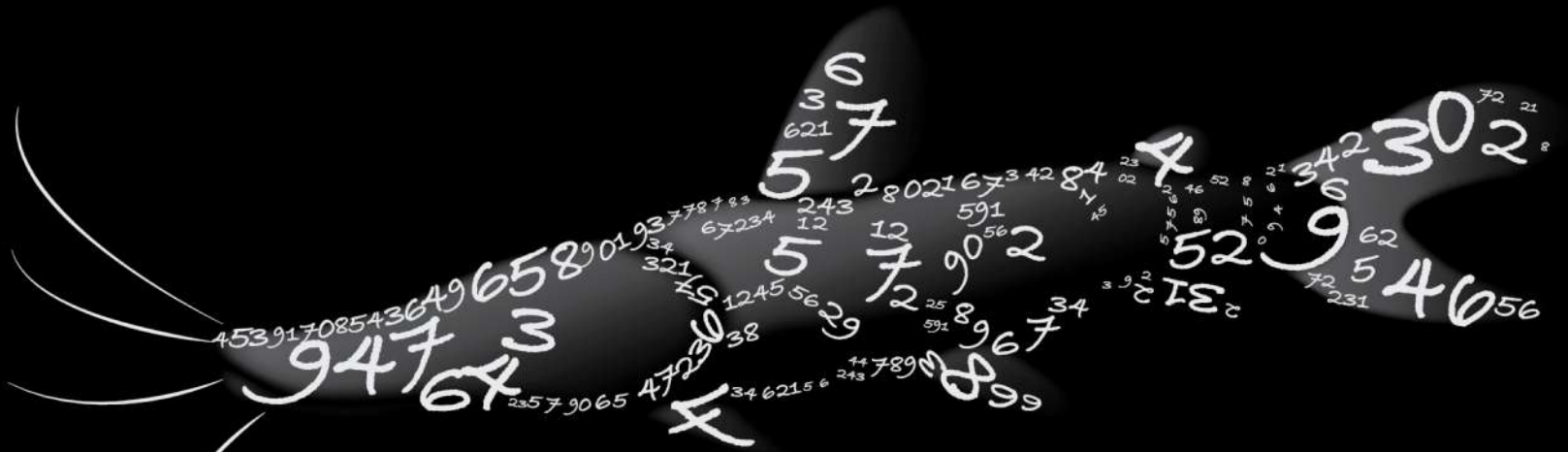


AMAZON FISH

Amazonian fishes and climate change
ERANetLAC/DCC-0210

www.amazon-fish.com

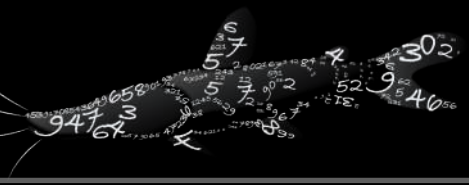
ERANet LAC

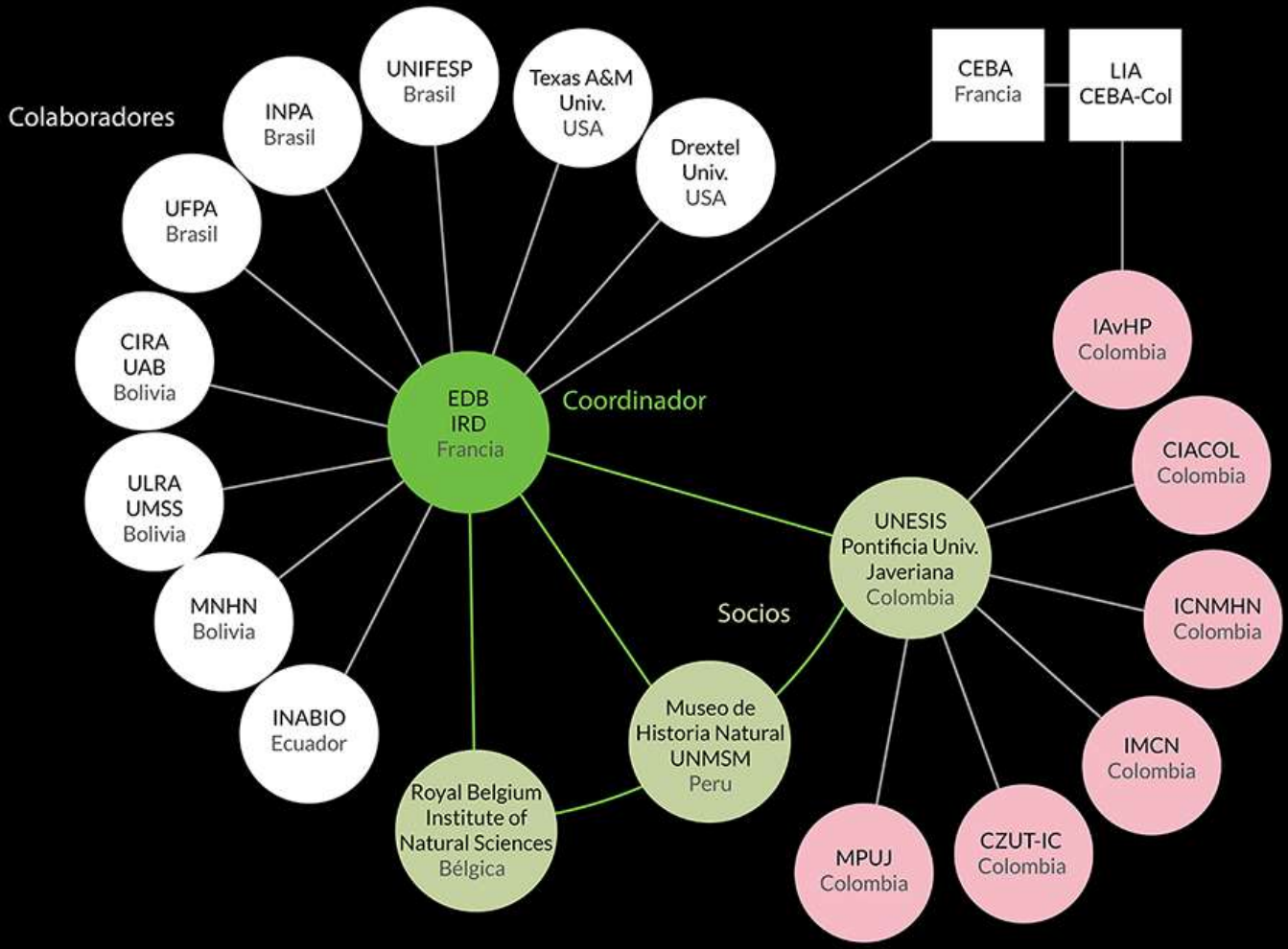
IRD
Institut de recherche pour le développement

Pontificia Universidad JAVERIANA Bogotá

museum
Operational Directorate Natural Environment
OD Nature | OD Natuur | DO Nature

AMAZON FISH database





Why the Amazon River?

- Surface area > 6,000,000 km^2 and produces 16% of the global discharge
- Concentrates the greatest part of the global freshwater fauna
- Biodiversity patterns not well-known yet
- Increased human disturbances

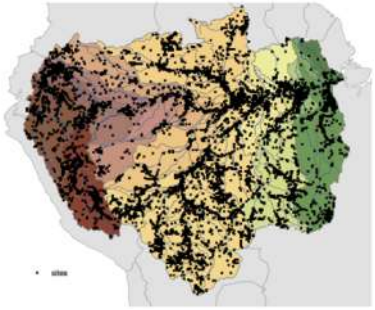
High diversity of riverine habitats

Why freshwater fishes?

- Important ecological resources
- A group highly diversified
- Potentially threatened

4 scientific objectives

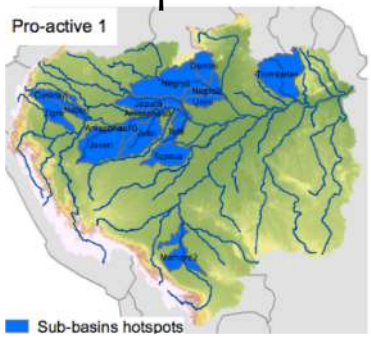
Building an exhaustive database



Analyzing diversity patterns

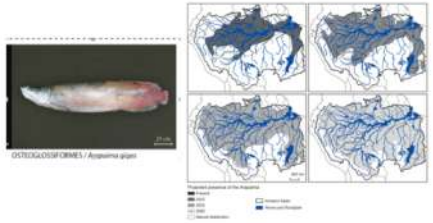
Explaining fish diversity gradients in the Amazon Basin

Defining “hotspots” to protect



Anticipating the future

Analyzing the future under global changes

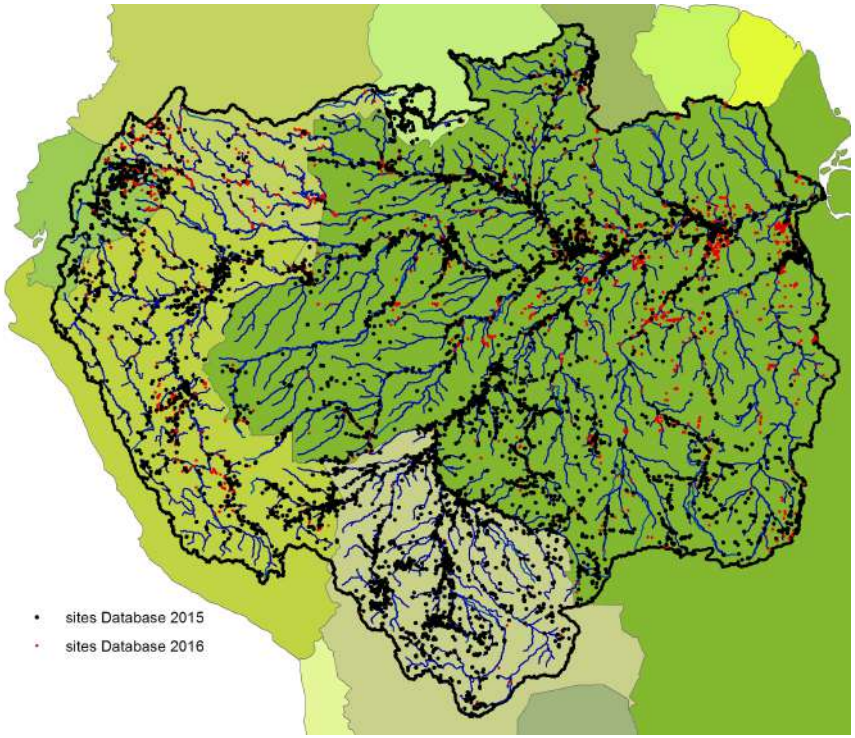


Currently under development

Planned

Building the database

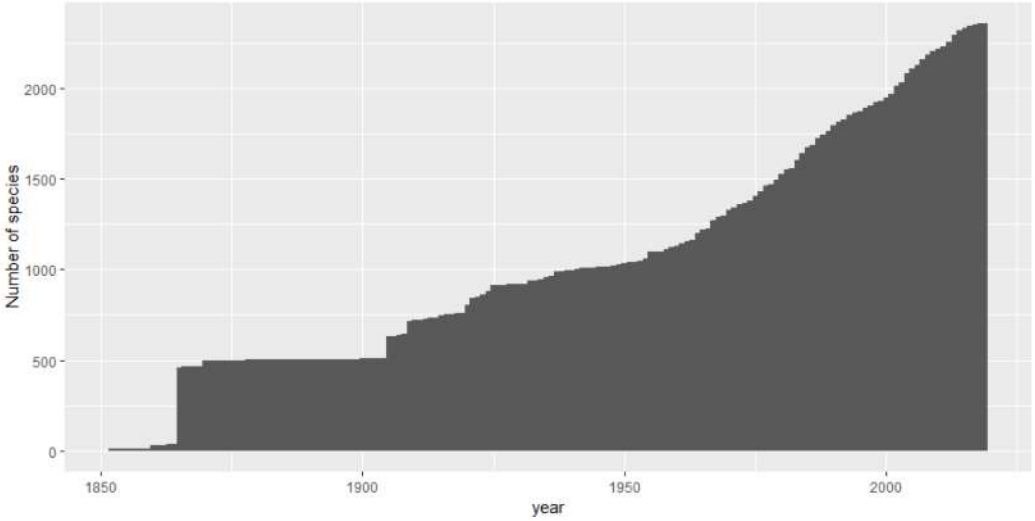
Metadata Journal (2019) 43, 1–9.
Scientific Data (In prep.)

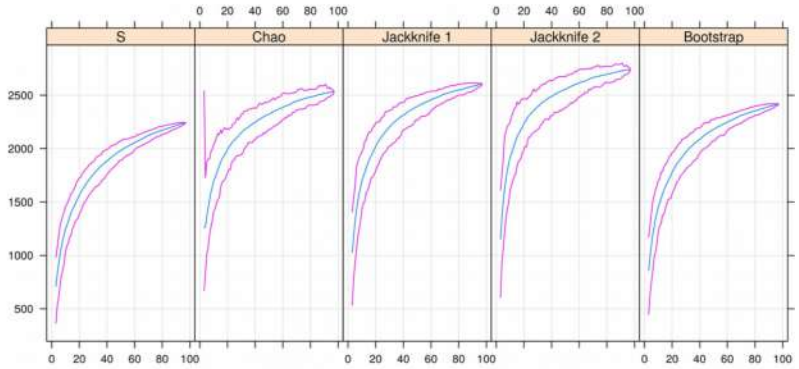


>21,000 sitios

2350 species

1345 endemics

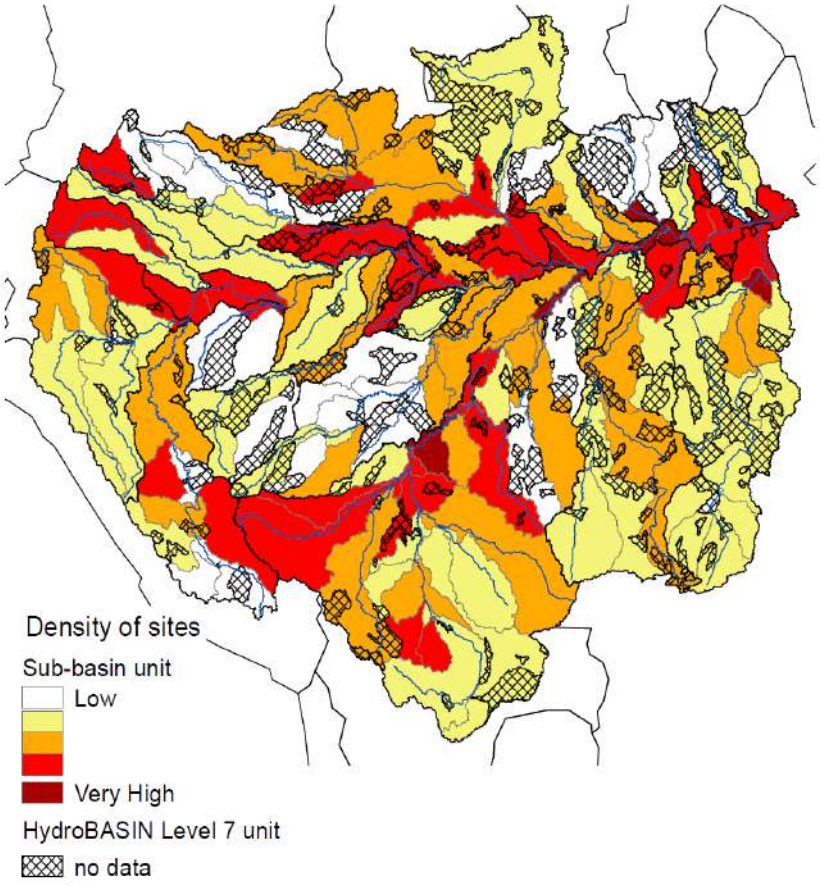


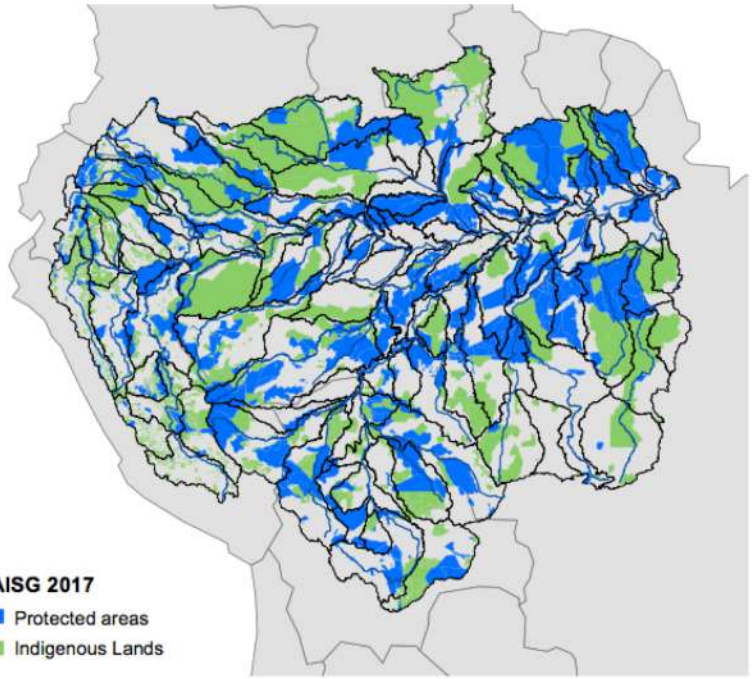


2350 species

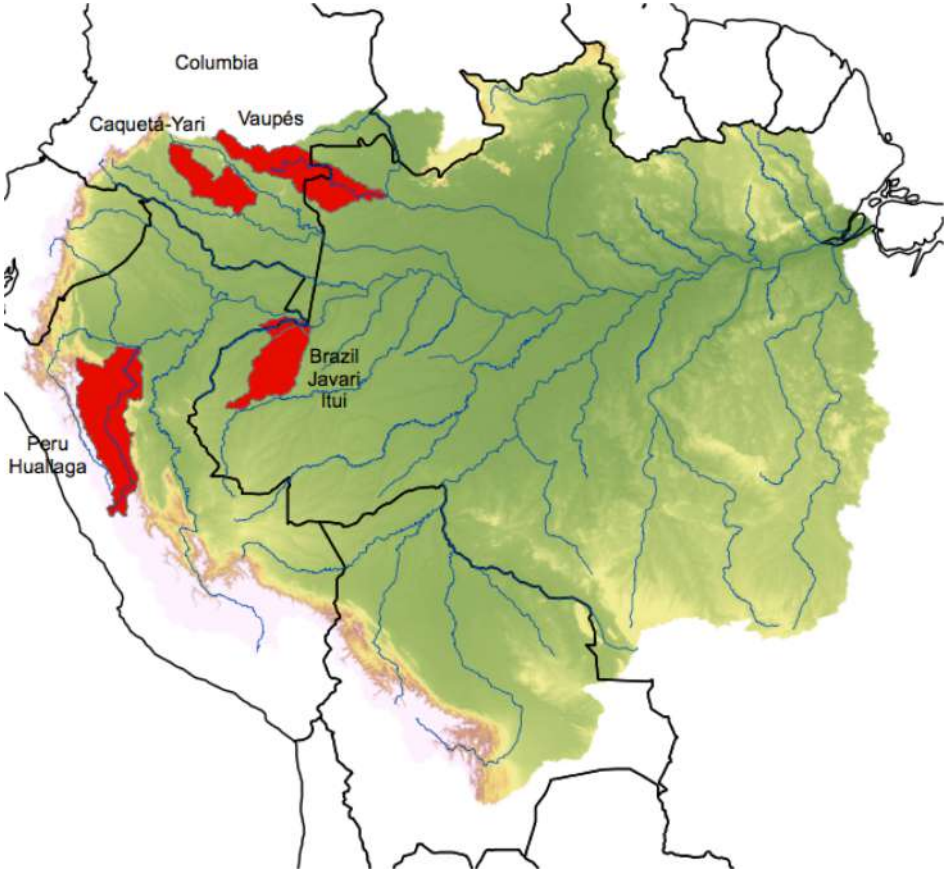
~2600 species

Still little known regions



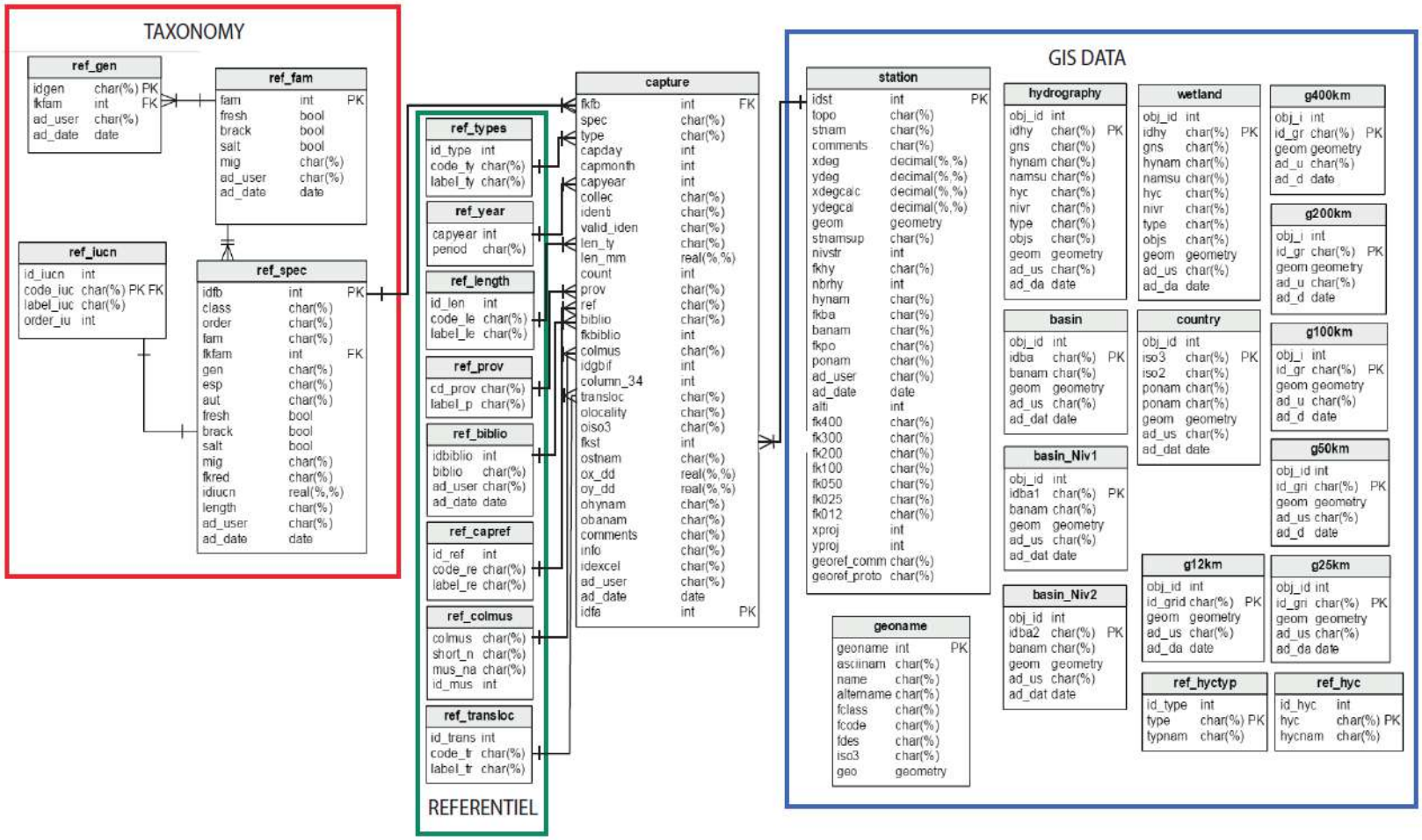


First AmazonFish expeditions



>800 sampled species

Database structure



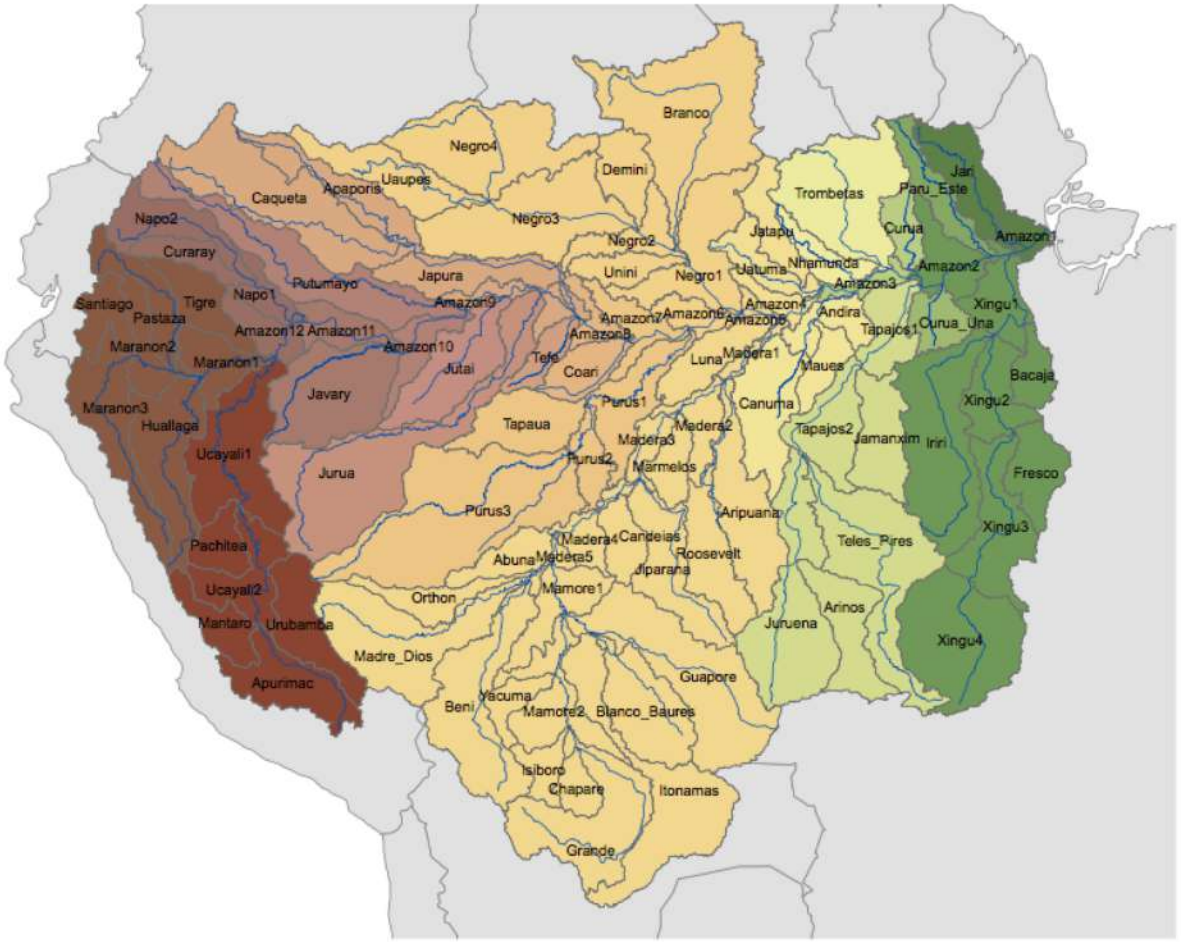
Diversity patterns

SCIENCE ADVANCES | RESEARCH ARTICLE

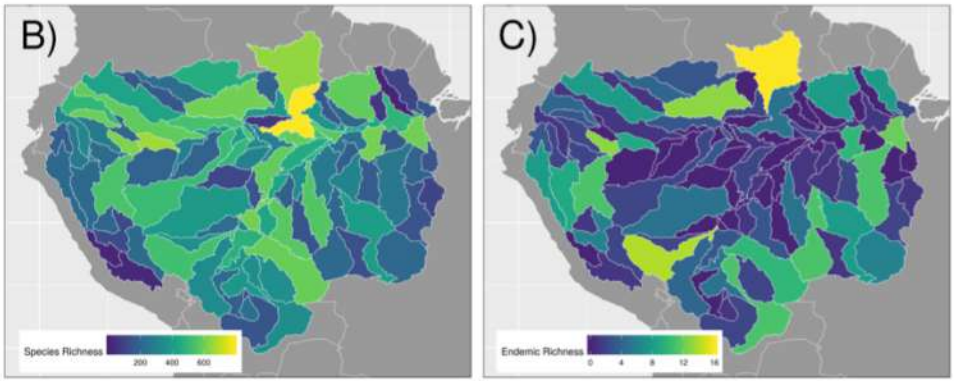
ECOLOGY

Unexpected fish diversity gradients in the Amazon basin

Spatial grain: 97 basins

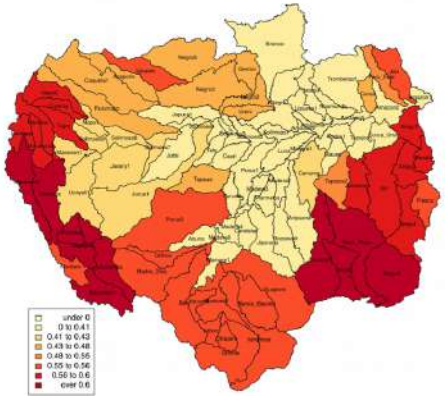


Richness and endemism patterns

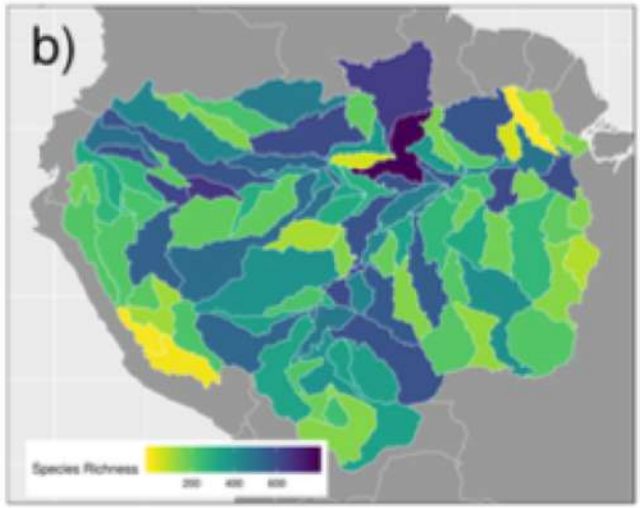


(Dis)similarity patterns

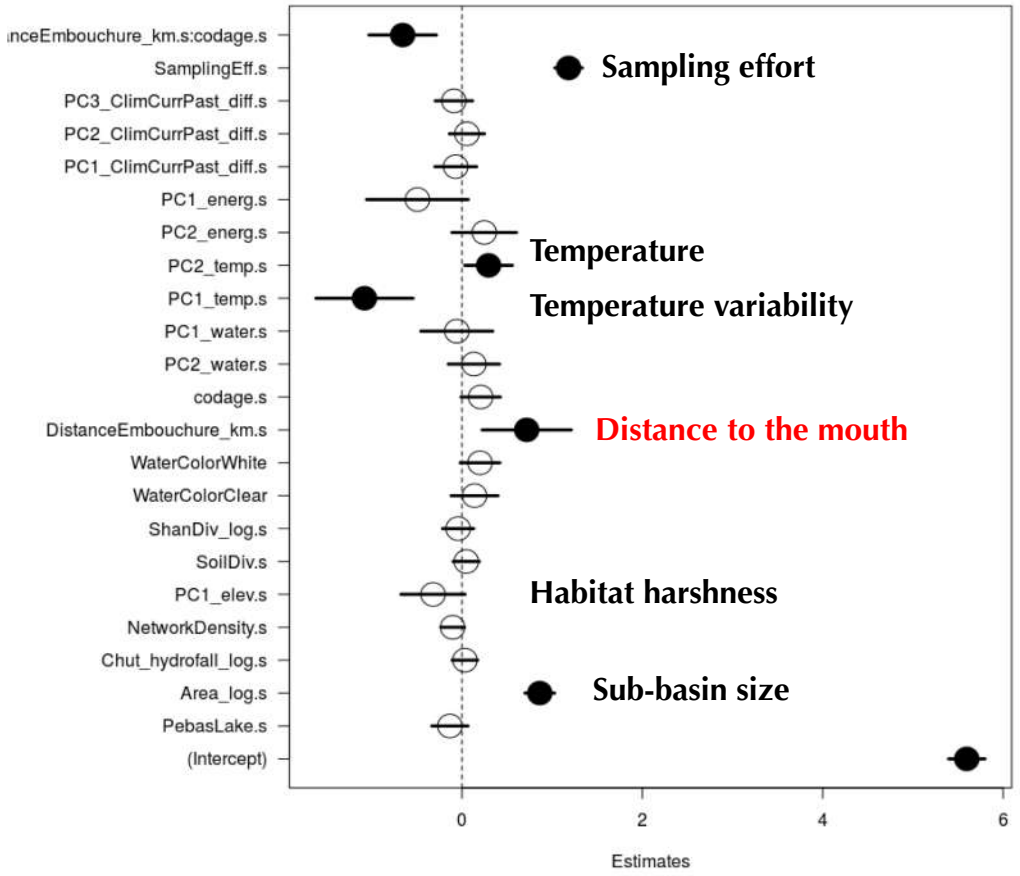
$$\beta_{sim} \quad \frac{\min(b,c)}{a+\min(b,c)}$$



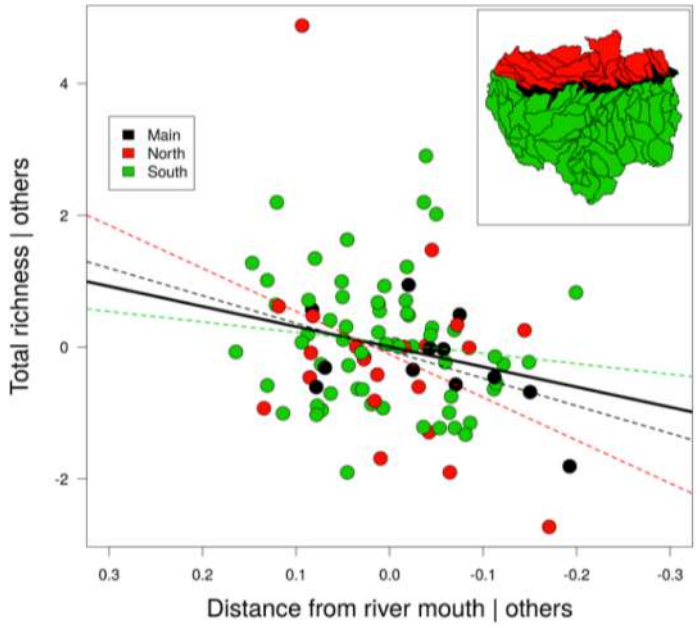
Species richness patterns

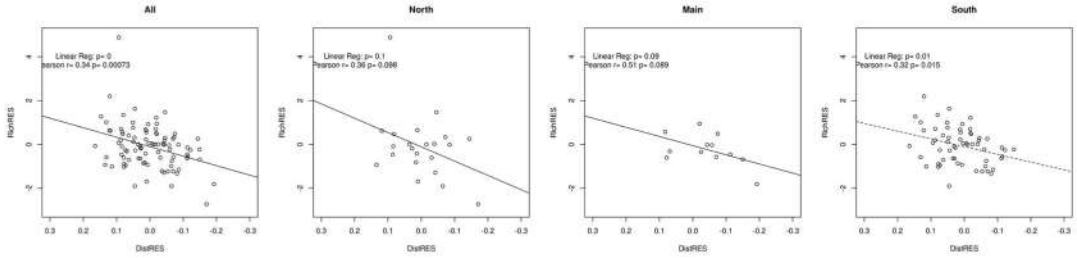


Negative-Binomial GLM
82% of variance explained



Observed richness pattern

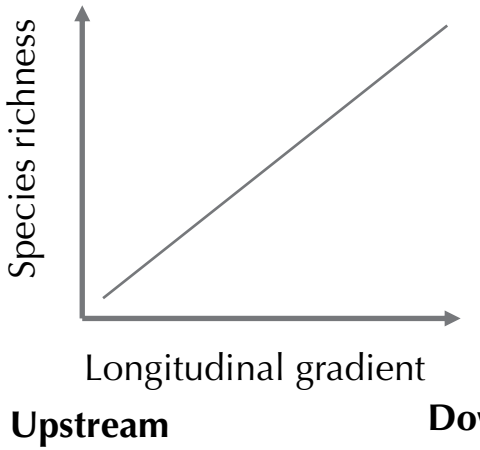


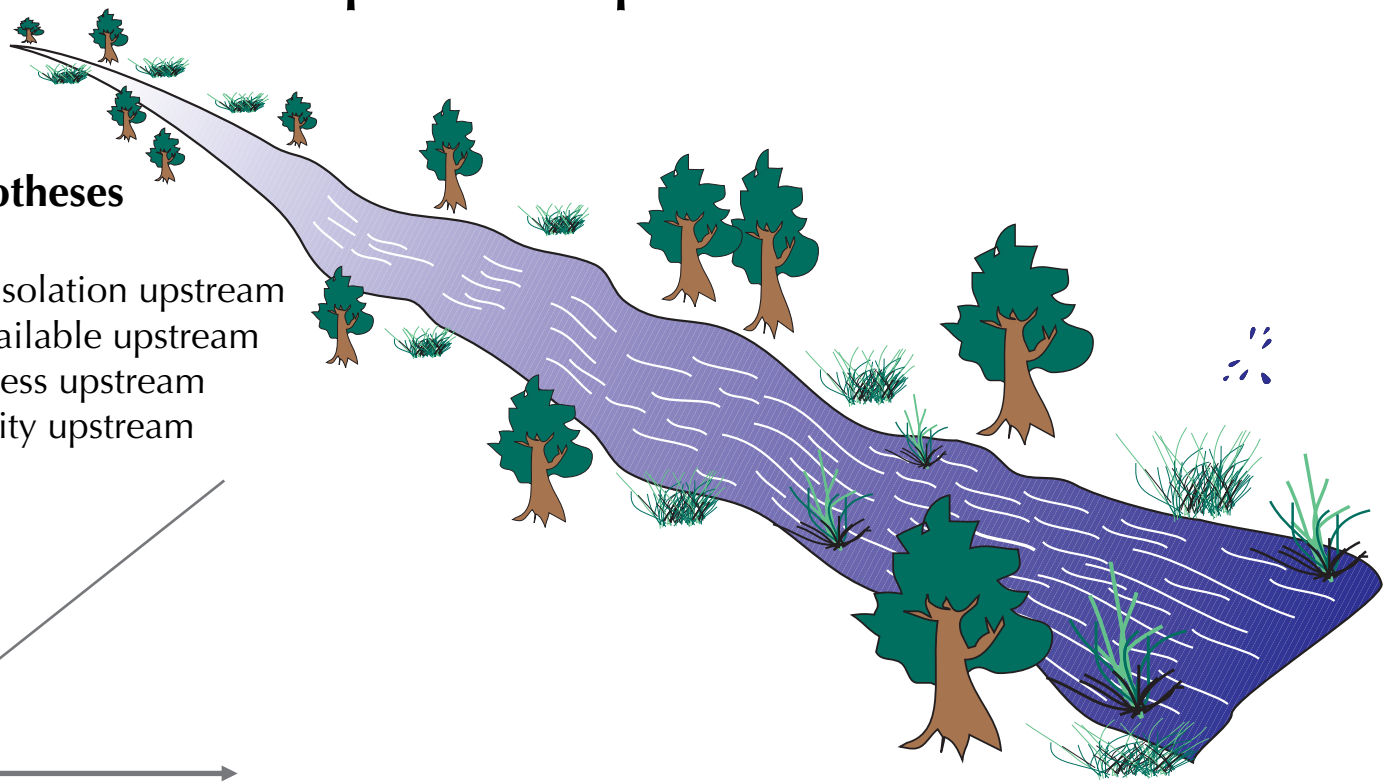


Expected pattern

Hypotheses

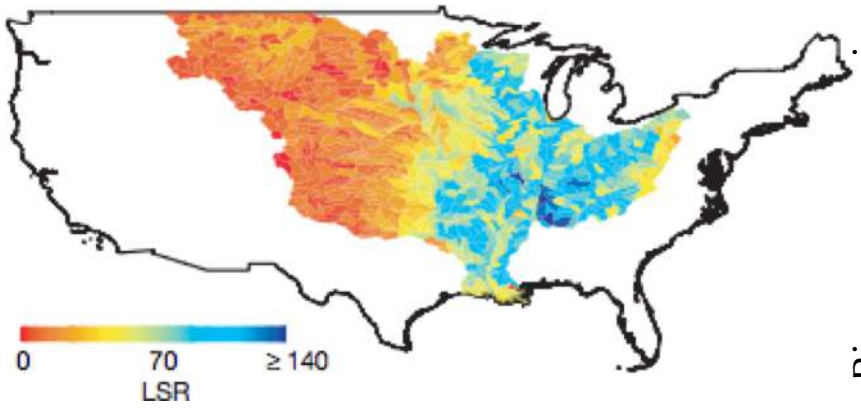
- Geographical isolation upstream
- Less energy available upstream
- Habitat harshness upstream
- Less connectivity upstream

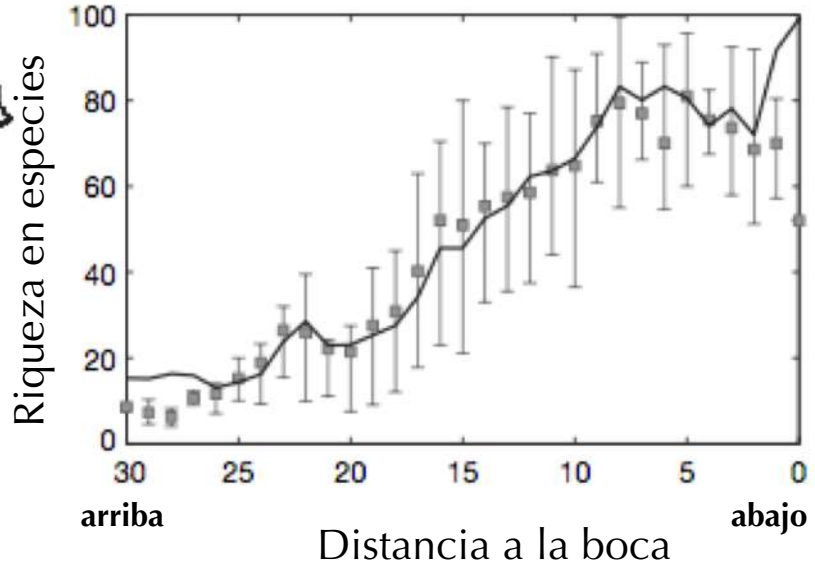




Example of expected trend

e.g. Mississippi River





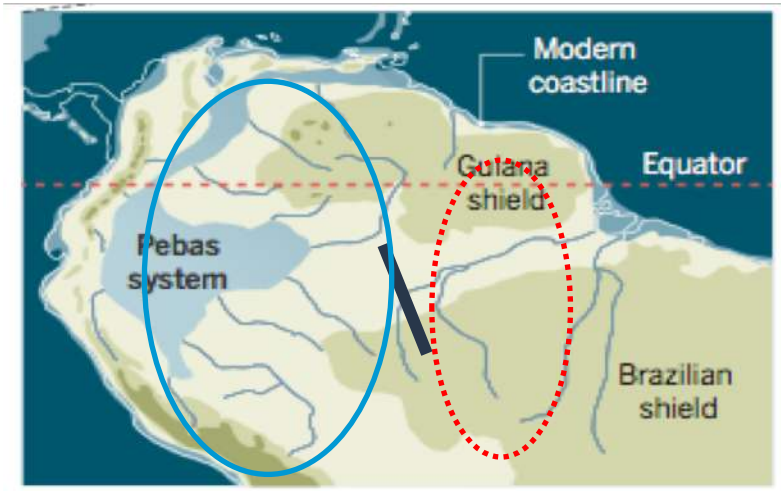
After Muneepeerakul et al. *Nature* 2008

~23 MA

Species pool 1

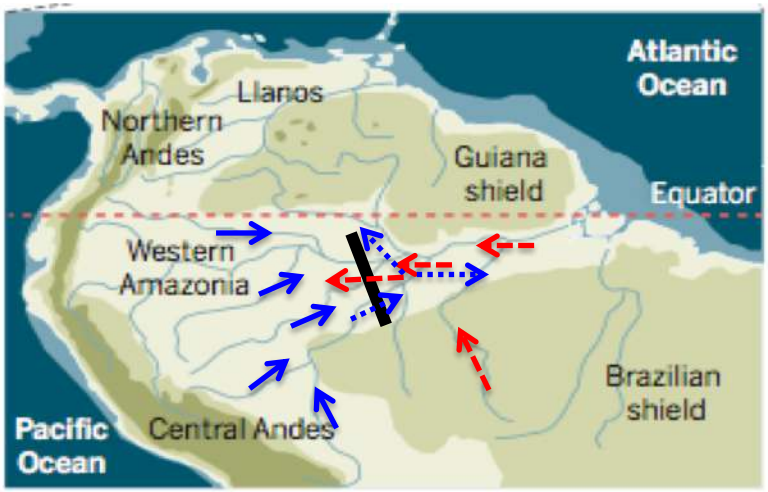
Species pool 2

Purus Arch



~9 and <2.5 MA

Colonisation



Our interpretation

Main species pool West

⬇

West-East unsaturation in species

⬇

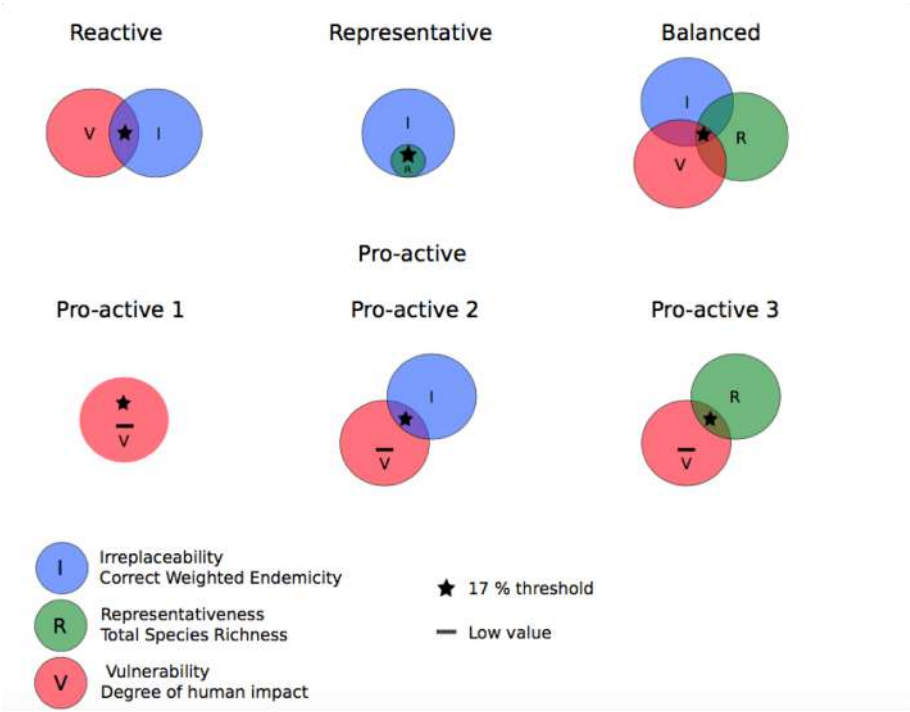
Incomplete colonization processes

⬇

Recent formation of the system such as existing today (≤ 2.5 Ma)

Defining diversity "Hotspots" for conservation priorities

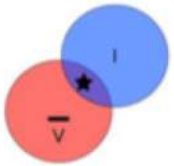
 # Scenarios



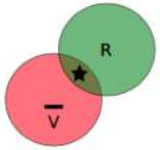
Conservation Biology (In revision)

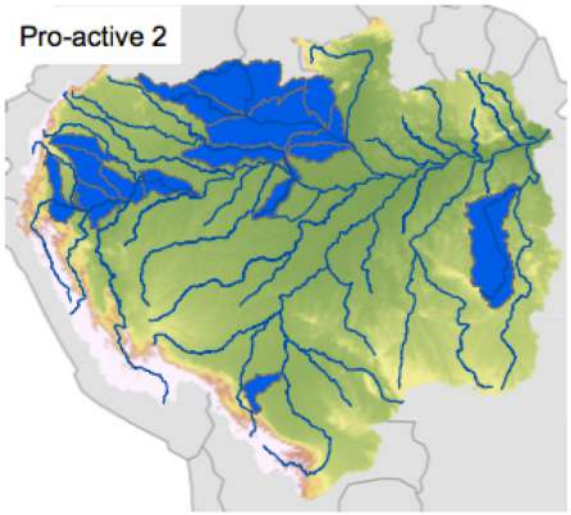
Best scenarios currently and in 2050

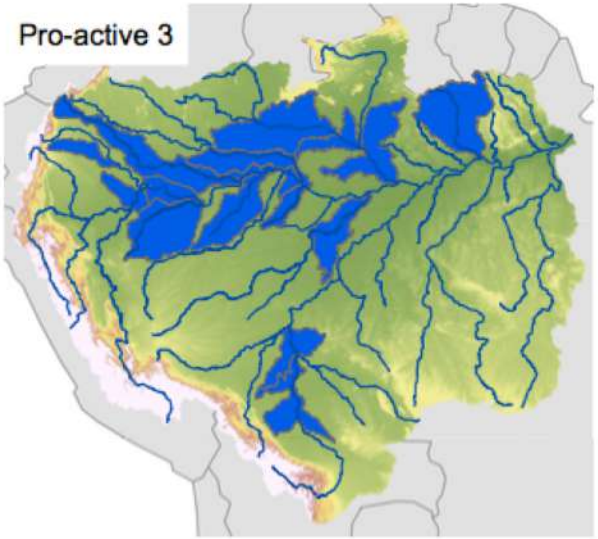
Pro-active 2



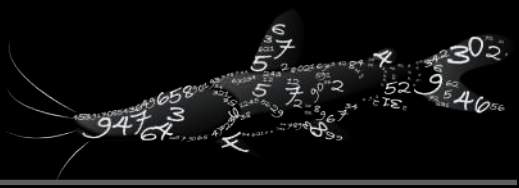
Pro-active 3







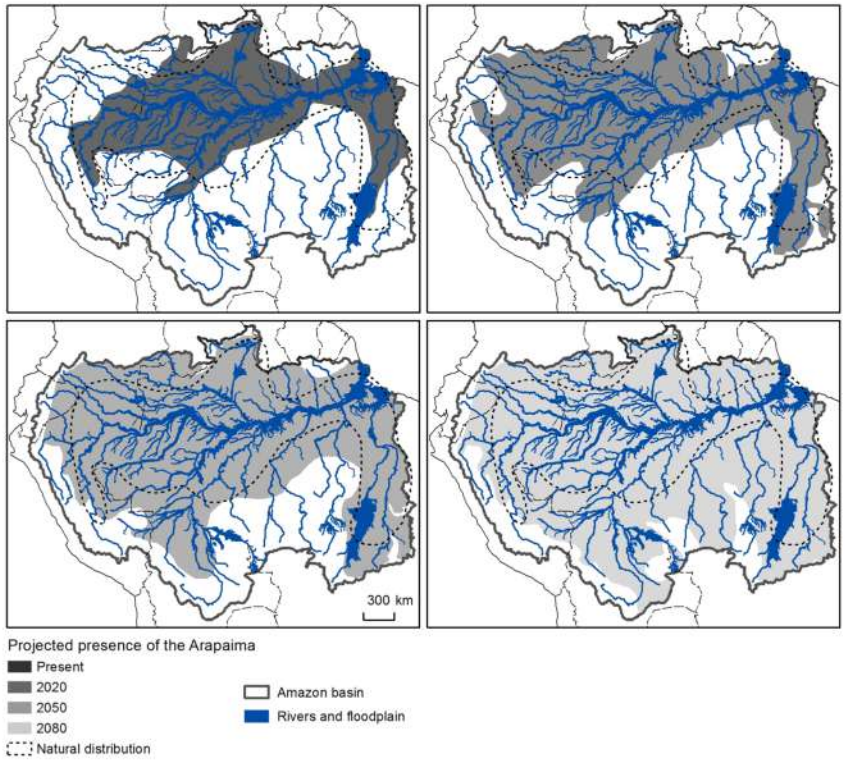
template	Families	Genera	Total species	Amazonian endemic species	Threatened species
pro-active 2	95 (53)	89 (456)	72 (1 676)	60 (804)	20
pro-active 3	97 (54)	86 (442)	72 (1 682)	60 (810)	7



Ongoing research

Colonization and extinction scenarios under global change

Species ranges and climate change



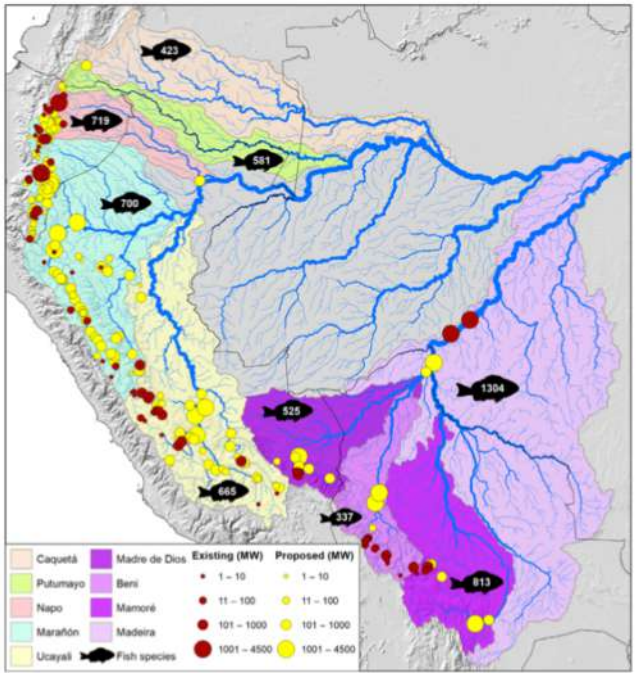
Predicting population extinction rates following habitat fragmentation

SCIENCE ADVANCES | RESEARCH ARTICLE

APPLIED ECOLOGY

Fragmentation of Andes-to-Amazon connectivity by hydropower dams

Elizabeth P. Anderson,[1]* Clinton N. Jenkins,[2,3,4] Sebastian Heilpern,[5] Javier A. Maldonado-Ocampo,[6] Fernando M. Carvajal-Vallejos,[7,8] Andrea C. Encalada,[9,10] Juan Francisco Rivadeneira,[11] Max Hidalgo,[12] Carlos M. Cañas,[13] Hernan Ortega,[12] Norma Salcedo,[12,14] Mabel Maldonado,[15] Pablo A. Tedesco[16]

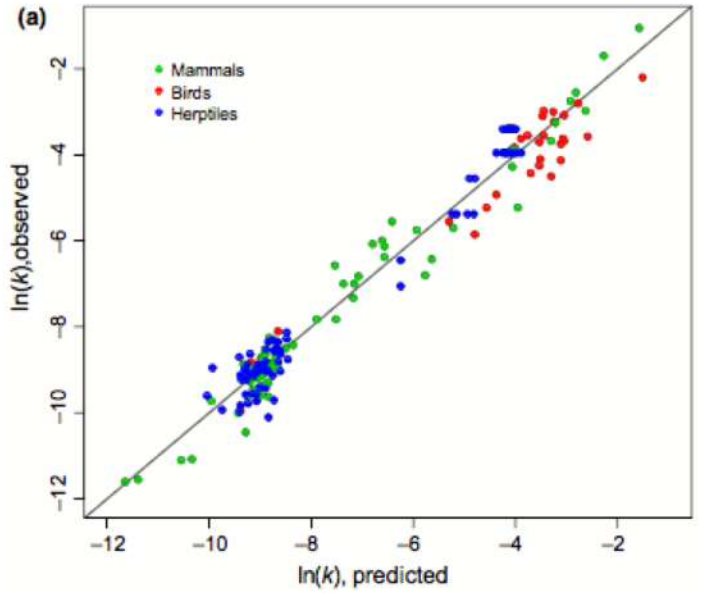


ECOLOGY LETTERS

Ecology Letters, (2017) 20: 591–598 doi: 10.1111/ele.12756

LETTER

Age–area scaling of extinction debt within isolated terrestrial vertebrate assemblages



Thank you for your attention!