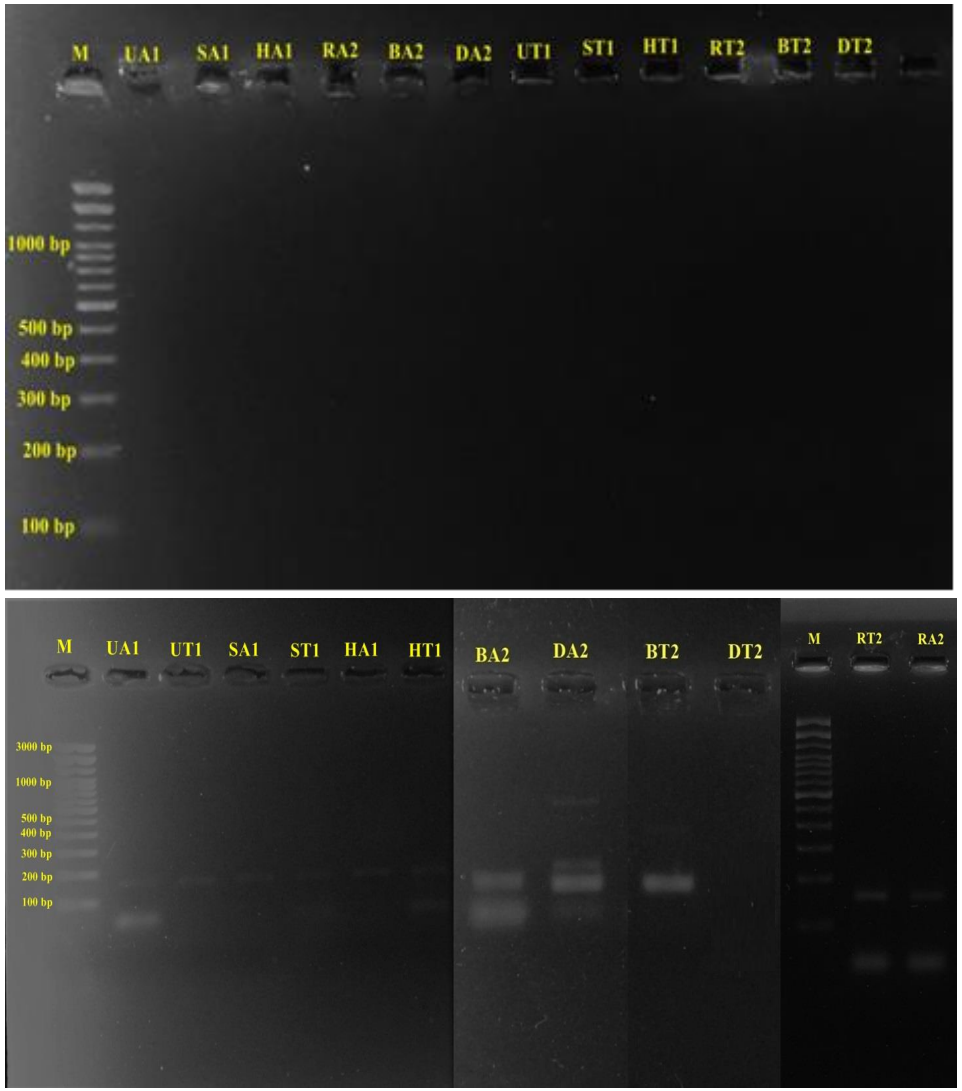
Results and Discussion



Visualization results of 12 samples individual sumatran rhinoceros showed 11 positive samples and 1 negative sample (DT2 sample).

Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

Results and Discussion



- Rhino's puddle containing a small number of eDNA source
- eDNA extraction was carried out to determine the presence of genetic material left in rhino puddles Sumatra in SRS
- Of the 12 DNA extracted from the puddles of the Sumatran rhinoceros in SRS, TNWK showed 11 samples were suitable for testing further steps such as the DNA sequencing stage, so that this research can support molecular-based conservation efforts.

Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

Conclusion

- Although it contains only a few genetic sources from the Sumatran rhinoceros, eDNA studies from wallows can be optimized as a non-invasive method of sampling for genetic analysis.
- The DNA amplification stage is very necessary as a test to confirm the success of DNA extraction from genetic sources from Sumatran rhinoceros puddles.

Priyambodo, et al.
Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia
priyambodo@fmipa.unila.ac.id

Acknowledgement

The Institute of Research and Community Service
Universitas Lampung

Way Kambas National Park

Yayasan Badak Indonesia

Lampung Veterinary Investigation Center

TAMAN NASIONAL
WAY KAMBAS
YABI
Thank you...
UNIVERSITAS LAMPUNG
2021
2nd ULICoSTE