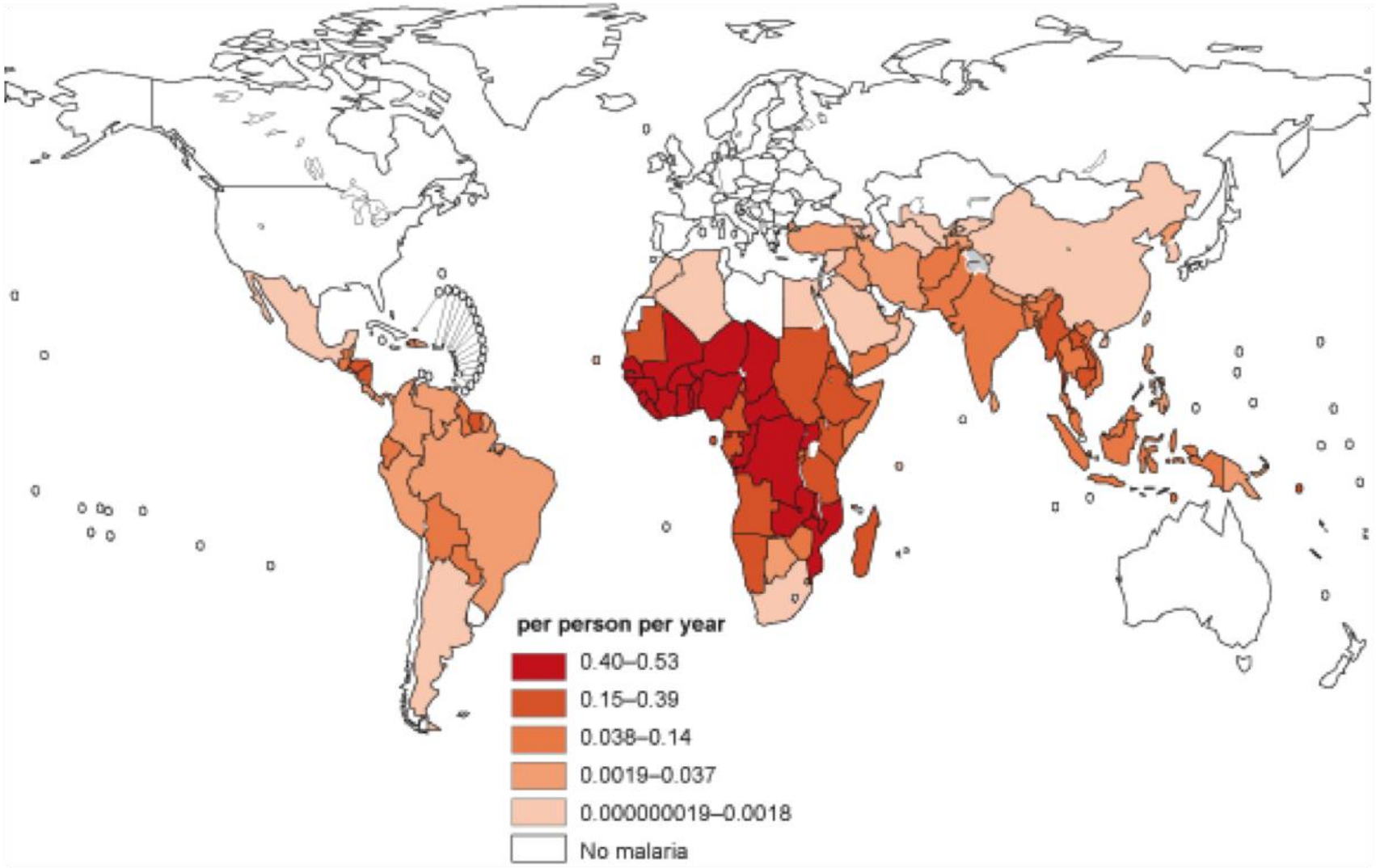
Impacts of Tropical Deforestation and Fragmentation on Mosquito Community Dynamics

Hayley Brant, Robert Ewers, Indra Vythilingam, Chris Drakeley, Suzan Benedick & John Mumford

Imperial College London

NATURAL ENVIRONMENT RESEARCH COUNCIL

Malaria

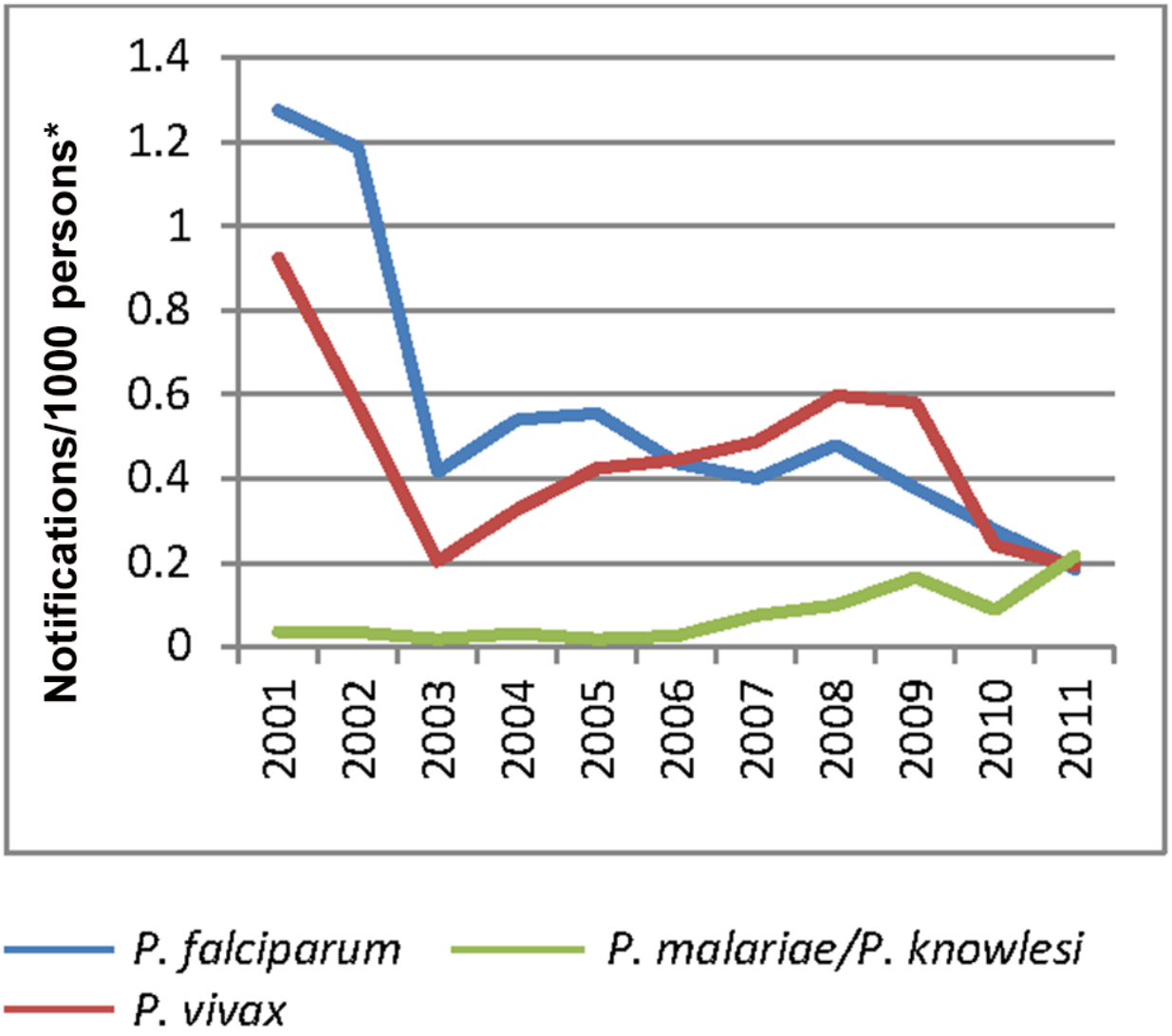


WHO 2011

Malaria

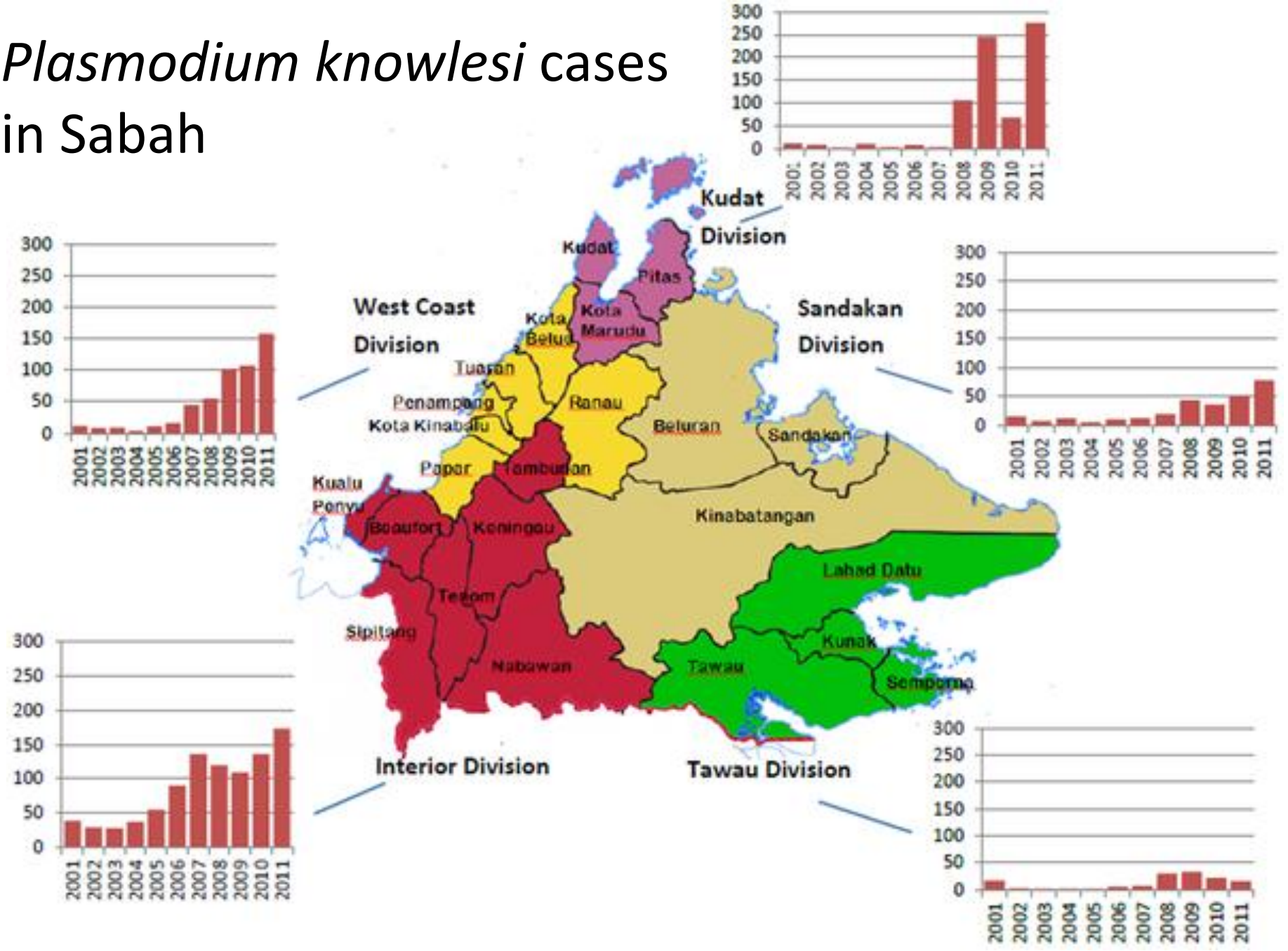
- Five malaria parasites
  - *Plasmodium falciparum*
  - *Plasmodium vivax*
  - *Plasmodium malariae*
  - *Plasmodium ovale*
  - *Plasmodium knowlesi*
- Spread by female *Anopheles* mosquitoes

Malaria Cases in Sabah



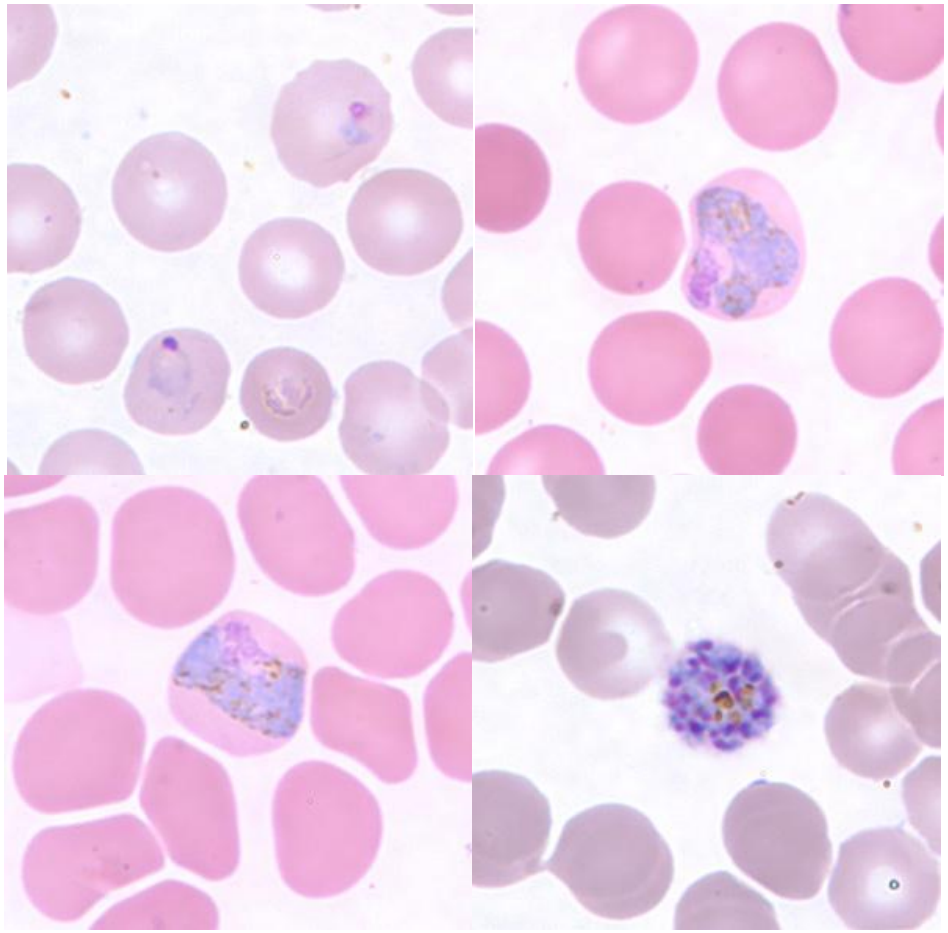
William *et al.* 2013

Plasmodium knowlesi cases in Sabah



William *et al.* 2013

Land Use Change



Different stages of *Plasmodium vivax* (CDC 2013)

- Land use and land cover changes modify temperature and relative humidity, which can affect mosquito survival, density and distribution
- To date, only one study on mosquito abundance in an oil palm plantation within South-east Asia

Research Question

- What is the effect of land use change on:
  - Abundance
  - Community composition
  - Biting times

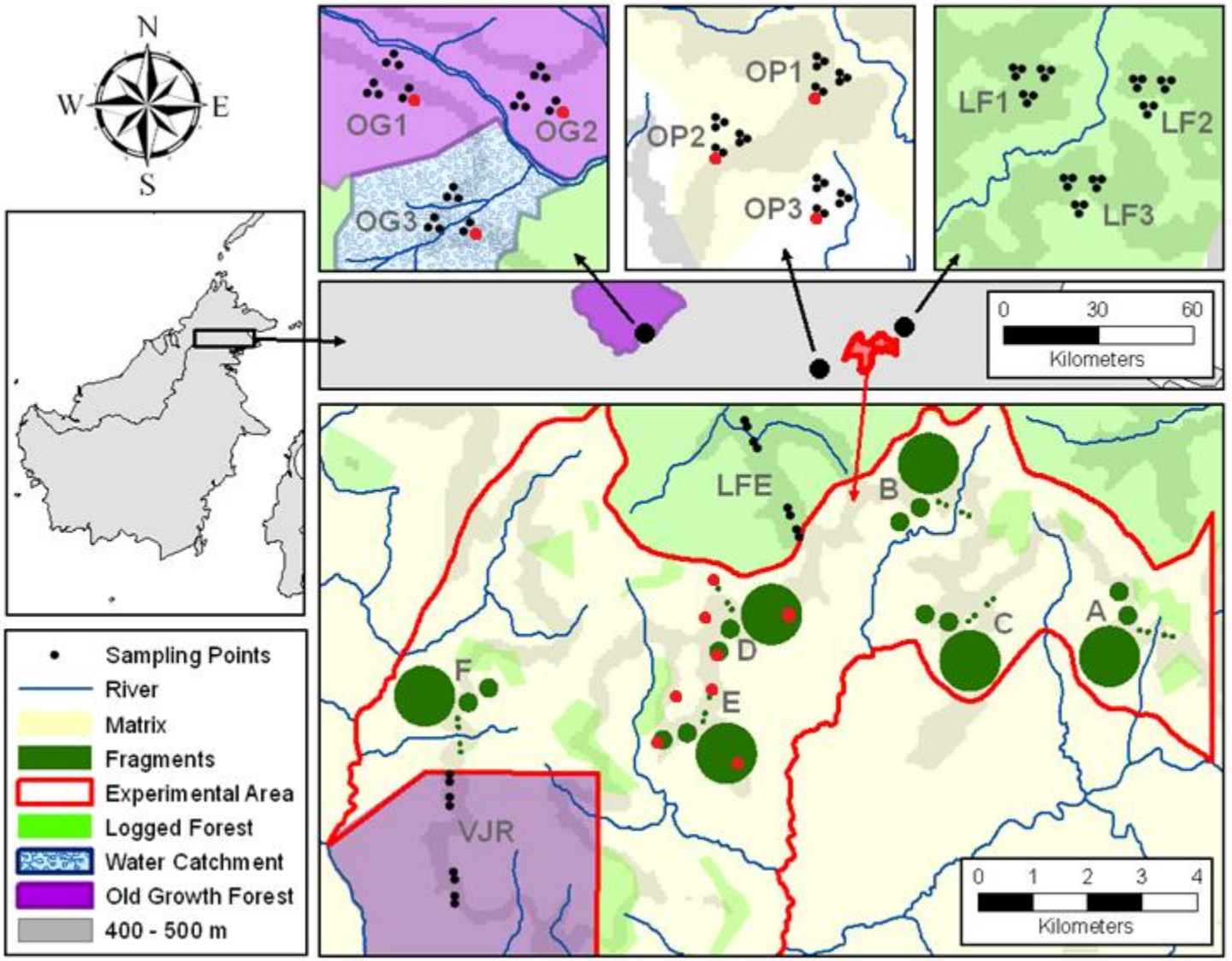
  of mosquitoes in Sabah, Malaysia

Old growth forest

Logged forest

Oil palm plantation

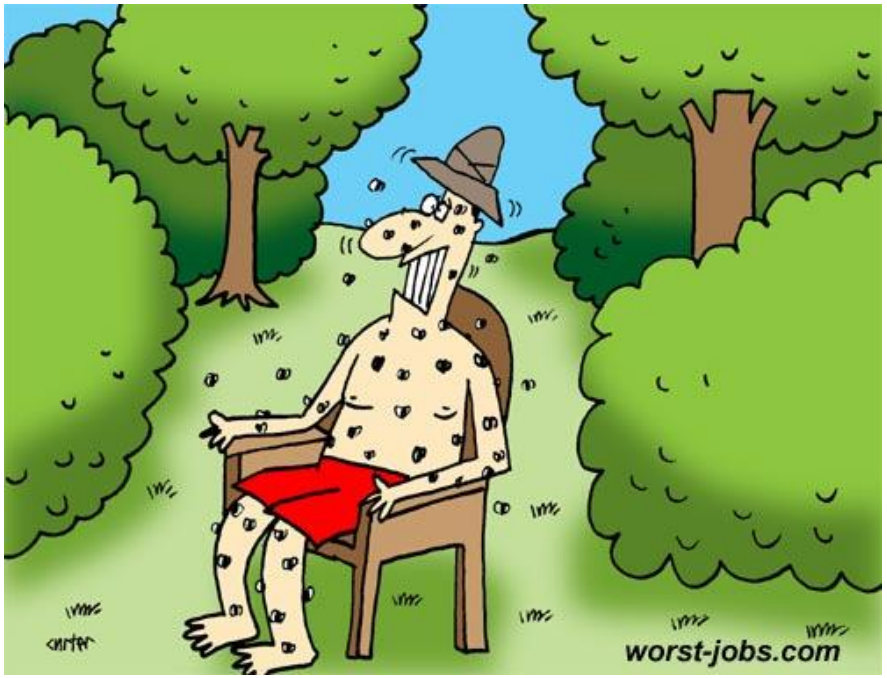
Field site (S.A.F.E. Project)



Ewers *et al.* 2011

Bare leg catches

- Human landing catches (5-11pm)
- 92 night collections within oil palm plantations, old growth forest and logged forest
- To collect anthropogenic crepuscular mosquitoes
- Red torch light to seek out mosquitoes

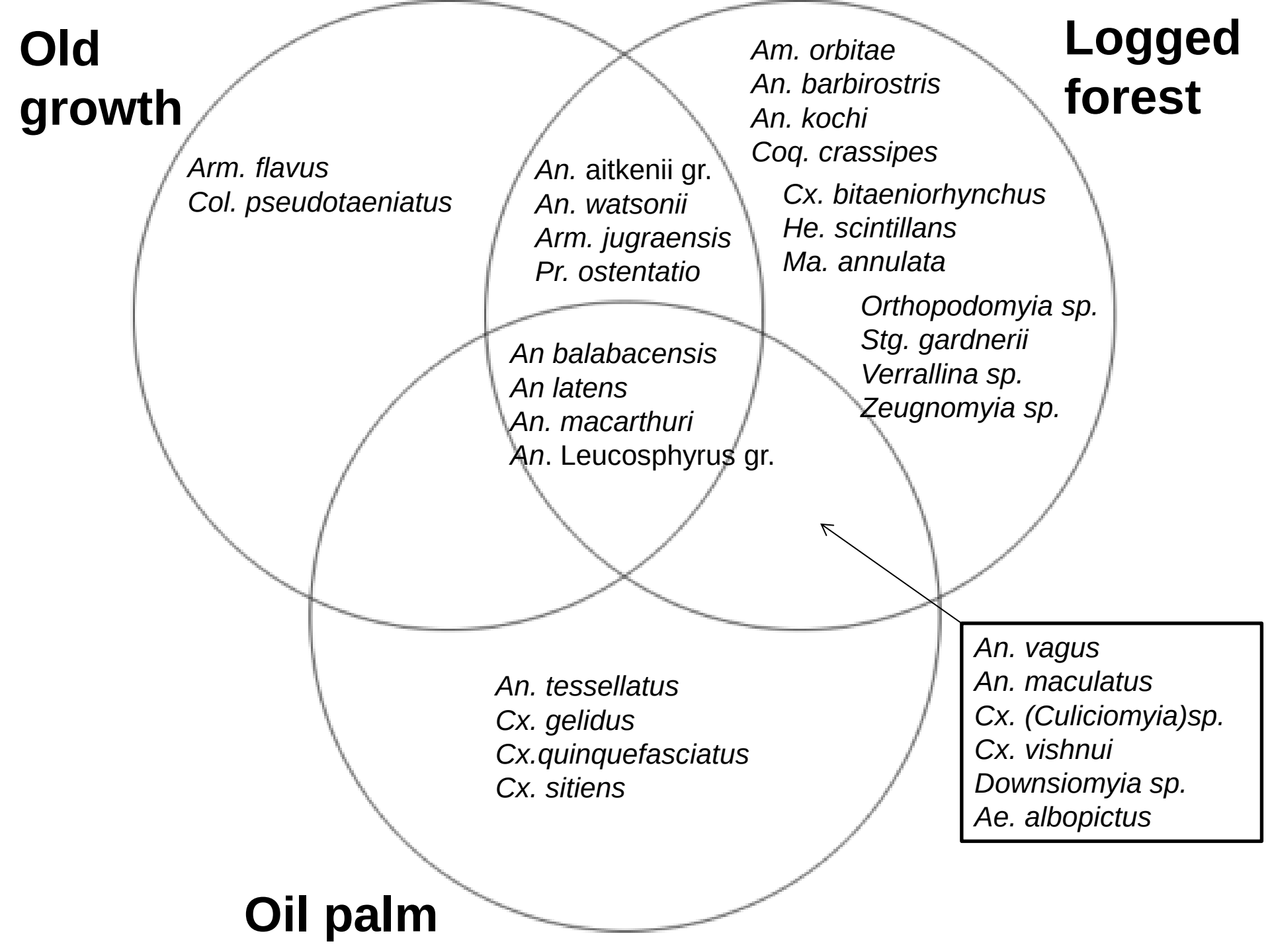


Species collected

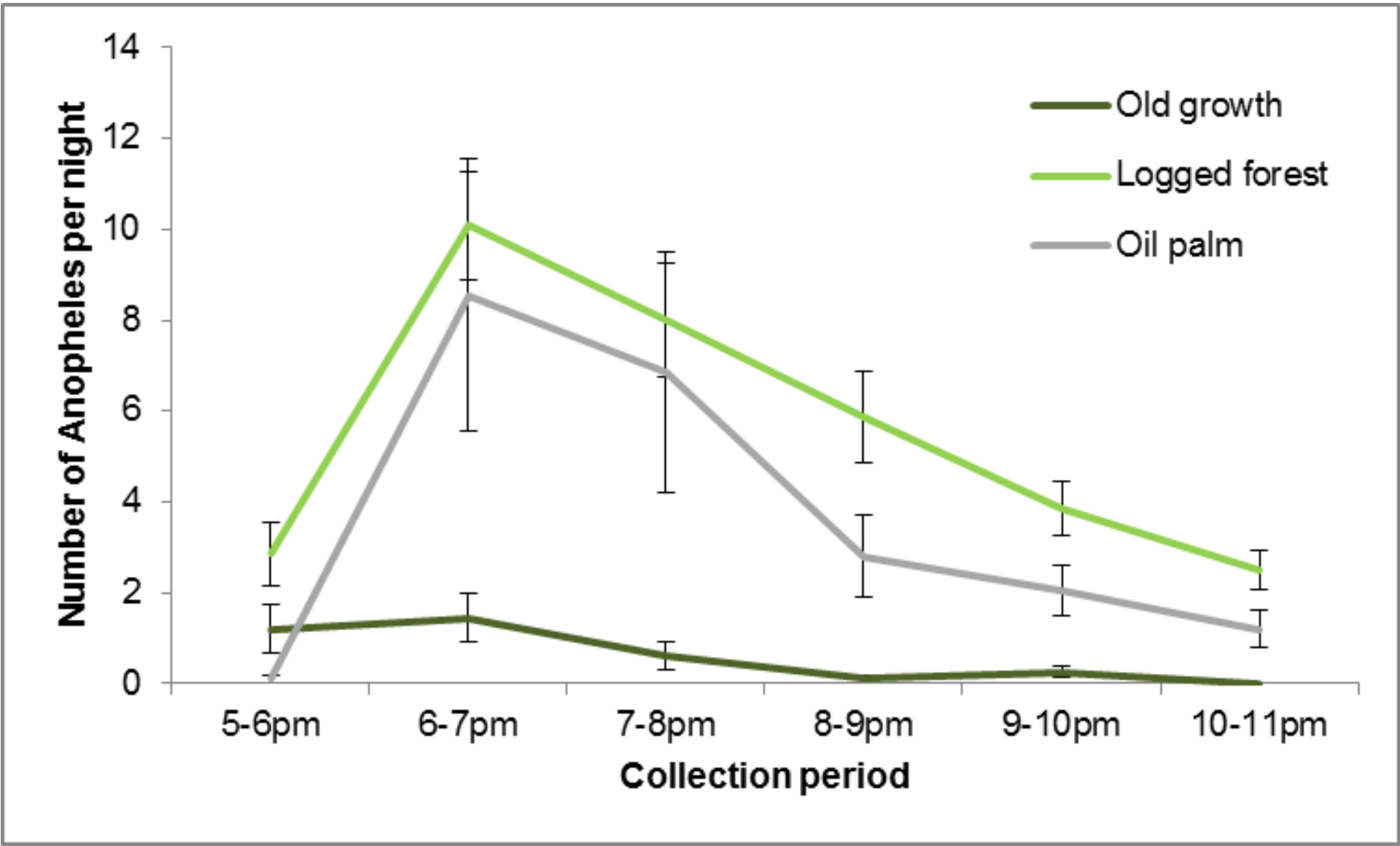
- 2245 mosquitoes collected
- Old growth= 11 species
  - 7 *Anopheles* species (83% of catch)
  - 4 Culicine species
- Secondary forest= 31 species
  - 11 *Anopheles* species (99% of catch)
  - 20 Culicine species
- Oil palm= 16 species
  - 8 *Anopheles* species (86% of catch)
  - 8 Culicine species

Species collected

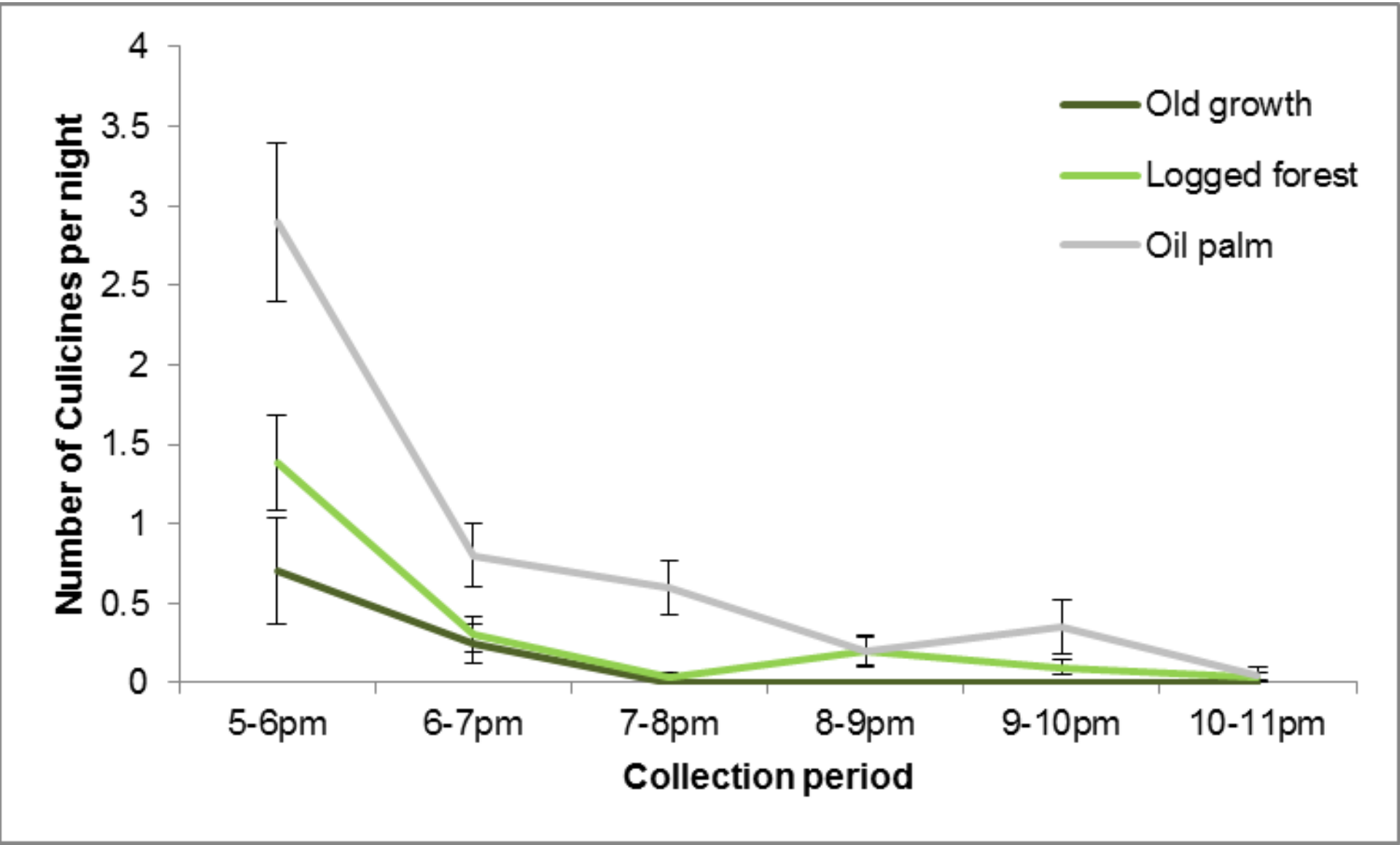
	Old growth		Logged		Oil palm	
Species	Number	%	Number	%	Number	%
An. balabacensis	13	18.1%	1272	76%	356	71.3%
An. Leucosphyrus group	6	8.3%	152	9.1%	9	1.8%
An. aitkenii	5	6.9%	70	4.2%	0	0.0%
An. macarthuri	1	1.4%	45	2.7%	26	5.2%
An. maculatus	0	0.0%	7	0.4%	25	5.0%
An. latens	32	44.4%	28	1.7%	2	0.4%
Ae. albopictus	0	0.0%	6	0.4%	46	9.2%
Cx. quinquefasciatus	0	0.0%	0	0.0%	12	2.4%
Arm.jugraneus	4	5.6%	5	0.3%	0	0.0%


Old growth
Logged forest
Oil palm
Arm. flavus
Col. pseudotaeniatus
An. aitkenii gr.
An. watsonii
Arm. jugraensis
Pr. ostentatio
Am. orbitae
An. barbirostris
An. kochi
Coq. crassipes
Cx. bitaeniorhynchus
He. scintillans
Ma. annulata
Orthopodomyia sp.
Stg. gardnerii
Verrallina sp.
Zeugnomyia sp.
An balabacensis
An latens
An. macarthuri
An. Leucosphyrus gr.
An. tessellatus
Cx. gelidus
Cx.quinquefasciatus
Cx. sitiens
An. vagus
An. maculatus
Cx. (Culiciomyia)sp.
Cx. vishnui
Downsiomyia sp.
Ae. albopictus

Biting times (*Anopheles*)



Biting times (Culicines)



Conclusions

- Large number of mosquitoes in logged forest & oil palm
- Each area has a different community composition
- Peak biting time 6-8pm for *Anopheles* in logged forest & oil palm
- *Anopheles* from the Leucosphyrus group were present in all areas

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hayley.brant10@ic.ac.uk