



Assessing the impacts of gold mining to bird communities in the Peruvian Amazon

Evaluando los impactos de la minería de oro en las comunidades de aves en la Amazonía Peruana

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The Amazon - *Amazonía*

Unresolved biodiversity losses

Pérdida de biodiversidad no resueltas

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PATTERNS AND MAGNITUDE OF TEMPORAL CHANGE IN AVIAN COMMUNITIES IN THE ECUADORIAN ANDES

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RESEARCH ARTICLE | ECOLOGY



Long-term monitoring reveals widespread and severe declines of understory birds in a protected Neotropical forest

Henry S. Pollock , Judith D. Toms , Corey E. Tarwater , and Jeffrey D. Brawn [Authors Info & Affiliations](#)

April 4, 2022 | 119 (16) e2108731119 | <https://doi.org/10.1073/pnas.2108731119>

2011

2015

2020

2022

2024



Enigmatic declines in bird numbers in lowland forest of eastern Ecuador may be a consequence of climate change

John G. Blake^{a,*} and Bette A. Loiselle^b



Contents lists available at [ScienceDirect](#)

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

Special Issue Article: Tropical Insectivores

Ongoing changes in the avifauna of La Selva Biological Station, Costa Rica: Twenty-three years of Christmas Bird Counts

W. Alice Boyle^{a,*}, Bryan J. Sigel^b



LETTER

ECOLOGY LETTERS

Ecology Letters, (2020)

doi: 10.1111/ele.13628

Long-term change in the avifauna of undisturbed Amazonian rainforest: ground-foraging birds disappear and the baseline shifts



Contents lists available at [ScienceDirect](#)

Global Ecology and Conservation

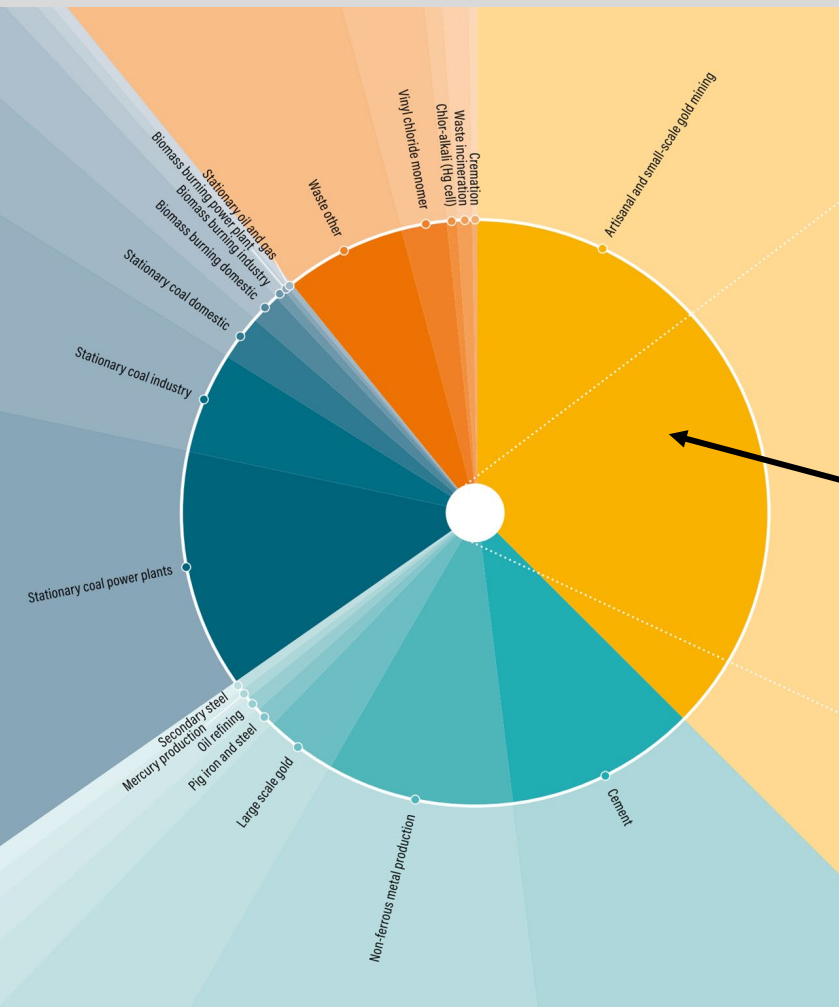
journal homepage: www.elsevier.com/locate/gecco

Sharp declines in observation and capture rates of Amazon birds in absence of human disturbance

John G. Blake^{a,b,*}, Bette A. Loiselle^{b,c}

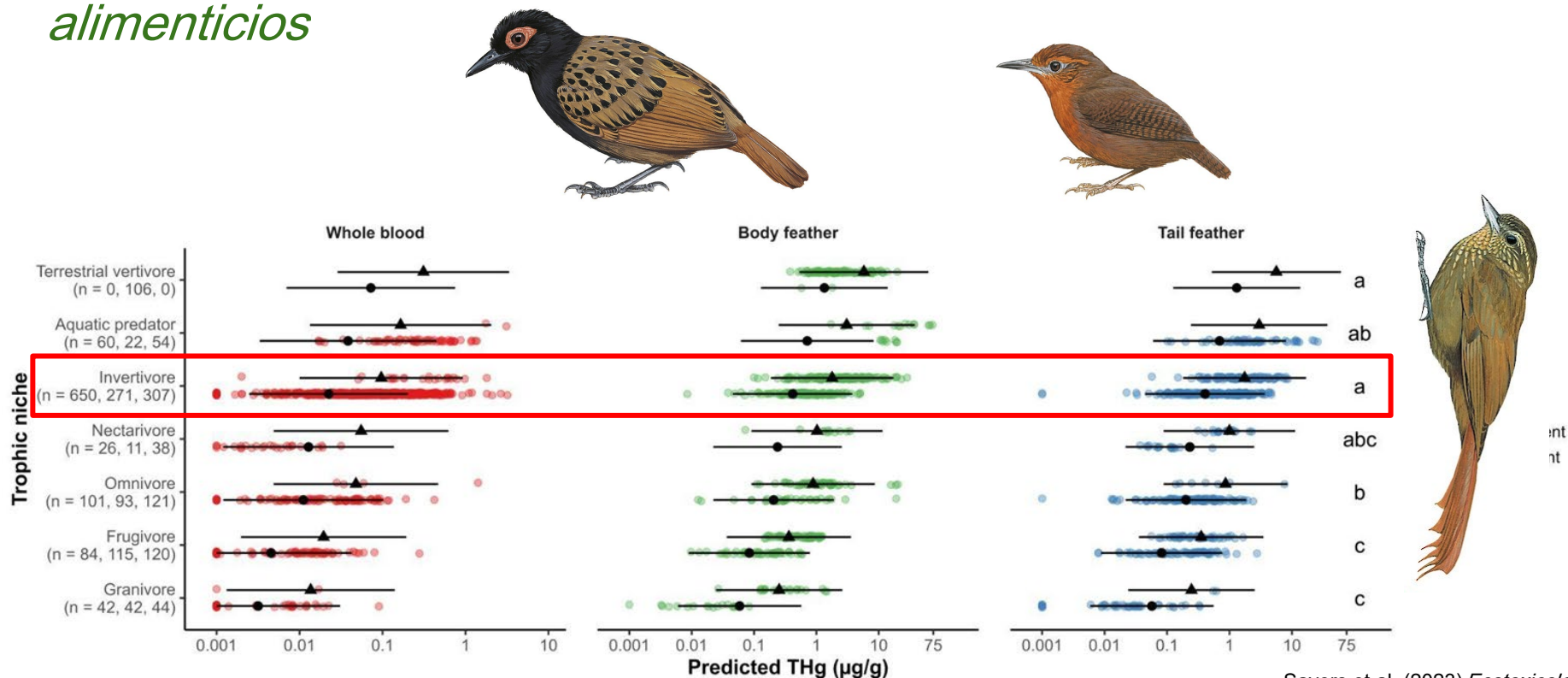


Artisanal & Small-scale Gold Mining (ASGM) - *Minería de oro artesanal (MAPE)*



Gold mining increases avian Hg exposure across trophic niches

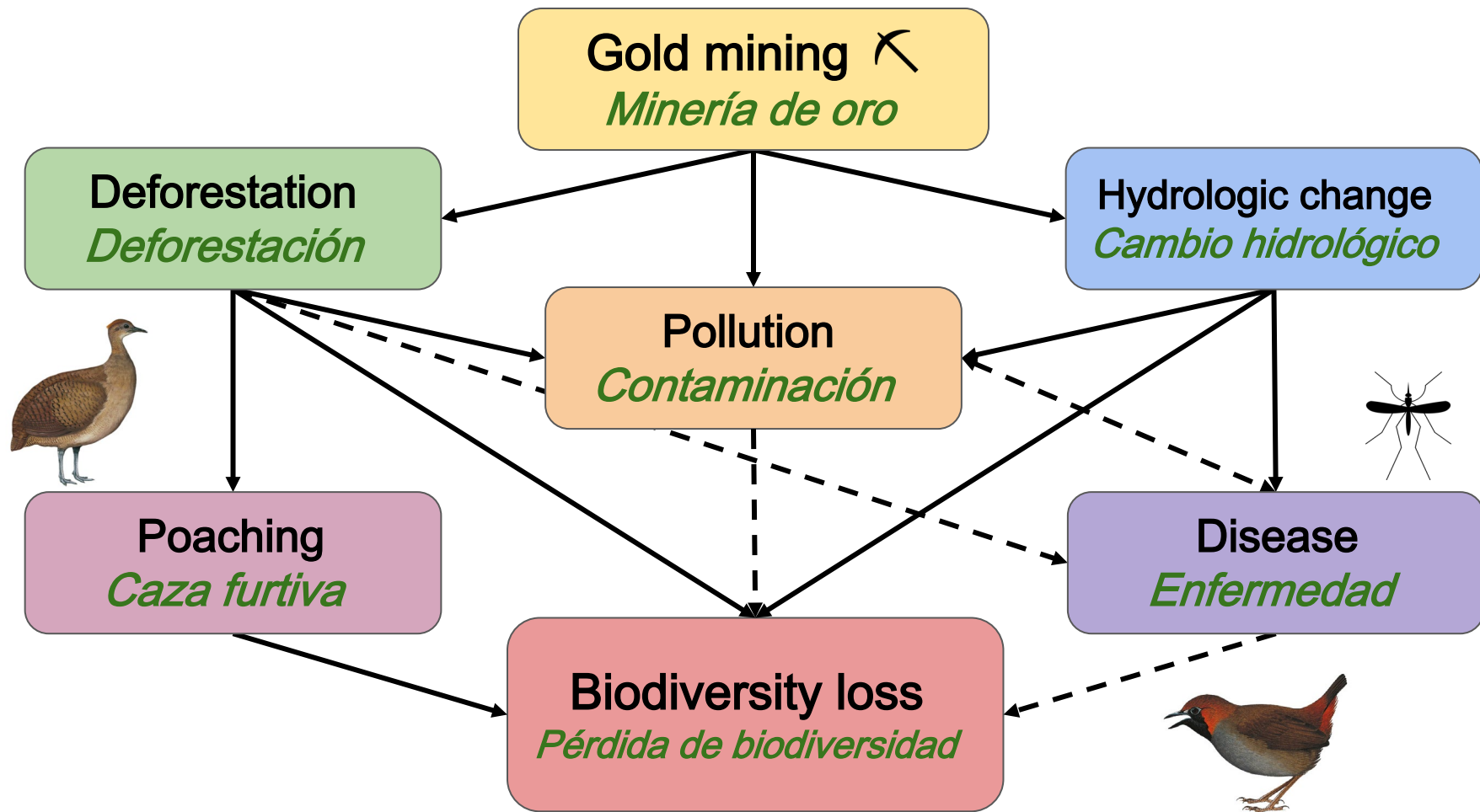
MAPE aumenta la exposición al Hg a través de los gremios alimenticios



Does Hg contribute to biodiversity loss?

*¿Contribuye el Hg a la pérdida de
biodiversidad?*



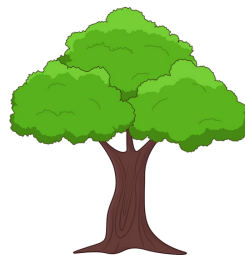


Goals - *Metas*

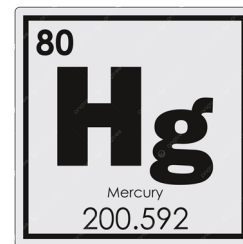
1. Isolate and quantify the impacts of Hg from gold mining on bird individuals, populations, and communities
 - *Aislar y cuantificar los impactos de Hg de la minería de oro en individuos, poblaciones, y comunidades de aves*
2. Develop accessible, replicable tools and monitoring strategies
 - *Desarrollar herramientas y estrategias de monitoreo accesibles y replicables*



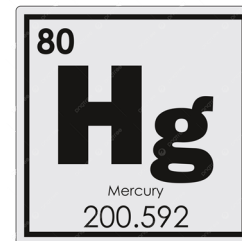
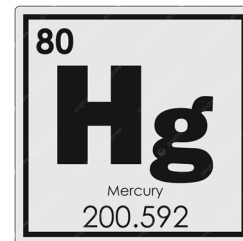
Conservation reserve
Reserva de conservación
(control)



Small-scale mining
Minería de pequeña escala
(deforestation + less Hg)



Artisanal mining
Minería artesanal
(deforestation + more Hg)

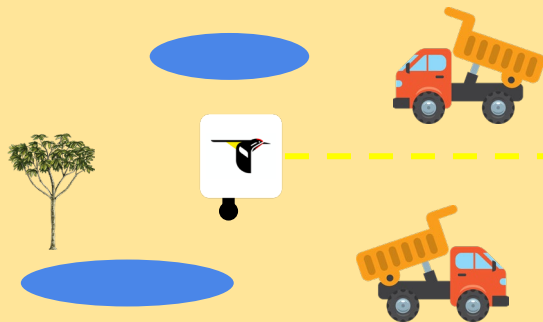


Background/ *Fondo*

Methods/ *Métodos*

Results/ *Resultados*

Conclusions/ *Conclusiones*

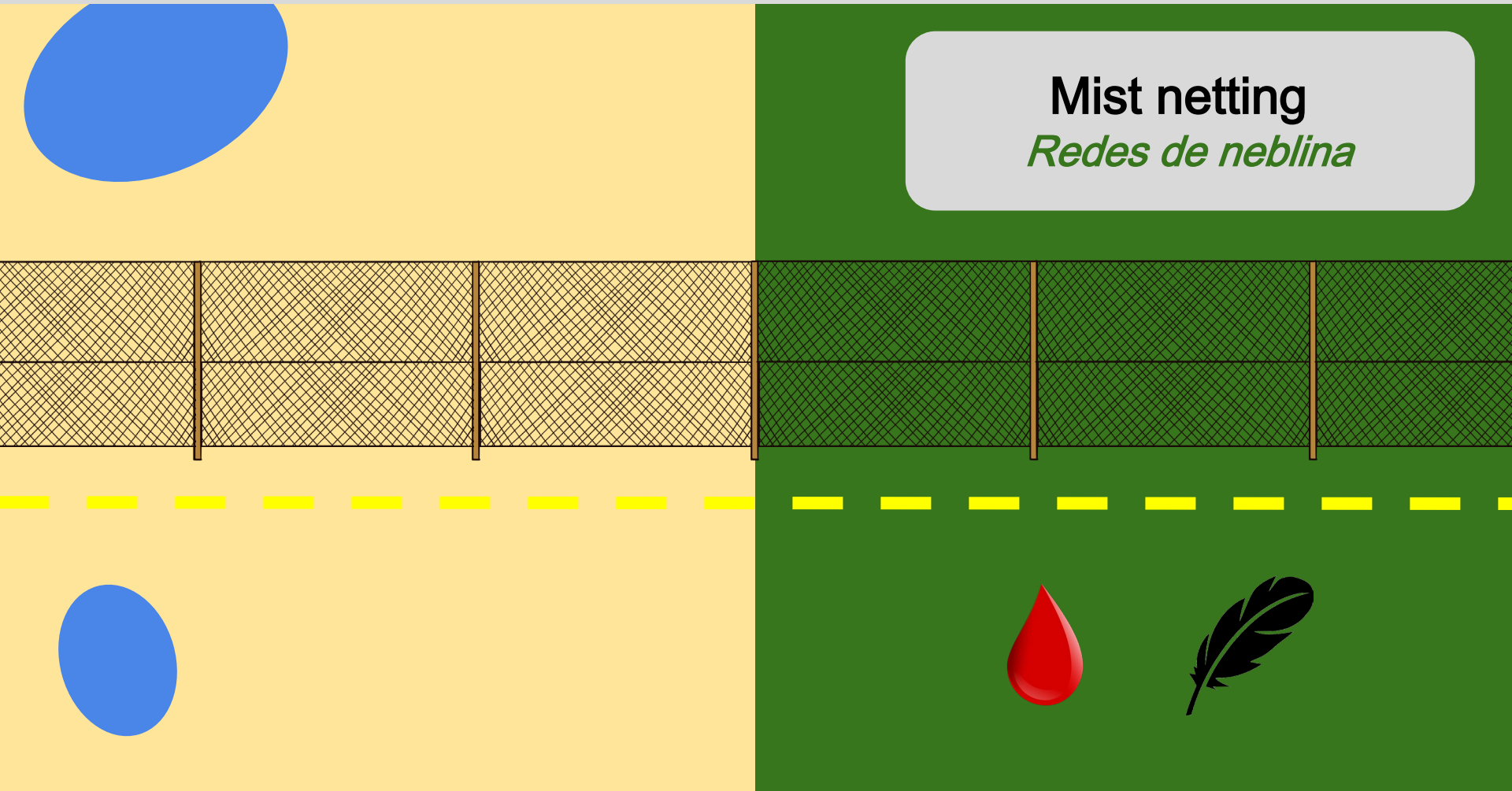


-250 m

0 m

250 m

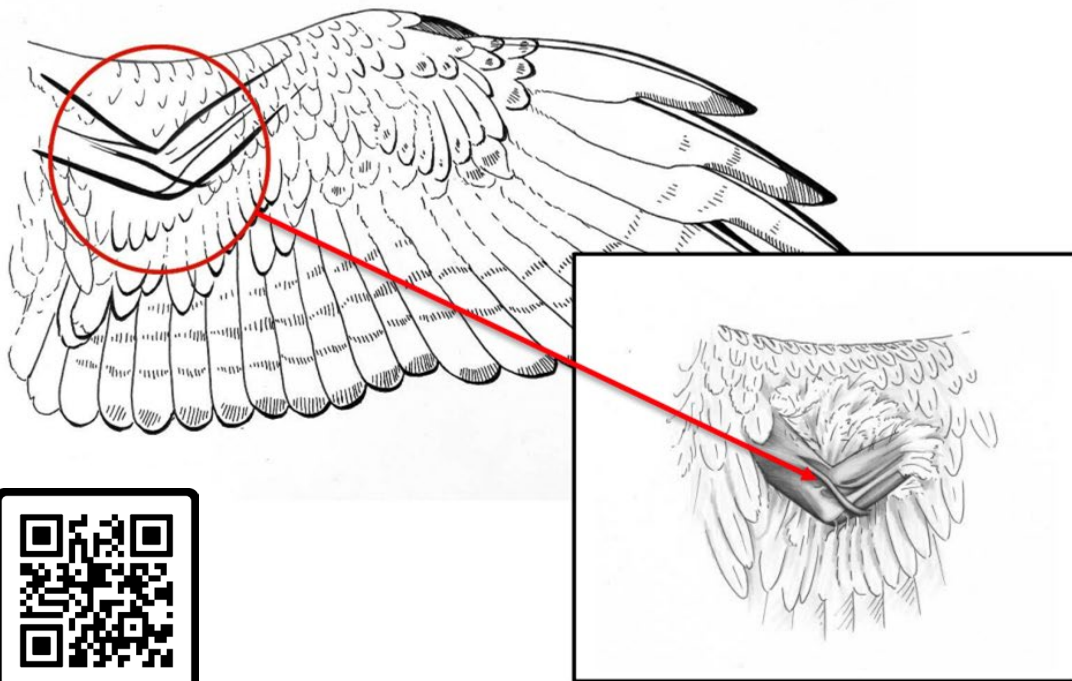
500 m



Mist netting
Redes de neblina

Brachial venipuncture

Venopunción braquial



Bird Field Sampling Methods

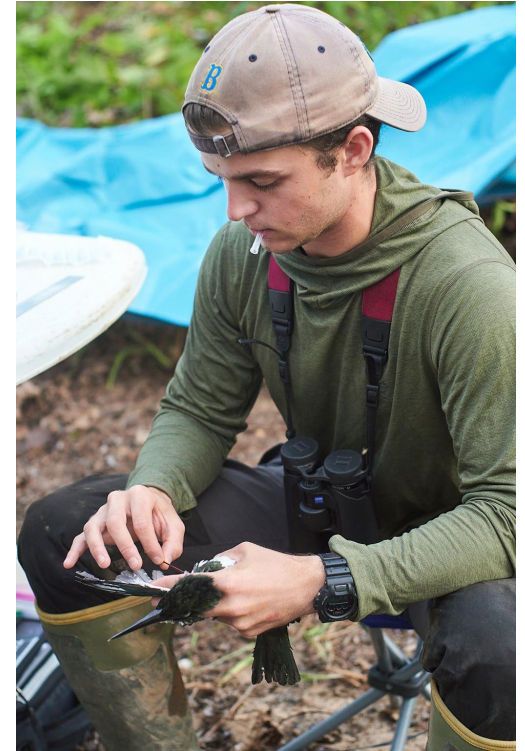


Collection of Tissues for Mercury Analysis



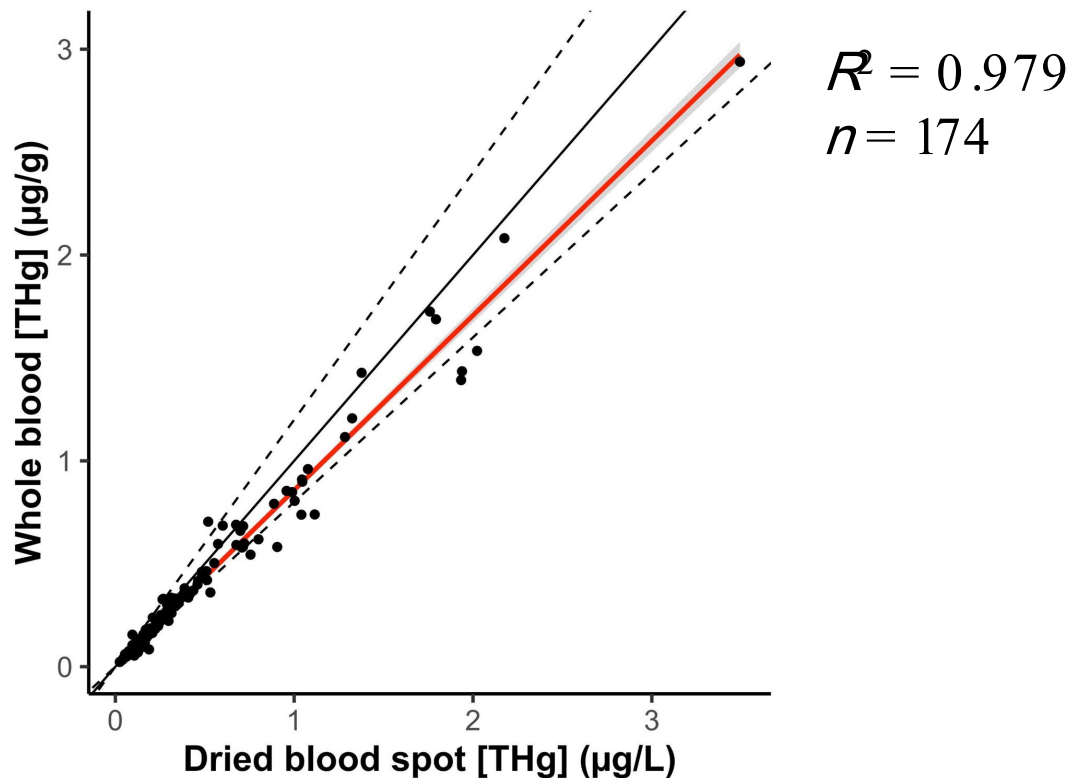
Dried blood spots (DBS) for Hg biomonitoring

Muestras de sangre seca (MSS) para biomonitoreo



Strong correlation between whole blood and DBS

Alta correlación entre sangre total y MSS



Key takeaways - *Conclusiones clave*

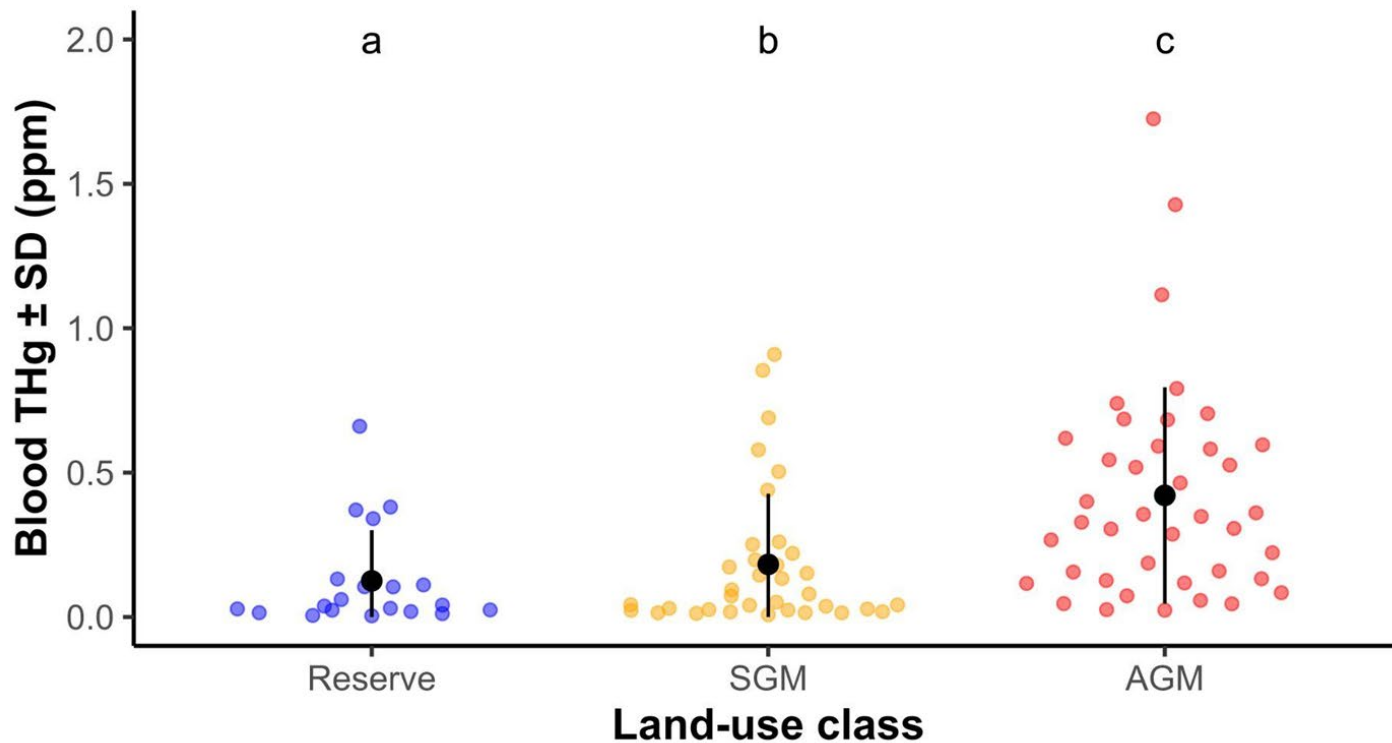
DBS are/ *MSS son*

1. Precise and reasonably accurate
 - *Precisas y razonablemente exactas*
2. Replicable across DMAs, sites, and species
 - *Replicable en DMAs, sitios, y especies*
3. Cheaper and eliminate logistic challenges
 - *Más barata y elimina desafíos logísticos*
4. Robust to tropical field conditions
 - *Robusto en condiciones de campo tropicales*



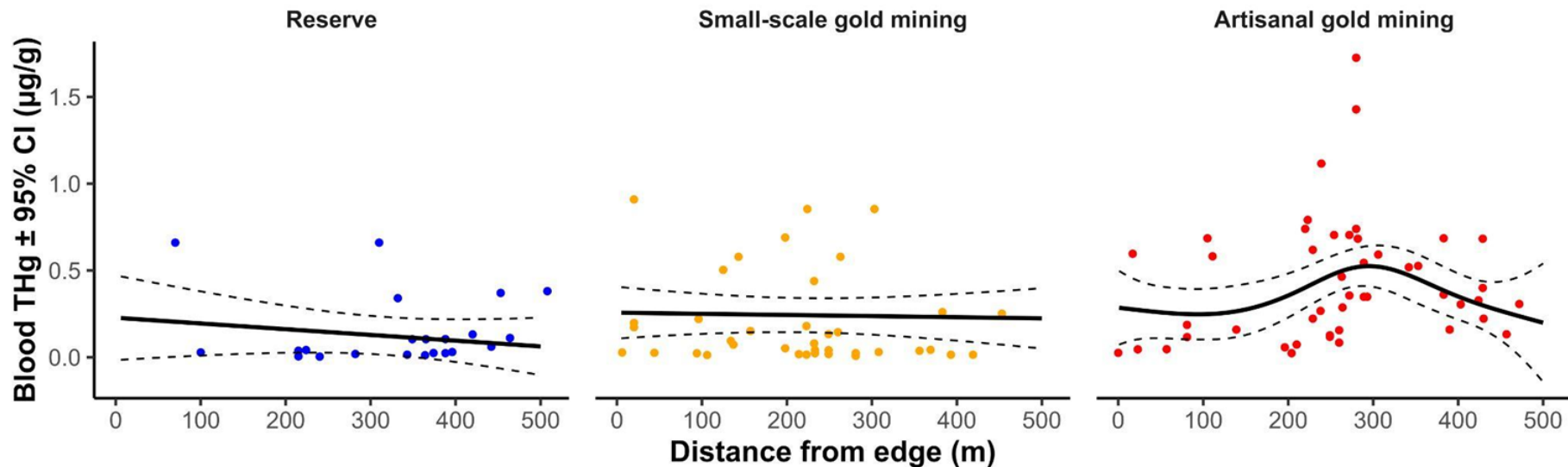
Strong Hg gradient across land-use classes

Alta gradiente de Hg entre clases de uso de tierra



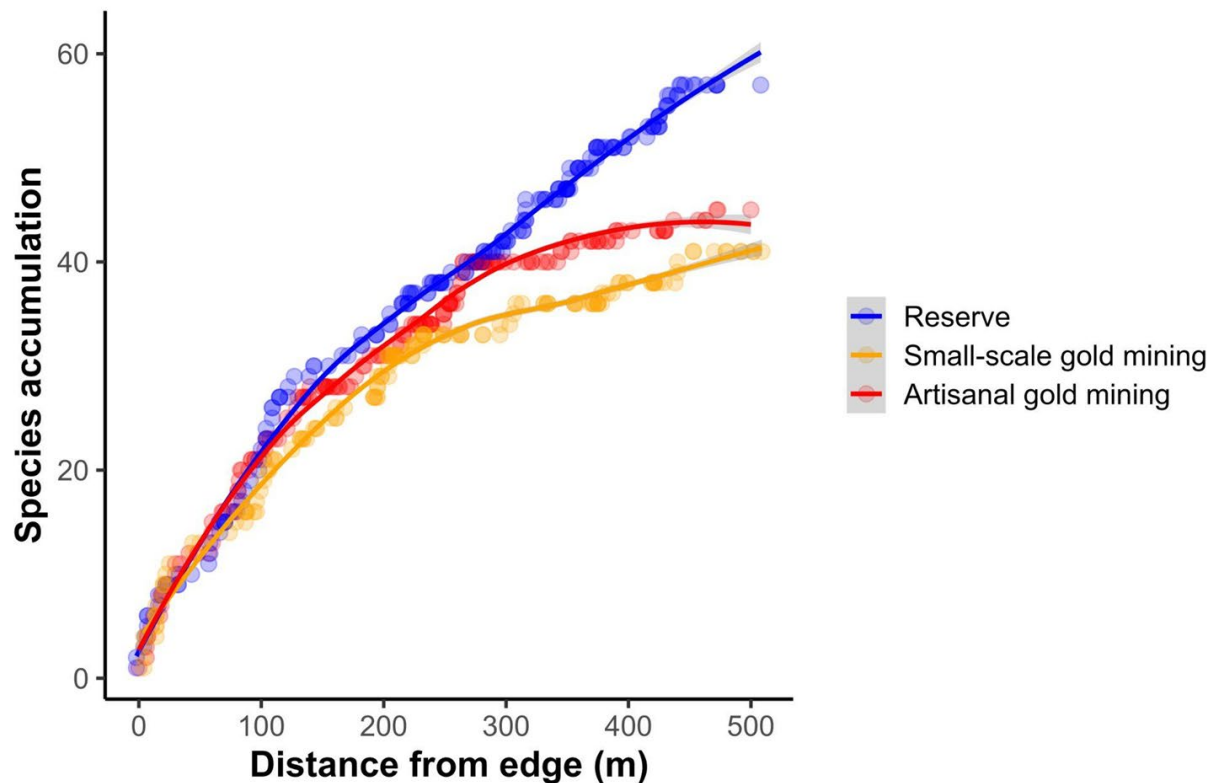
Elevated Hg bioaccumulation in forest interiors

Alta bioacumulación en el interior del bosque



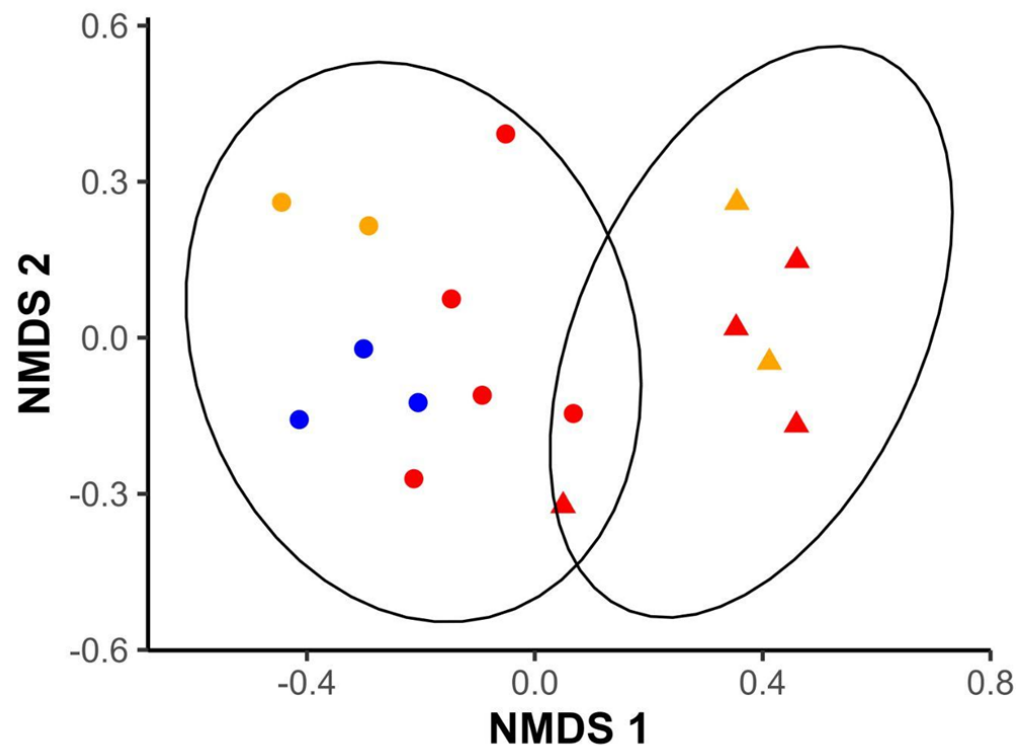
Reserves have higher species accumulation

Reservas tienen más riqueza de especies



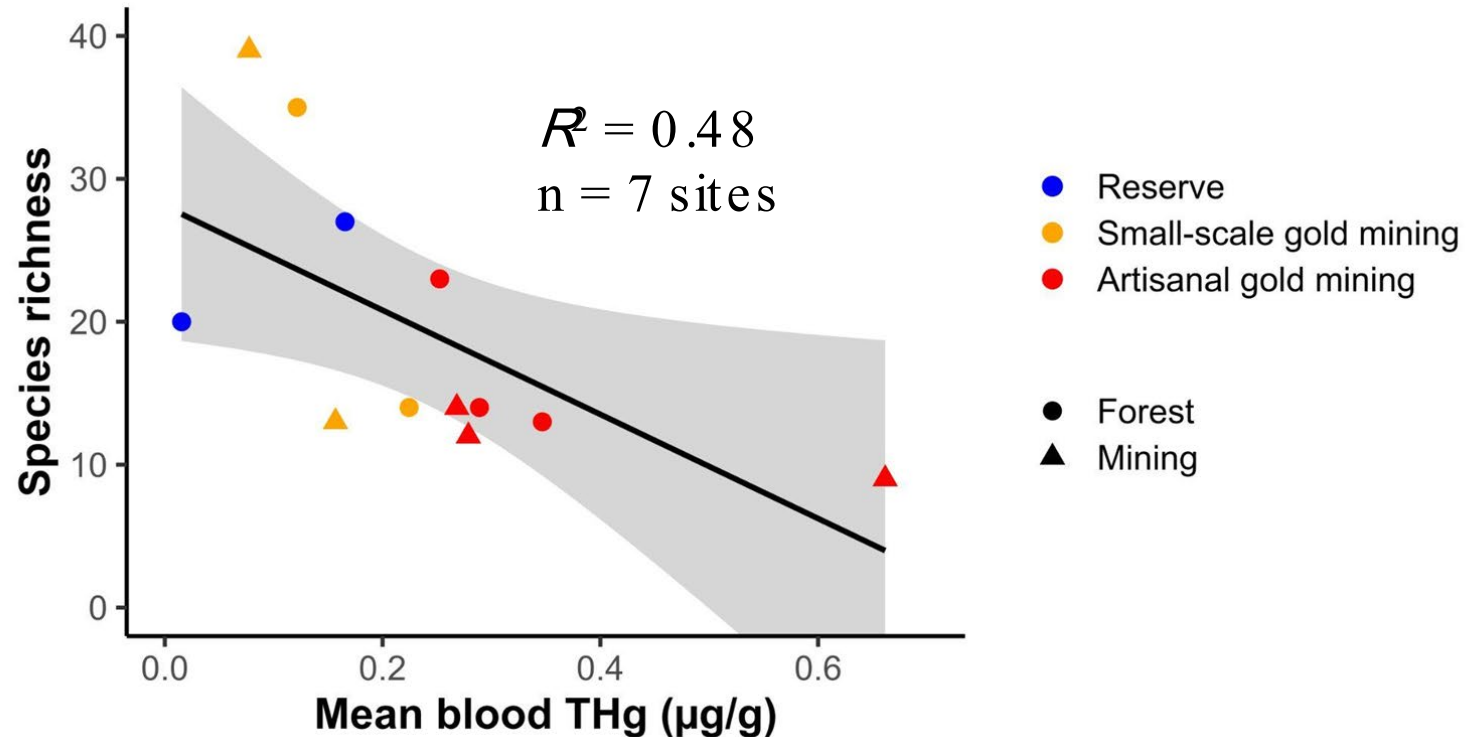
Gold mining changes the avian community

MAPE cambia la comunidad aviar



Inverse relationship between species richness and Hg

Relación inversa entre riqueza de especies y Hg



Conclusions & future directions - *Conclusiones y direcciones futuras*

- Invertivores can help us achieve study goals
 - *Invertívoros pueden ayudarnos a lograr nuestras metas*
- Strong Hg gradient across land-use classes
 - *La bioacumulación de Hg es consistente a través de clases de uso de la tierra*
- Lower bird diversity at mining sites
 - *Menor diversidad aviar en sitios mineros*
- Replicating surveys & adding new sites
 - *Replicar estudios y agregar nuevos sitios*
- Leveraging bioacoustic & remote-sensing data to reduce sampling bias
 - *Aprovechar datos bioacústicos y satélites para reducir sesgos de muestreo*
- Separating correlation and causation
 - *Separando correlación y causalidad*

Thank you - ¡Gracias!



Questions? - ¿Preguntas?



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SCAN ME