



Genomic insights into invasive rodent populations: unlocking conservation and synthetic gene drive potential

Overview

This study, published in *Evolutionary Applications*¹, examined the population genomics of invasive rodents on islands, exploring the genetic consequences of colonization and evaluating the feasibility of localized synthetic gene drives for species management. Signios Bio supported this research by providing high-quality genomic sequencing services, enabling the generation of detailed genetic data critical for understanding population dynamics and informing innovative conservation strategies.

Challenges

Invasive rodents significantly threaten island biodiversity, impacting native species and ecosystems. Understanding the genetic consequences of colonization—such as founder effects and bottlenecks—is essential to develop effective management strategies. This includes exploring synthetic gene drives, which require precise population genomic data to minimize unintended ecological impacts.

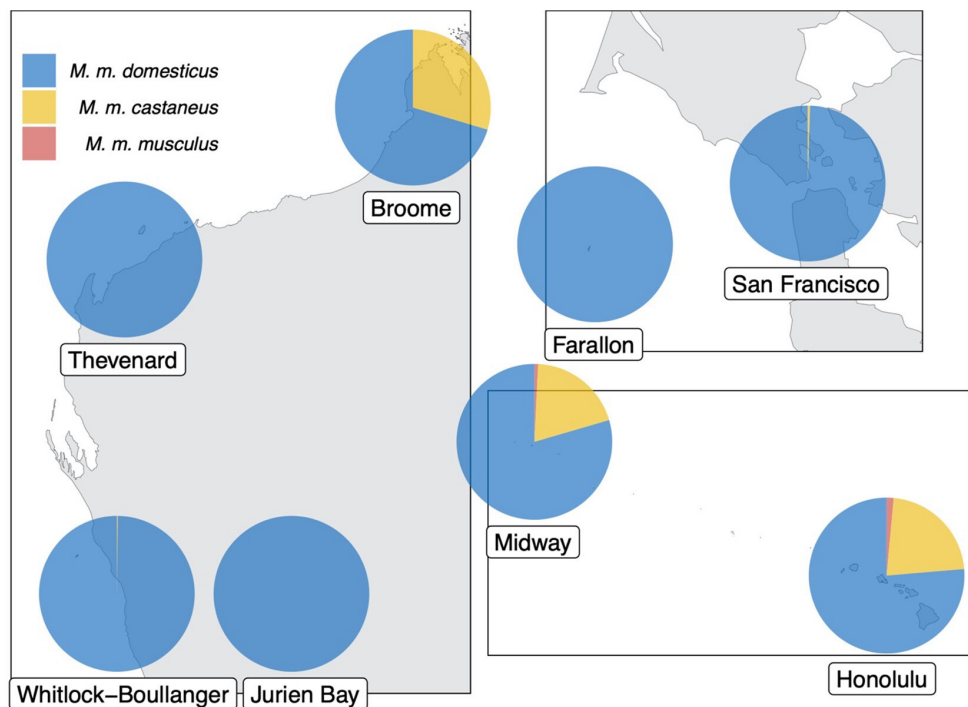
Signios Bio's contribution

Signios Bio provided whole genome sequencing services to support the research team in generating high-resolution genetic data for invasive rodent populations.

- **Sequencing services:** Leveraged advanced sequencing technologies to produce accurate and comprehensive genomic datasets across multiple rodent populations.
- **Data generation for population studies:** The data enabled researchers to assess genetic diversity, population structure, and evolutionary history, laying the groundwork for potential gene drive applications.

Key findings

- **Population structure:** Distinct genetic differentiation among island rodent populations, shaped by geographic isolation and colonization events.
- **Genetic diversity:** Evidence of founder effects and genetic bottlenecks, highlighting the need for targeted management approaches.
- **Synthetic gene drive potential:** Identification of genomic targets suitable for localized gene drives, emphasizing the importance of precise population-specific data.



Genomic admixture of *Mus musculus* populations based on pooled whole-genome resequencing and subspecies allele frequencies from Kevin P. Oh, et al. (2021)

SNP filter stage	Island Population			
	Farallon Isl.	Midway Atoll	Thevenard Isl.	Whitlock–Boullanger Isls.
Total autosomal SNPs	1.13e7	2.39e7	1.14e7	1.04e7
Fixed in island population	1.96e6	1.60e6	1.63e6	2.29e6
In Cas9 sites (PAM-forming or gRNA target sequence)	683,791	759,522	750,156	1.04e6
In CDS or 5'UTR	6932	8680	8280	10,497
In female fertility gene	127	155	135	196
“Source” population allele frequency (# multiplex sets)				
AF ≤0.95	81 (8)	79 (7)	59 (7)	97 (13)
AF ≤0.50	22 (2)	8 (0)	10 (1)	18 (1)
AF ≤0.15	0	0	0	0

Identification of CRISPR-Cas9 locally fixed alleles across four island–source population pairs from Kevin P. Oh, et al. (2021)

Impact

The study demonstrated how genomic sequencing can revolutionize invasive species management and conservation efforts:

- **Data-driven management strategies:** Informed tailored approaches to mitigate invasive species impacts while protecting biodiversity.
- **Biodiversity conservation:** Highlighted the ecological importance of addressing invasive species with precision tools.
- **Innovation in synthetic biology:** Provided foundational insights for designing localized synthetic gene drives with minimized ecological risks.

Why Signios Bio?

Signios Bio is a trusted partner in plant and animal genomics, offering:

- High-quality genomic sequencing services tailored for population studies and conservation research.
- Expertise in generating actionable data to support biodiversity and ecosystem management.

Reference

1. Kevin P. Oh, *et al.* Population genomics of invasive rodents on islands: Genetic consequences of colonization and prospects for localized synthetic gene drive, *Evolutionary Applications*, Volume 14, Issue 5, 2021, <https://doi.org/10.1111/eva.13210>

About Signios Bio

Signios Bio is a leader in providing end-to-end genomic solutions for wildlife, plant, and animal research. From advanced sequencing technologies to expert bioinformatics, Signios Bio empowers scientists to decode genomes, uncover genetic insights, and drive impactful conservation and agricultural advancements worldwide.

Contact us to learn more about how Signios Bio can advance your genomics research.

