# Population genomic structure in *Sardinops sagax*

Peter Teske
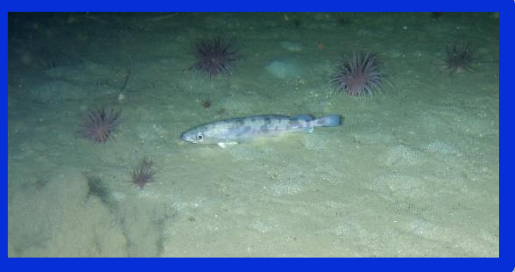
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Ecological Genomics & Wildlife Conservation

One of the world's best-defined thermal gradients

**West coast**
Similar to: **Norway**

**Southwest coast**
Similar to: **Irish Sea**

**South coast**
Similar to: **Portugal**

**East coast**
Similar to: **Eastern Mediterranean**

**Northeast coast**
Similar to: **Red Sea**

# Genetic structure often mirrors biogeography
## Each species may comprise up to four 'cryptic species'

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*Kraussillichirus kraussi*
(sandprawn)

**COI phylogeny**

tropical
North-east coast

subtropical
East coast

warm-temperate
South coast

cool-temperate
West coast

Pillay et al. 2017, Mar Ecol Prog Ser 347: 1–14

Teske et al. (2009) Mar Biol 156:1265-1275

# Conservation applications

## Translocations to increase genetic diversity must be prevented



**Langebaan**
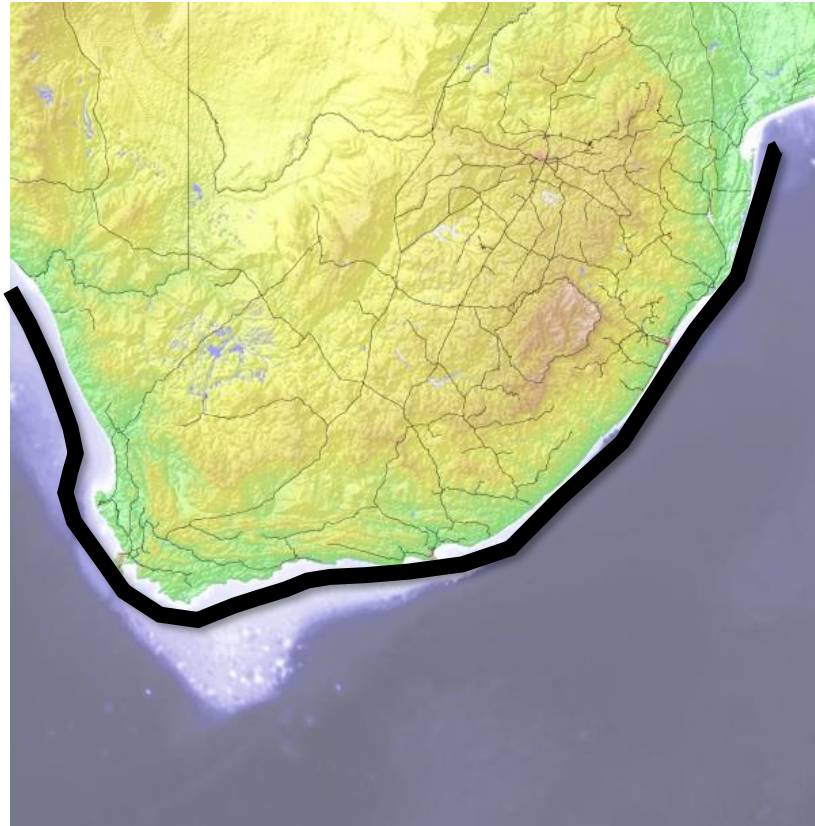
**Knysna**

de Coito et al. (submited)
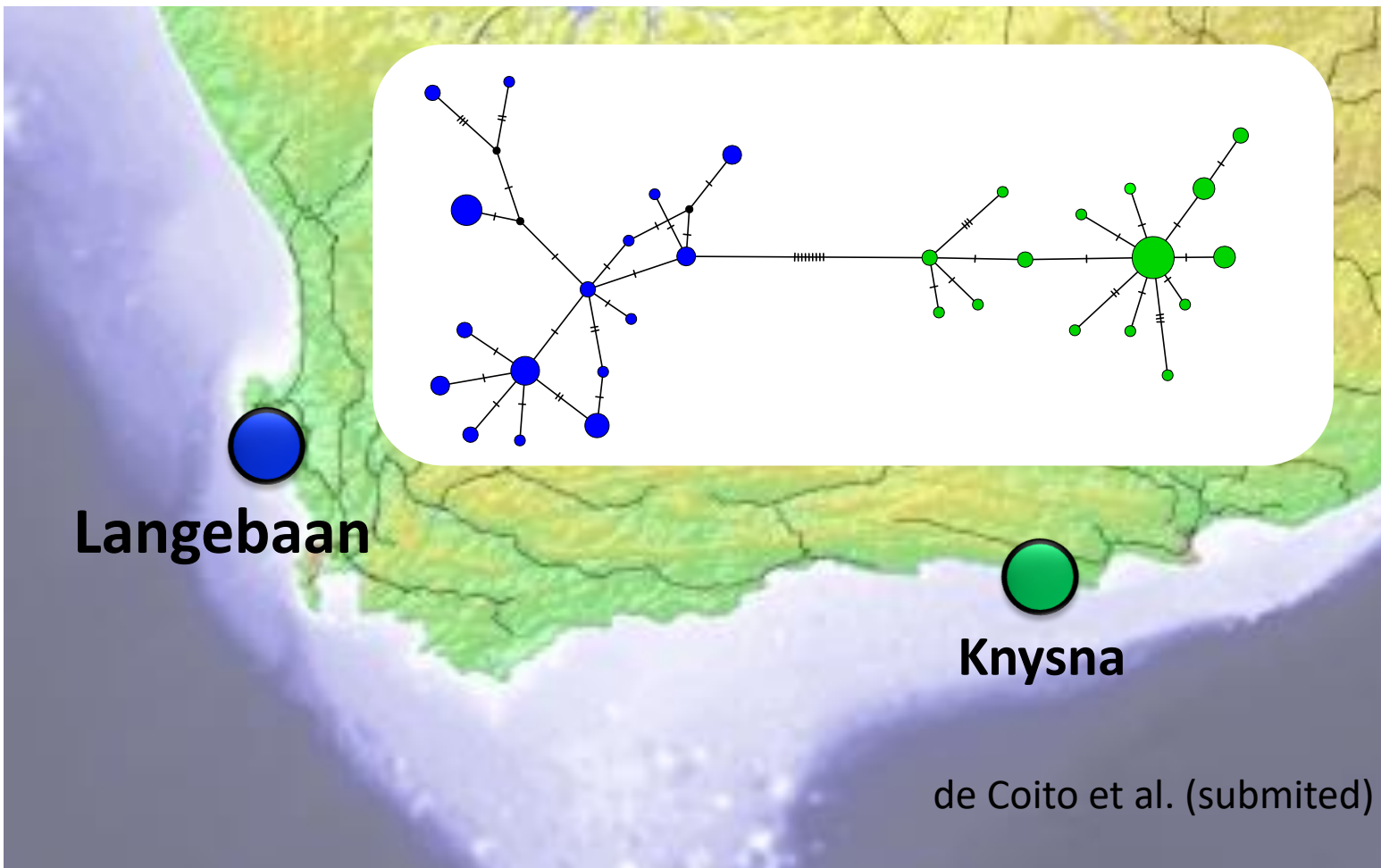
*Siphonaria compressa*
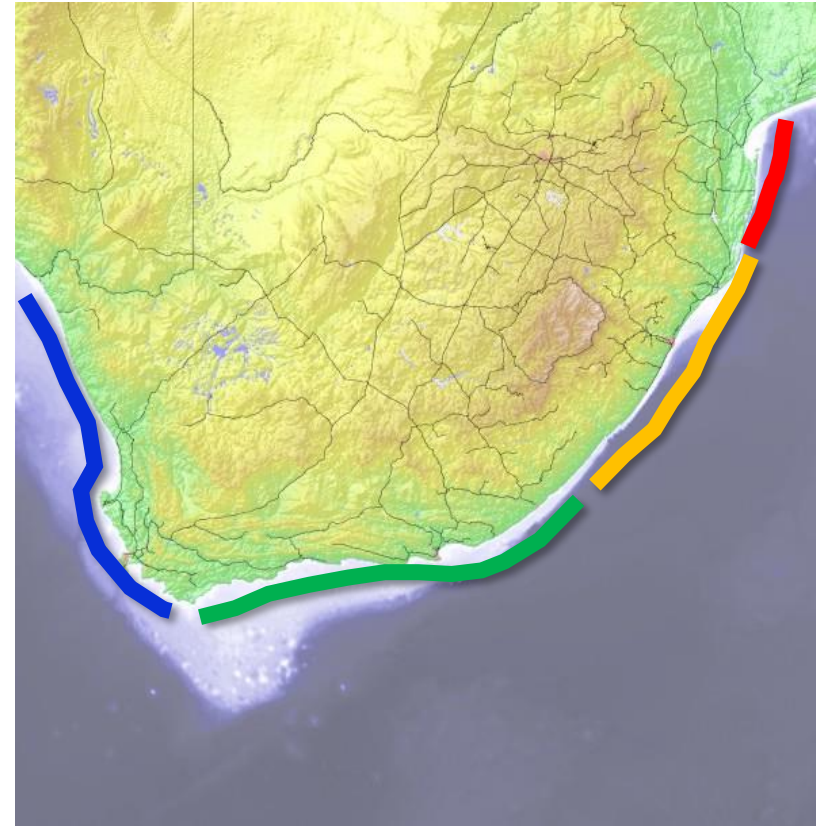**(Critically Endangered)**
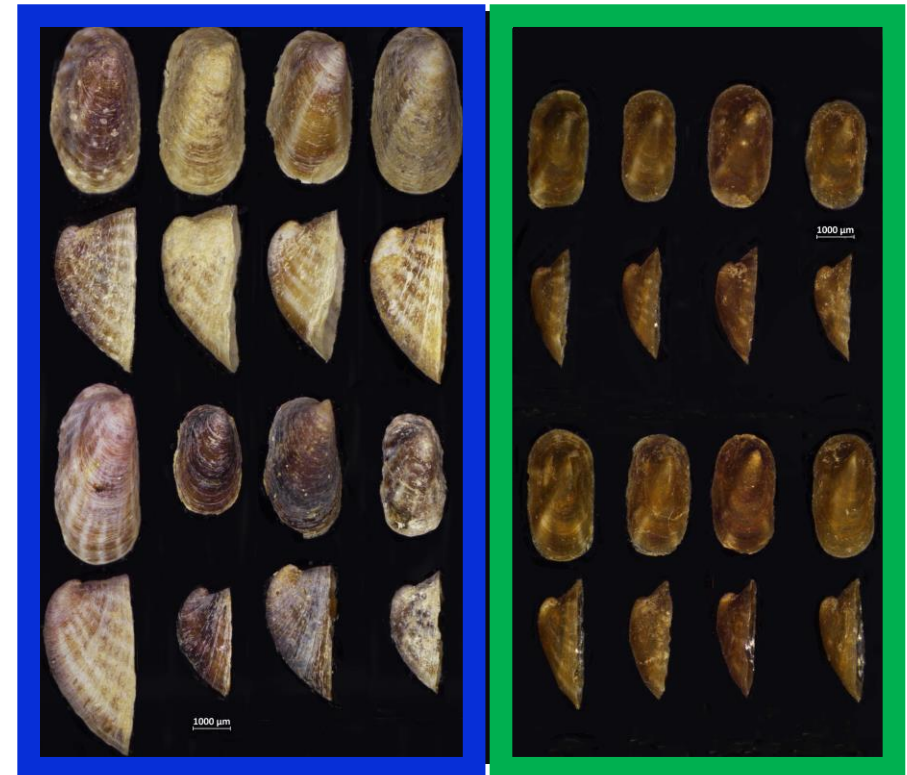
# Not all species exhibit structure
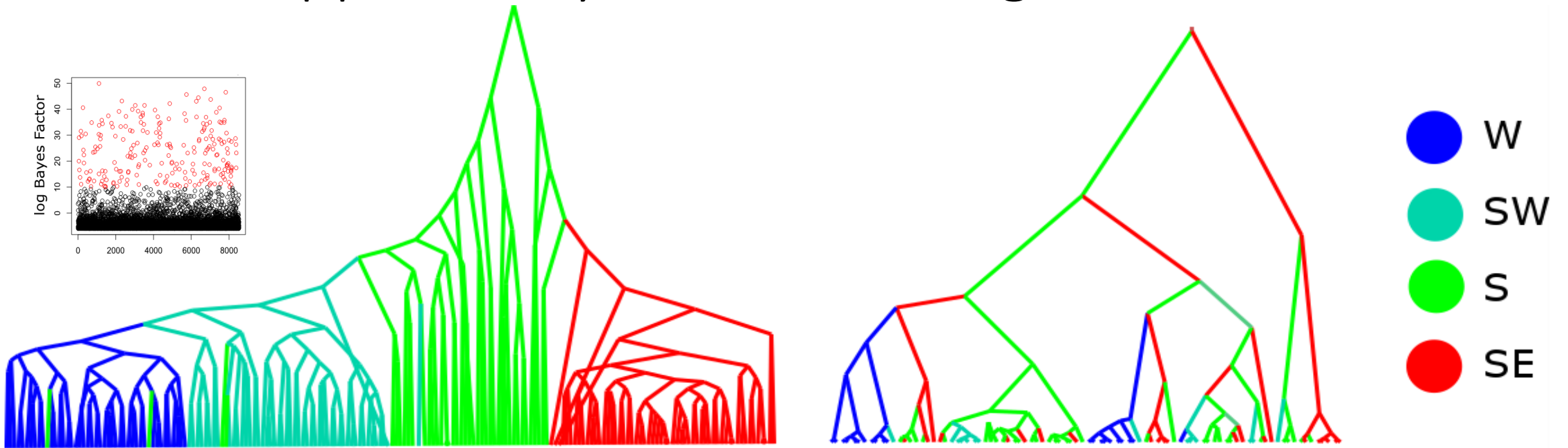## Does this depend on dispersal ability?



Active dispersers:
**Genetic homogeneity?**

Passive dispersers:
**Genetic structure?**

https://www.wikipedia.org
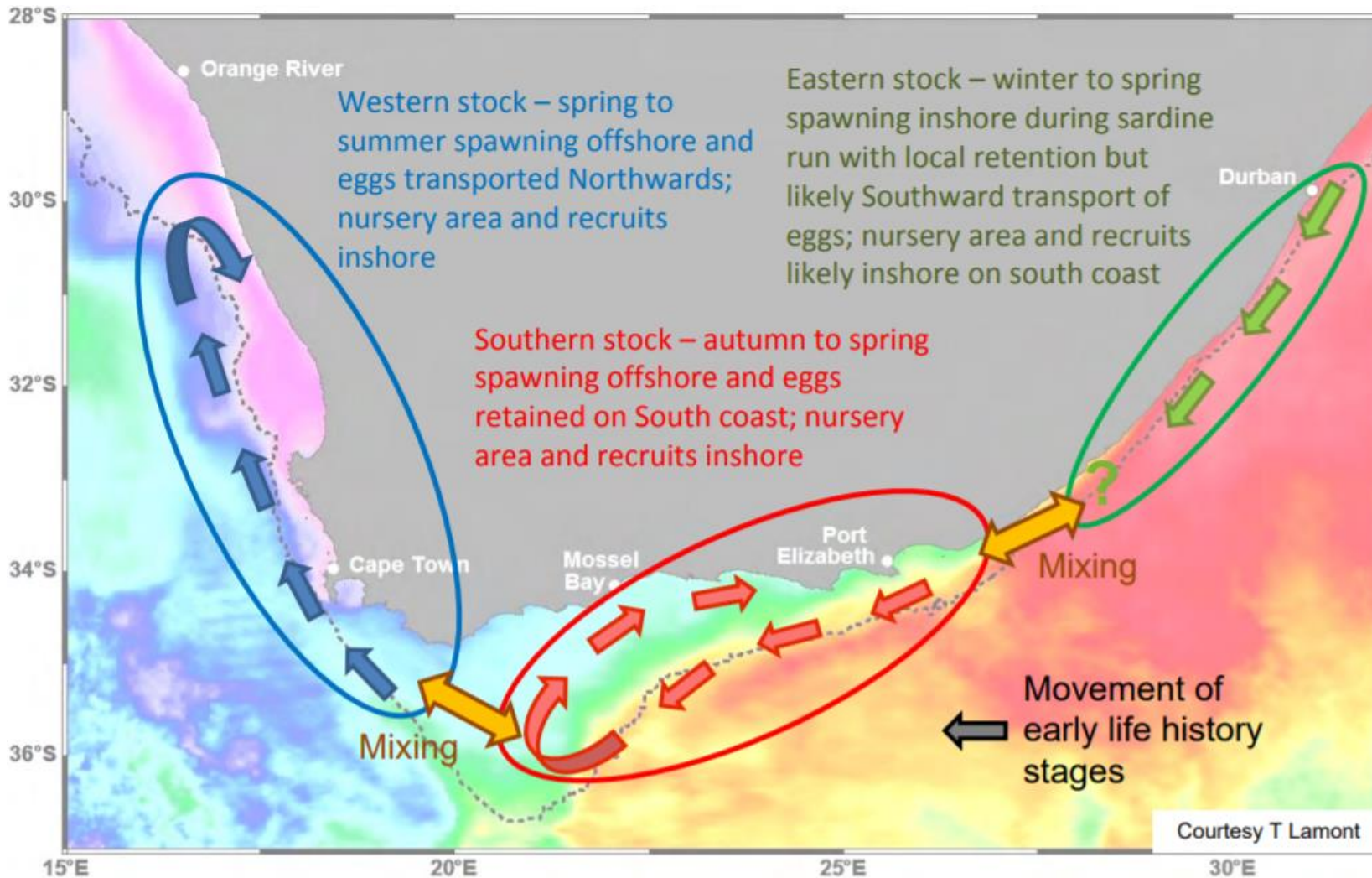
# Incipient ecological speciation?
## Not supported by DNA barcoding



**ddRADseq SNPs**
(under thermal selection)

**COI**
(incomplete lineage sorting)

Teske et al. (2019) Proc R Soc B 286: 20182023

Drost et al. (2016) Mar Biodivers 46:465-471

# 3 stock hypothesis



Western stock – spring to summer spawning offshore and eggs transported Northwards; nursery area and recruits inshore

Eastern stock – winter to spring spawning inshore during sardine run with local retention but likely Southward transport of eggs; nursery area and recruits likely inshore on south coast

Southern stock – autumn to spring spawning offshore and eggs retained on South coast; nursery area and recruits inshore

Mixing

Mixing

Movement of early life history stages

Orange River

Durban

Cape Town

Mossel Bay

Port Elizabeth

Courtesy T Lamont

van der Lingen C & Moloney C (unpublished)
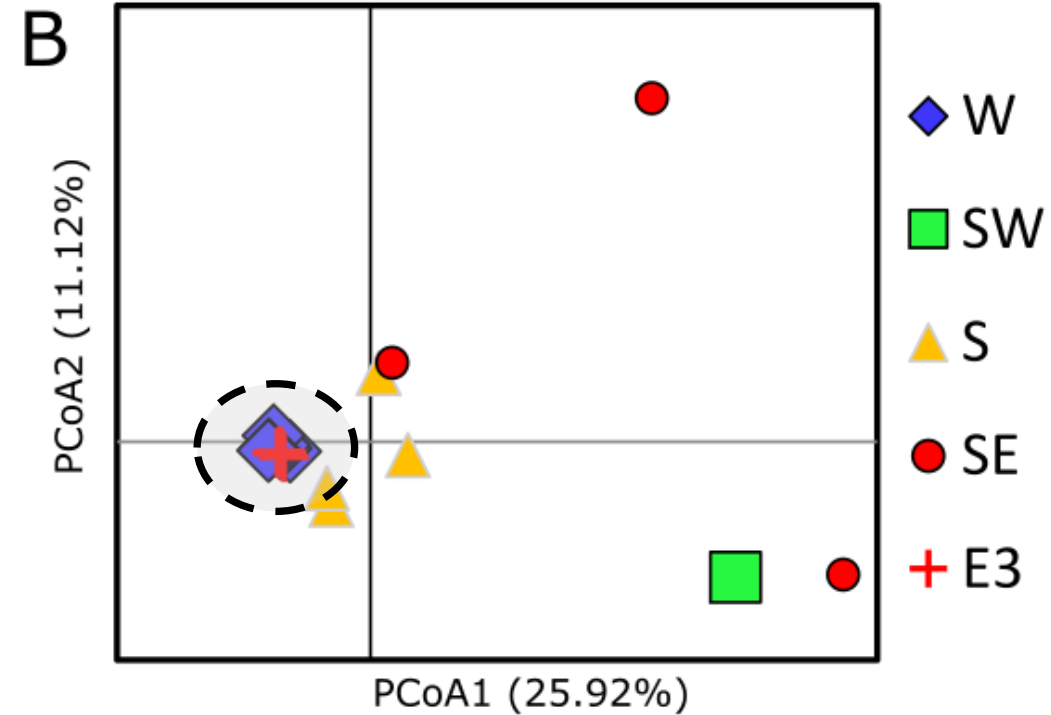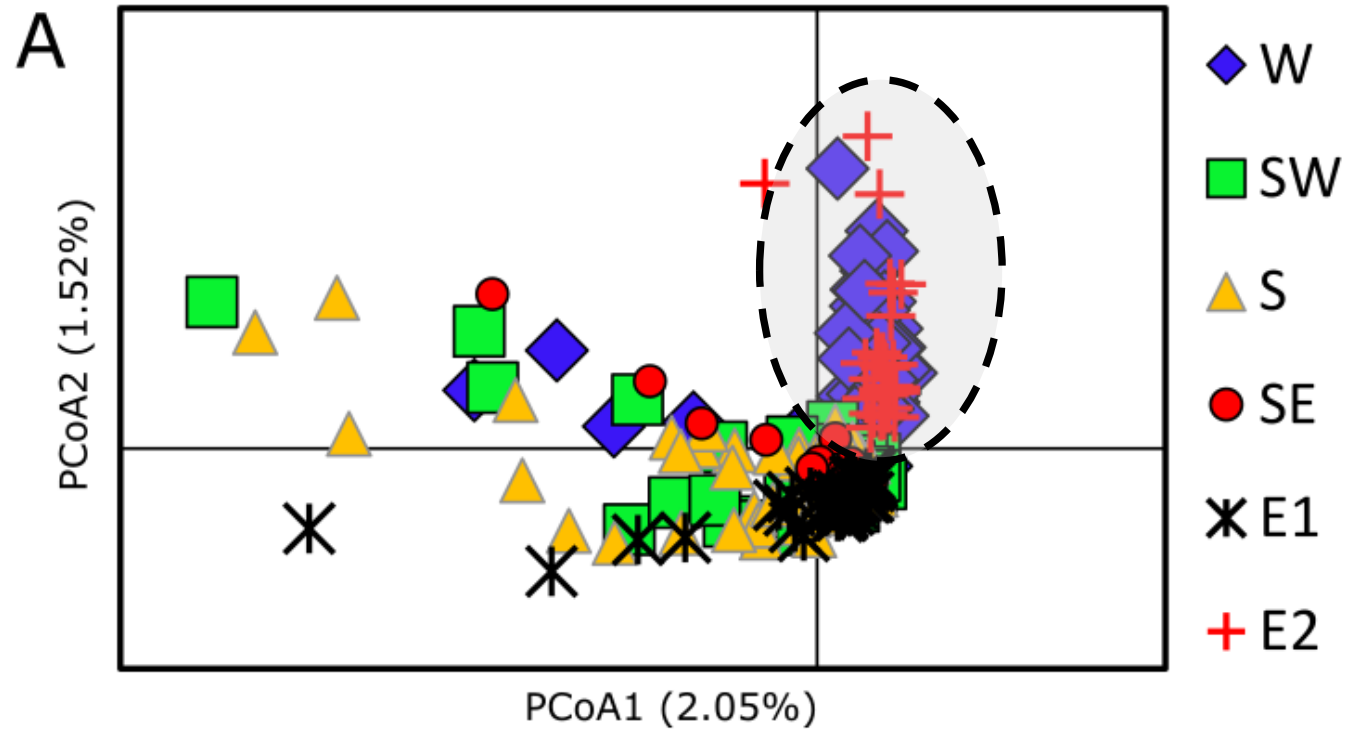
# Sampling and sequencing
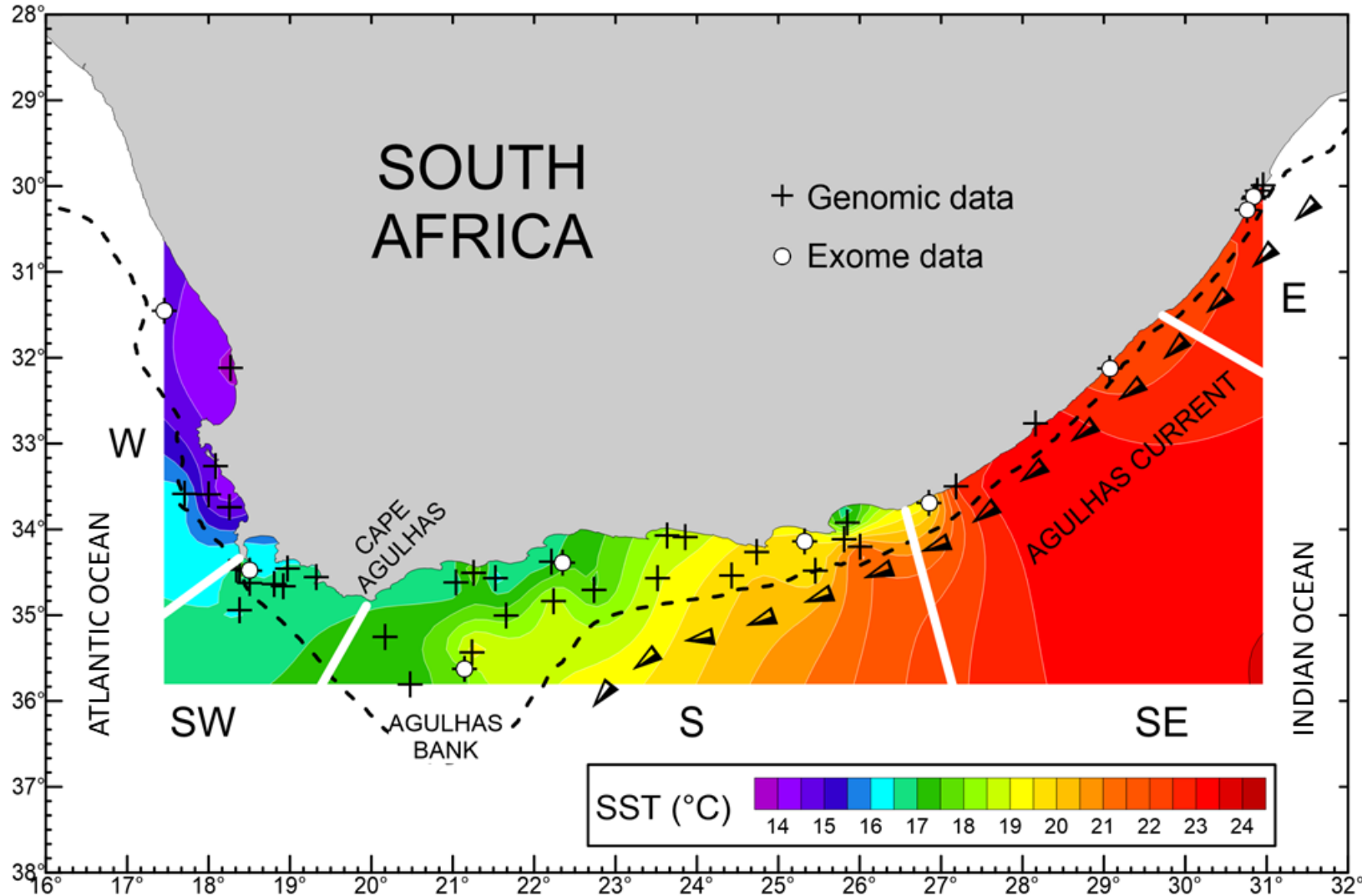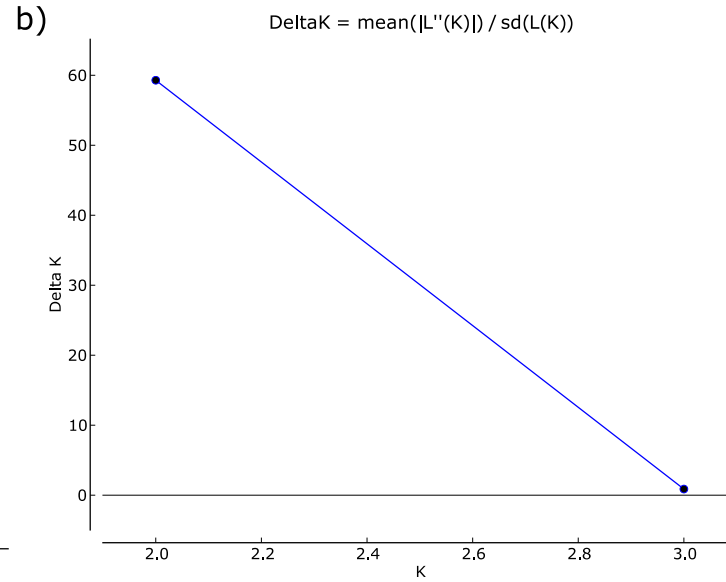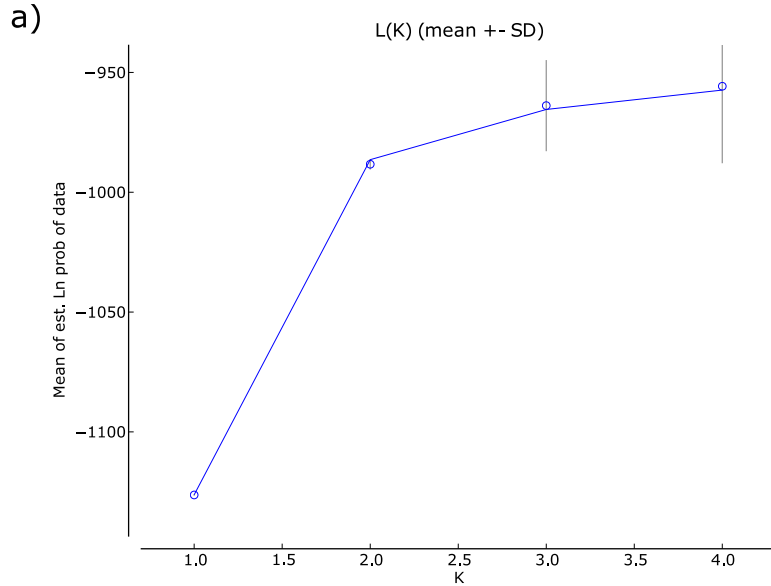


**Genomic data (ddRADseq):**
284 sardines
40 locations
8 295 SNPs

**Exome data (RNA-seq):**
14 sardines
7 locations
14 973 SNPs

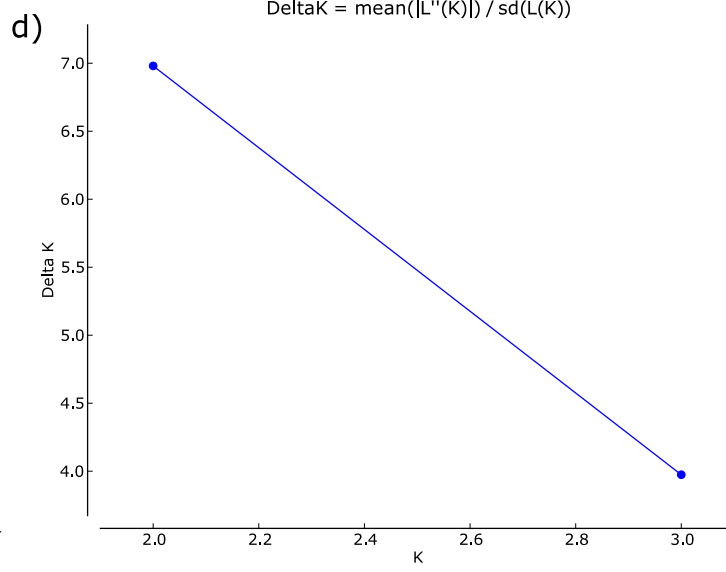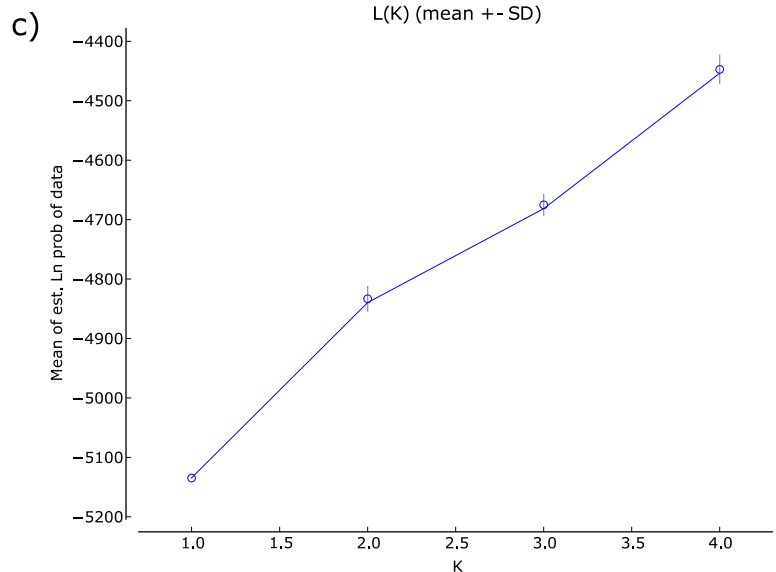Teske et al. (2021) Science Advances 7: eabf4514

# Selectively neutral SNPs



**Genomic data**

**Exome data**

# Candidate SNPs: Identification of clusters



**Genomic data**
*K* = 2

**Exome data**
*K* = 2

STRUCTURE analyses
followed by STRUCTURE HARVESTER

# Assignment to two stock components



Teske et al. (2021) Science Advances 7: eabf4514