

DISTRIBUTION, HABITAT, GENETICS AND STABLE ISOTOPE SIGNATURES IN SYNGNATHID FISHES FROM CÍES ARCHIPELAGO (ATLANTIC ISLANDS NATIONAL PARK, NW SPAIN)

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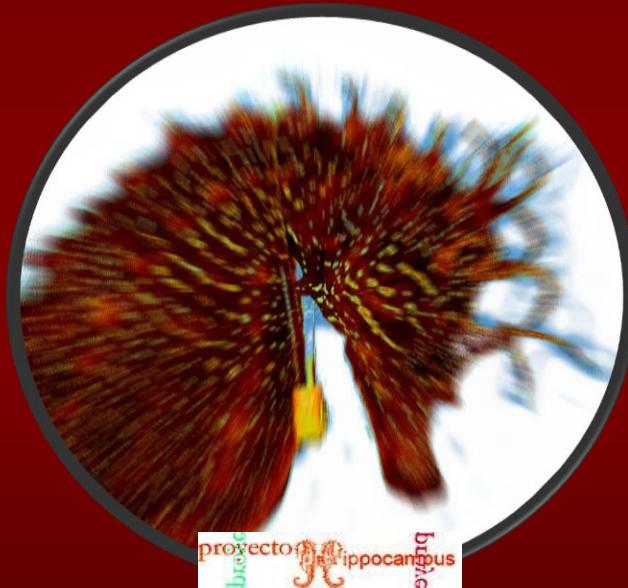
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**ISMS 2018 - Workshop Patrimonio Cíes
Vigo (Spain), 20-22th June 2018**

Proyecto Hippoparques 1541S/2015

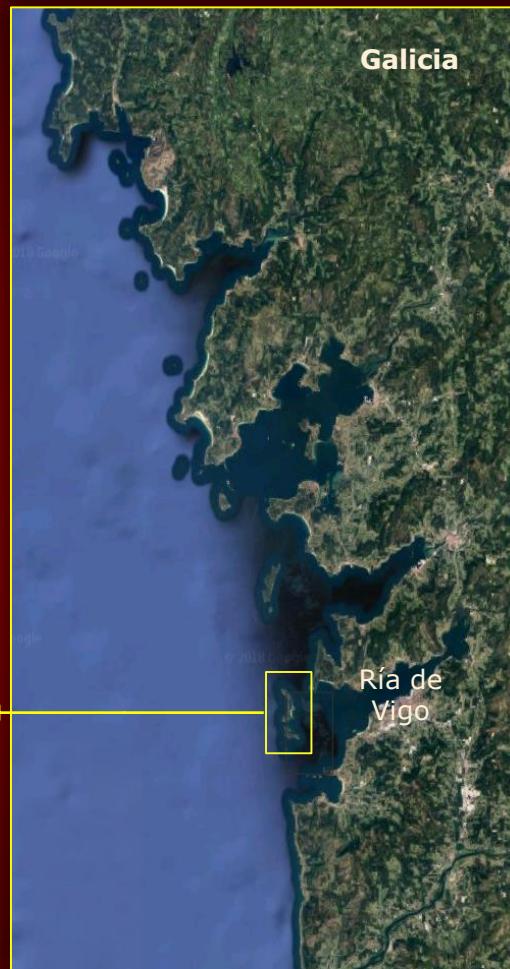


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MINISTERIO
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ALIMENTACIÓN Y MEDIO AMBIENTE

Sampling area: Cíes Archipelago (NW Spain)



Syngnathids in Cíes Archipelago



Syngnathus acus



Hippocampus guttulatus



© marevision

Hippocampus hippocampus

Surveys 2016: 10 transects along Eastern coast



Underwater visual transects
From 2 to 20 m depth
100 – 400 m length
Duration: 1 hour
4-5 persons



Sampling

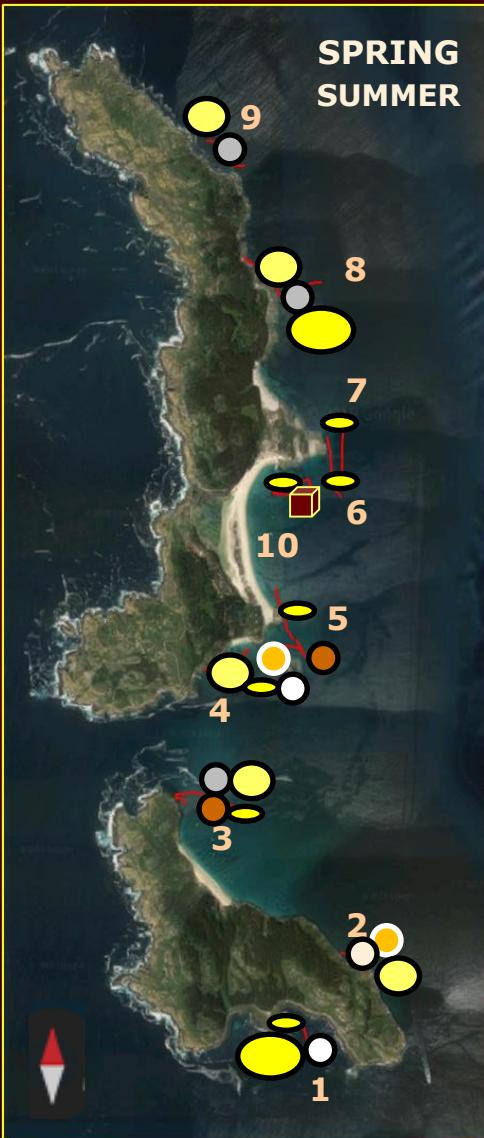
- Substrate
- Vegetal communities
- Syngnathid fishes



Length / Weight
Sexual maturation
Fin clipping (SIA, Genetics)
Sampling of embryos/juveniles
Labelling (VIE)
Return to original site



Substrates characterization



Sampling (52 samples; spring 2016)

Gravel (10%)

Coarse (medium) sand (89%)

Silt (<1%)

Average particle size: 620 µm (coarse sand)

High calcium carbonate content (60%)

- C: Cobbles
- G: Gravel
- VCS: Very coarse sand
- CS: Coarse sand
- MS: Medium/Fine sand
- S: Silt
- M: Maërl
- R: Rocks

Surveys 2016: Vegetal communities

55 species with medium-high density

25 Rhodophyta

25 Ochrophyta

5 Chlorophyta

10 allochthonous species
(*Asparagopsis armata* –
sporophite phase *Falkenbergia*
rufolanosa-)

1/3 of the species were identified in most surveyed sites:

Brown algae: *Cystoseira baccata*, *C. usneoides*, *Dictyota dichotoma*, *Padina pavonica*, *Saccorhiza polyschides*.

Red algae: *Asparagopsis armata* - *Falkenbergia rufolanosa*, *Corallina spp.*, *Gracilaria spp.* *Lithophyllum spp.*, *Mesophyllum expansum*, *Peyssonnelia spp.*, *Plocarmium cartilagineum*

Green algae: *Codium tomentosum*, *C. vermilara*, *Ulva spp.*



Syngnathids: Distribution and abundance



Species (mostly at 3-8 m depth)

● *Syngnathus acus* ($n=27$)

31.8 ± 10.0 cm
 $14.8 - 49.7$ cm



● *Hippocampus guttulatus* ($n=4$)

22.6 ± 2.0 cm
 $18.7 - 22.7$ cm

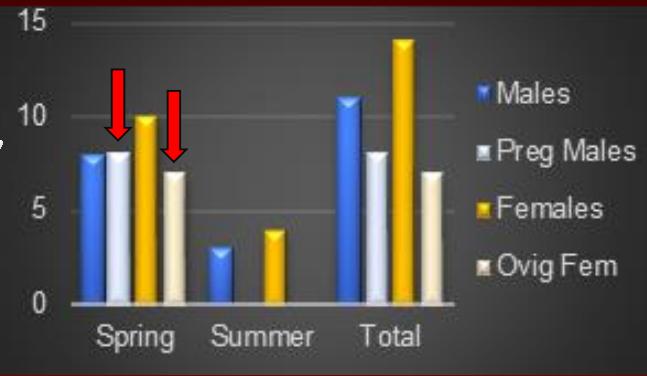


● *Hippocampus hippocampus* ($n=1$)



Syngnathids: Distribution and abundance

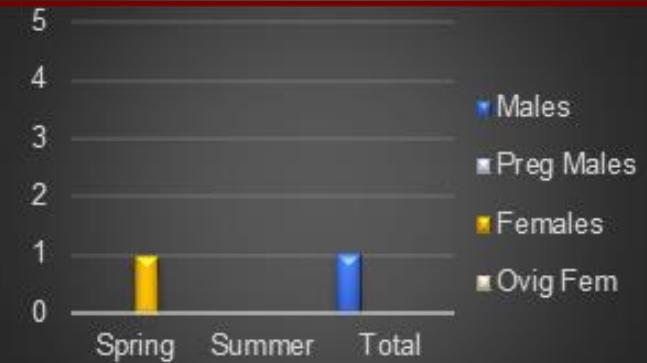
● *Syngnathus acus*



● *Hippocampus guttulatus*

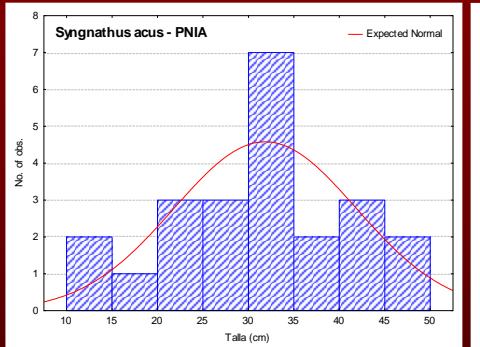


● *Hippocampus hippocampus*

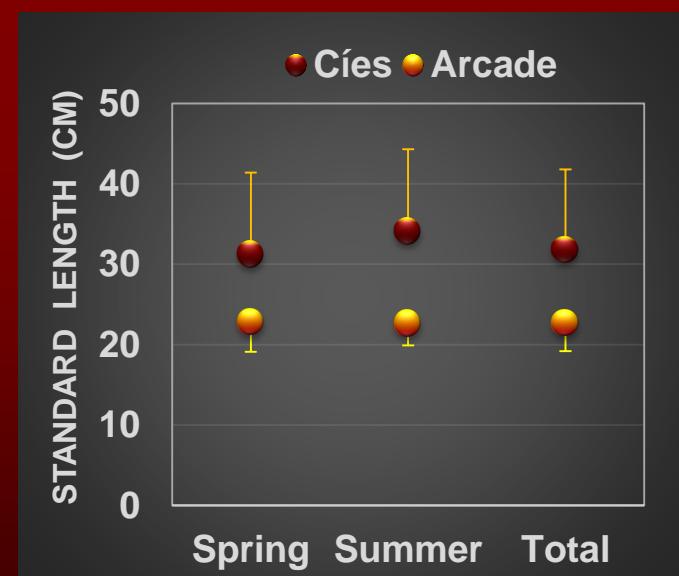
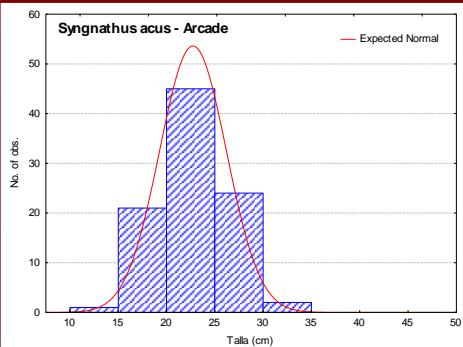


**Rocky-sandy bottoms
populated by:**
Cystoseira baccata
Asparagopsis armata
Codium tomentosum
Padina pavonica

Syngnathus acus: Cíes vs Arcade



Length: Cíes vs Arcade

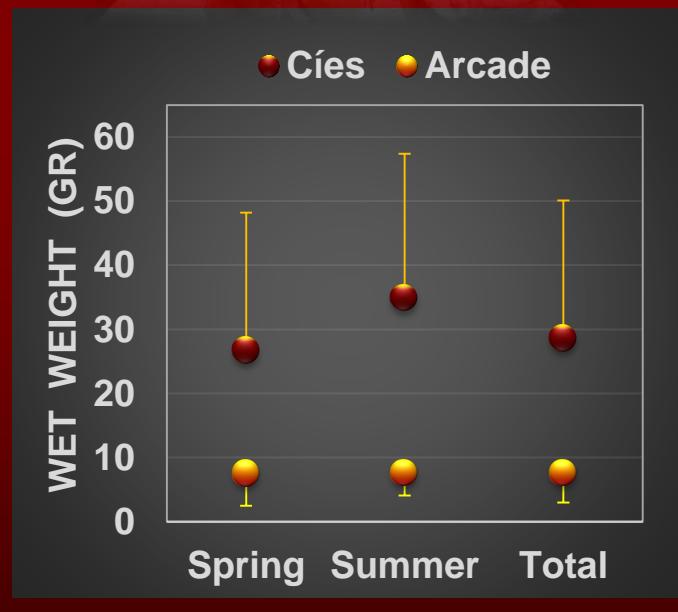


Syngnathus acus: Cíes vs Arcade



Significantly differed in size and weight

Cíes >> Arcade



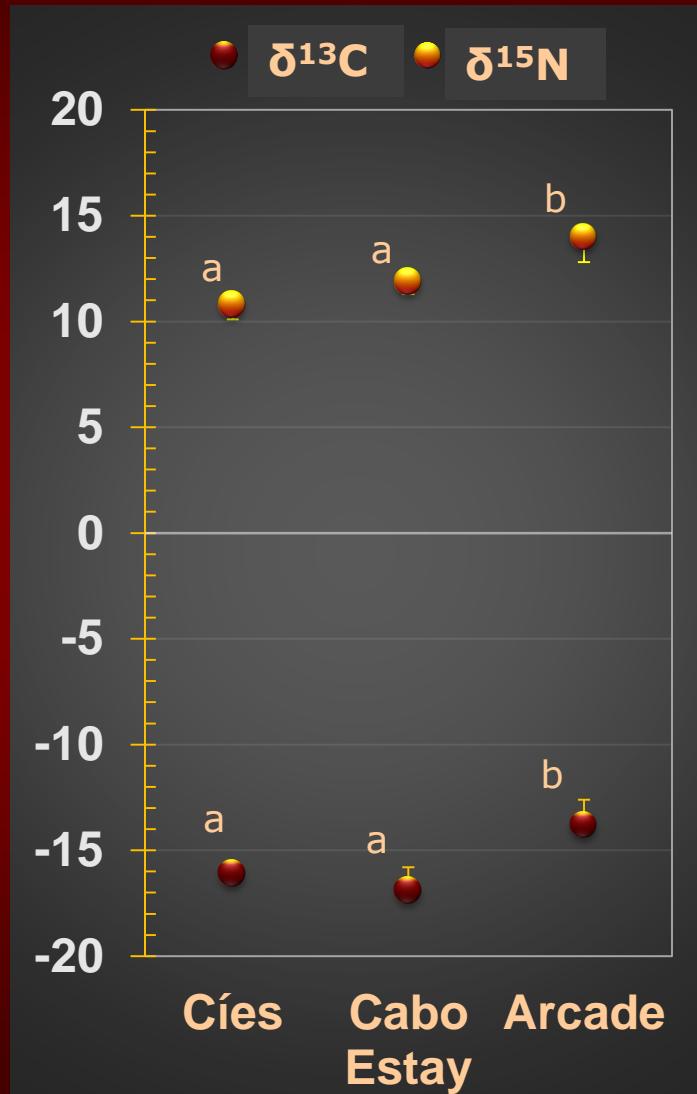
Weight: Cíes vs Arcade

Stable isotopes: Cíes vs other areas



Isotopic signatures in Syngnathids for Cíes were similar to those from Cabo Estay but significantly lower than those from Arcade.

Do they differ in diet composition or isotopic turnover rates?



Stable isotopes: Syngnathids from Cíes

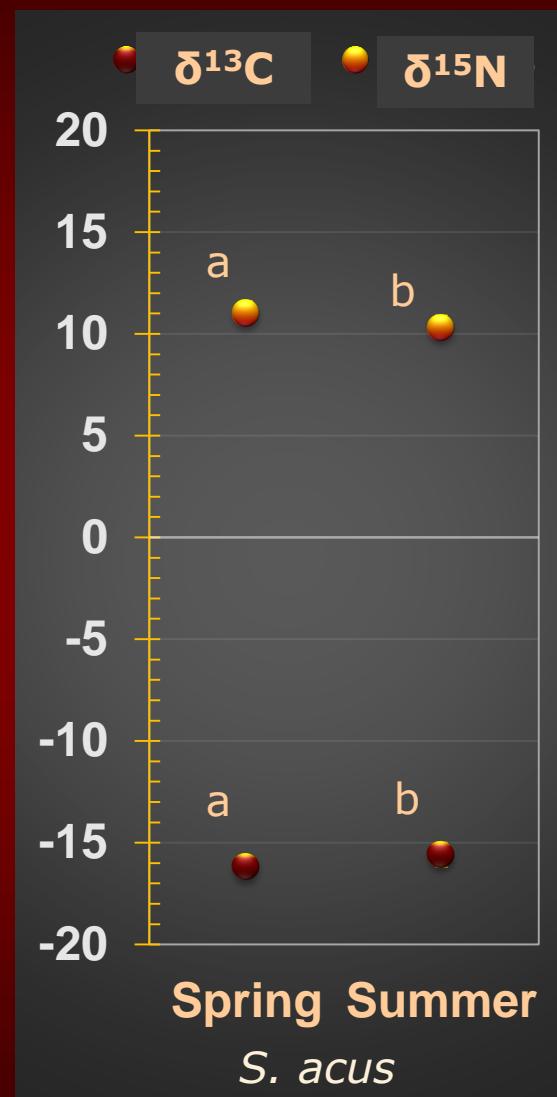
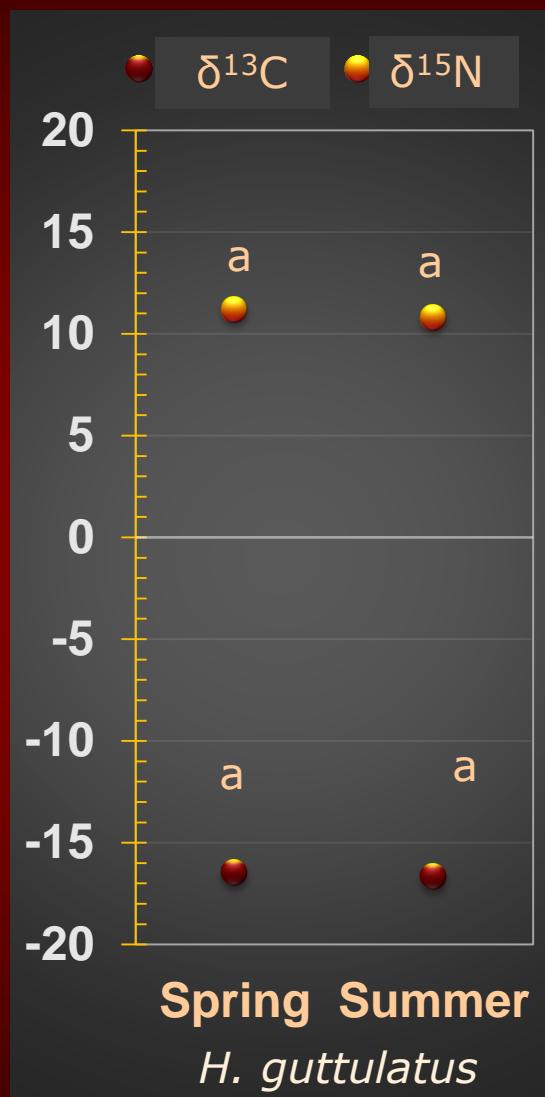
H. guttulatus

Similar isotopic signatures within seasons.

S. acus

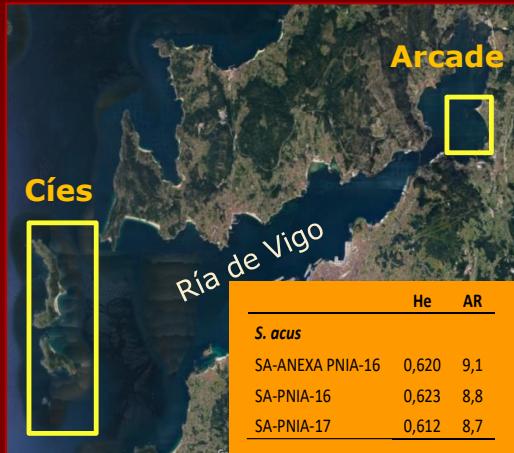
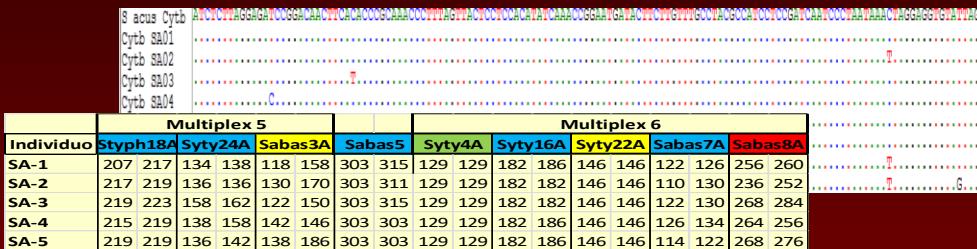
Changes in isotopic signatures with seasons.

Changes in diet composition need to be assessed (under study)

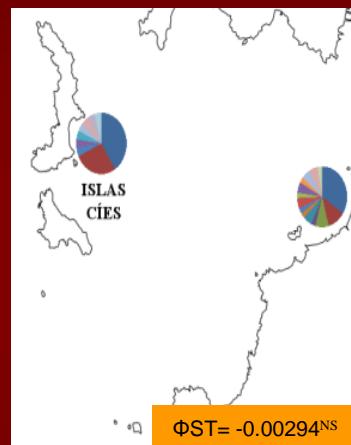


Conservation genetics: *Syngnathus acus*

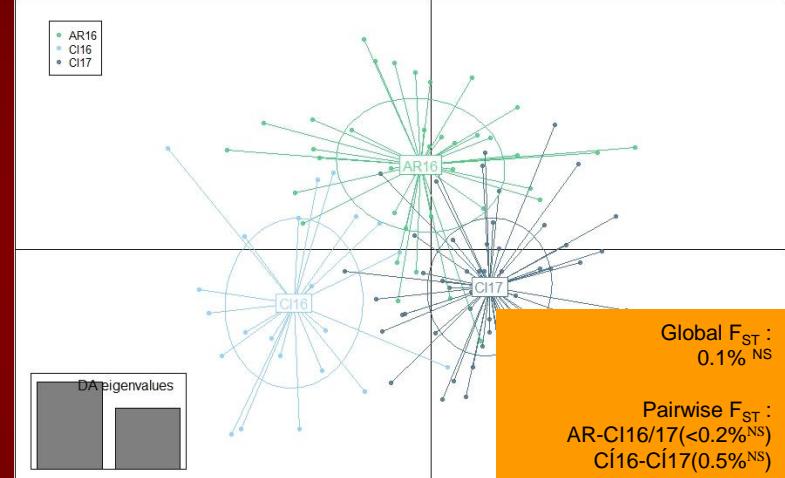
**Species/Population/Individual DNA barcoding:
mtDNA (cytochrome b) and microsatellite (9 loci) markers**



Similar genetic diversity (He) and allelic richness (AR) among spatial and temporal *S. acus* (SA) samples from Cíes-PNIA and Arcade.



Major matriarchal cytb haplotypes were shared between locations. No significant mtDNA differentiation.



Very low and non significant differentiation index both global and between pairs of populations: $F_{ST} < 0.5\%$ of total genetic diversity due to interpopulation differences

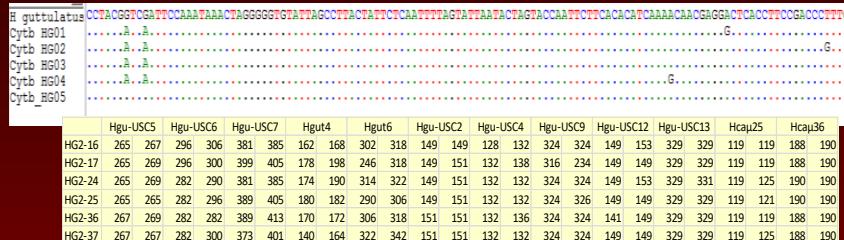
Temporary stable genetic diversity in Cíes Archipelago, connected by gene flow with populations from annex areas of Ría de Vigo as part of a single panmictic (random mating) population.

Conservation genetics: *Hippocampus guttulatus*

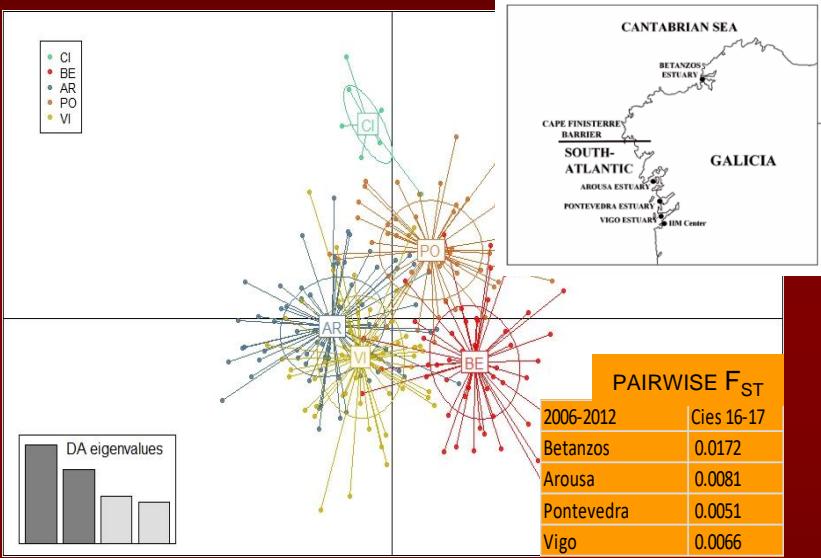
Species/Population/Individual

DNA barcoding:

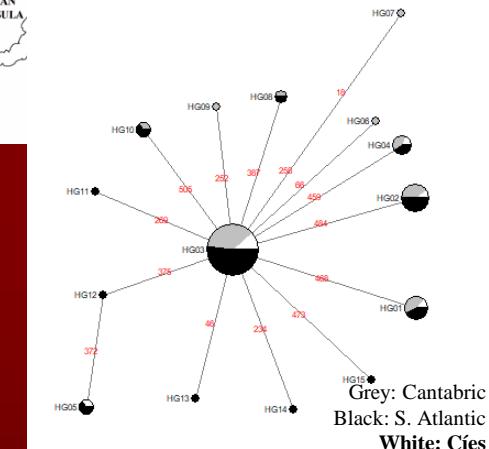
mtDNA (cytochrome b) and microsatellite (12 loci) markers



Similar genetic diversity (He) and allelic richness (AR) between samples from Cíes and Vigo Estuary.



Very low and non significant differentiation index: $F_{ST} < 2\%$ of total genetic diversity due to interpopulation differences between Cíes and other Galician populations.



Major mtDNA haplotypes shared among all Galician locations. Non significant mitochondrial differentiation.

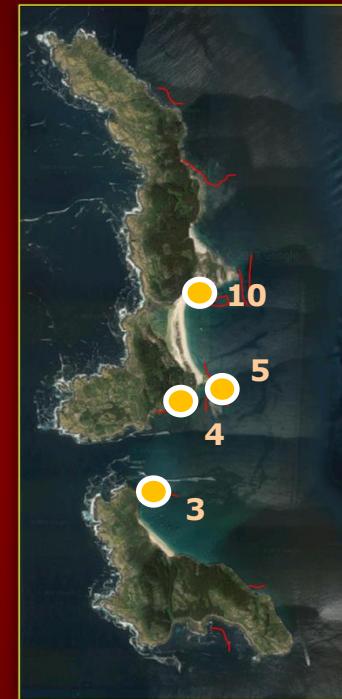
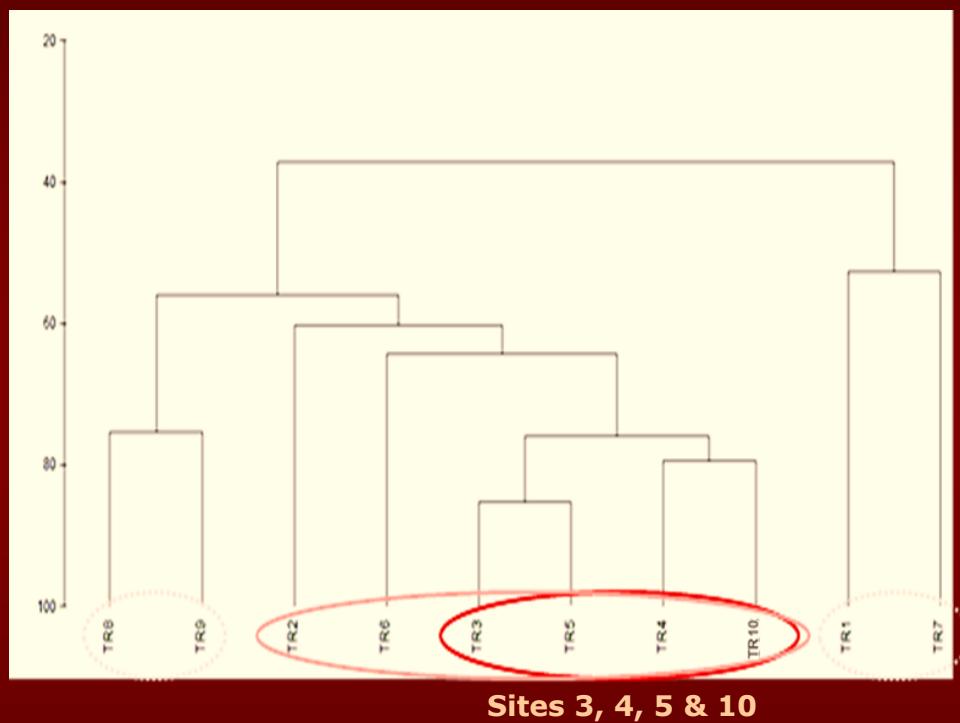
Temporary stable genetic diversity in Cíes Archipelago, connected by gene flow with populations from annex areas of Ría de Vigo as part of a single panmictic (random mating) population.

DNA barcoding useful for non-lethal genetic monitoring of vulnerable syngnathid species: taxonomy, population analysis and individual traceability

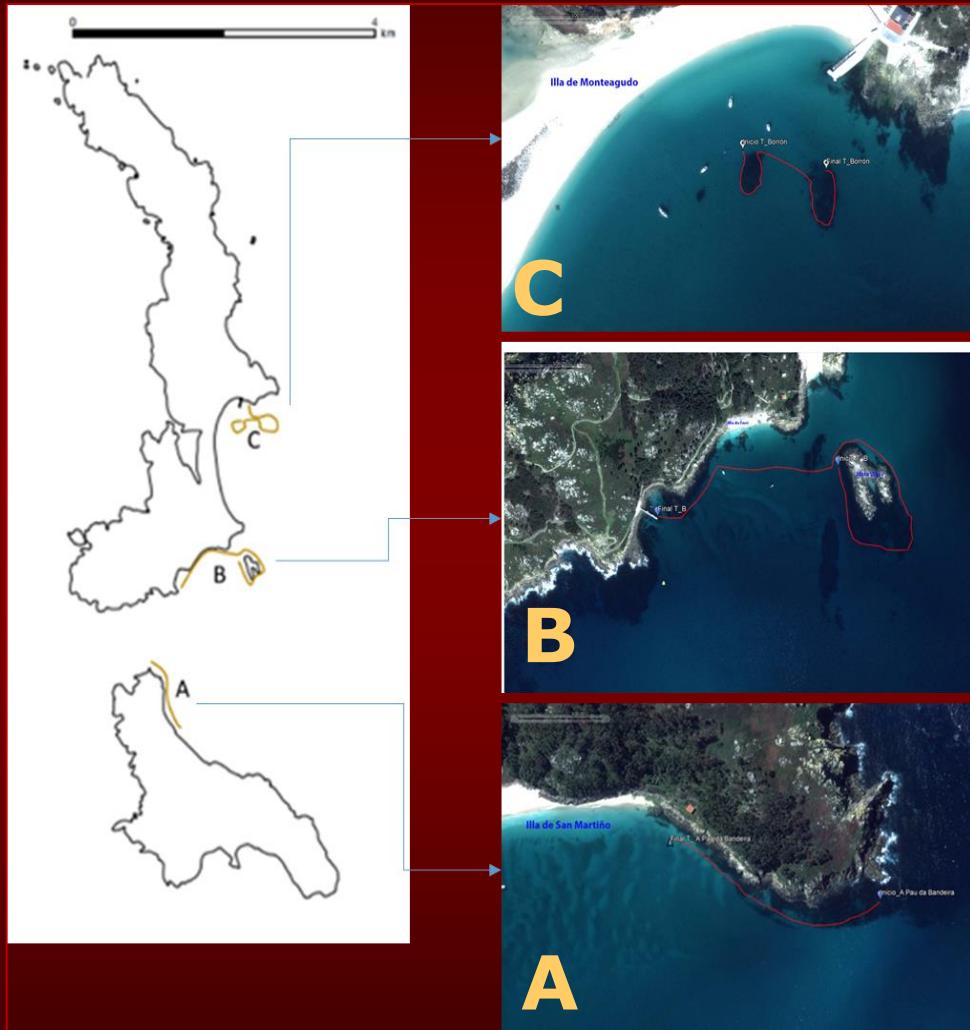
Vegetal communities similarity

Cluster of location similarities

From data of medium-high density vegetal species (>5% dominance)



Sites selected for 2017 surveys



Substrate

Rocky-sandy bottoms

Gravel

Maërl

Habitat

**Macroalgae communities
generating habitat and
protection to Syngnathids**

Cystoseira baccata

C. usneoides

Dictyota dichotoma

Padina pavonica

Saccorhiza polyschides

Asparagopsis armata

Gracilaria spp.

Codium tomentosum

Ulva spp.

General conclusions



Three species identified:

S. acus (dominant)

H. guttulatus (low density, highly restricted area)

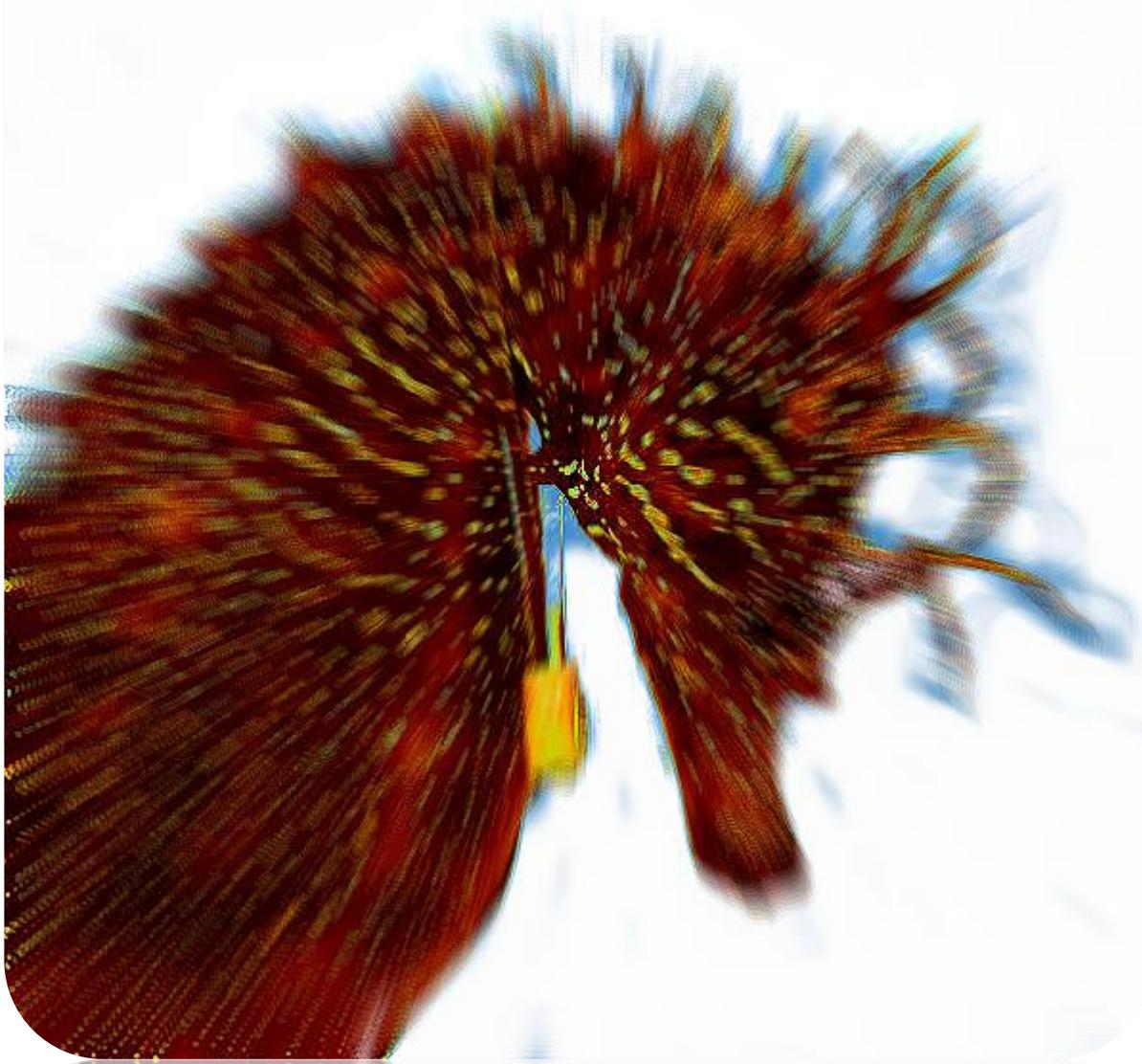
H. hippocampus (highly rare)

Interest:

- *Central Cíes Archipelago is a reduced but valuable reserve deserving future conservation plans for Syngnathids.*
- *Most Syngnathids were located in areas with similar algal communities and higher protection against sea currents and storms.*
- *Potential breeding area, particularly for S. acus.*
- *Temporary stable genetic diversity (gene flow with populations from annex area).*

Selected areas for monitoring in 2017 and 2018

- *Pau da Bandeira*
- *Viños-Carracido*
- *Borrón*



Thank you !!!!