Catchment land cover effects on stream food webs: What do isotopes say?

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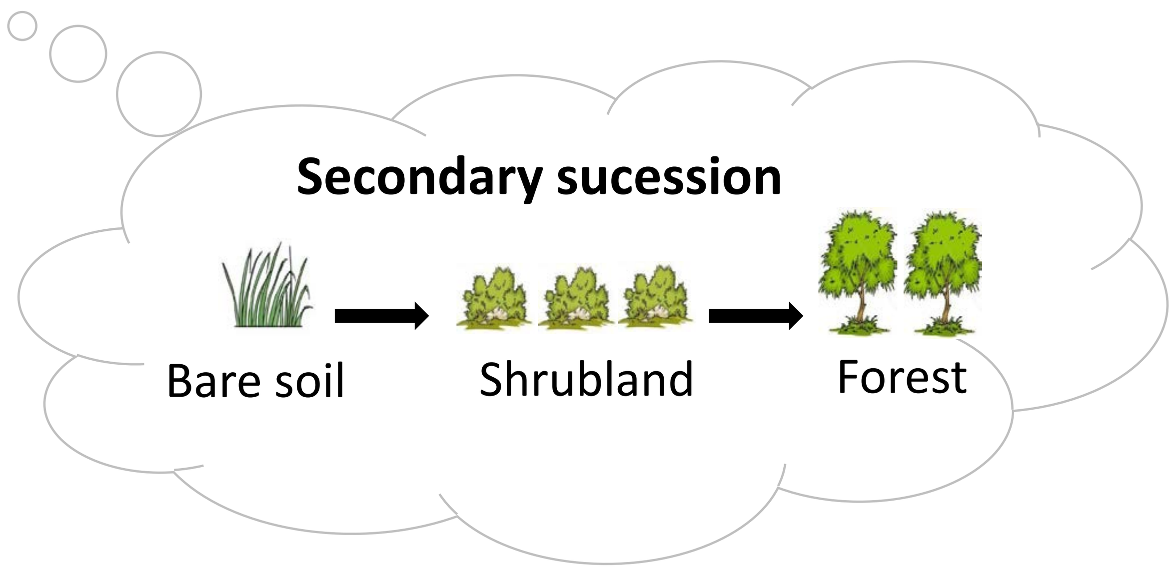
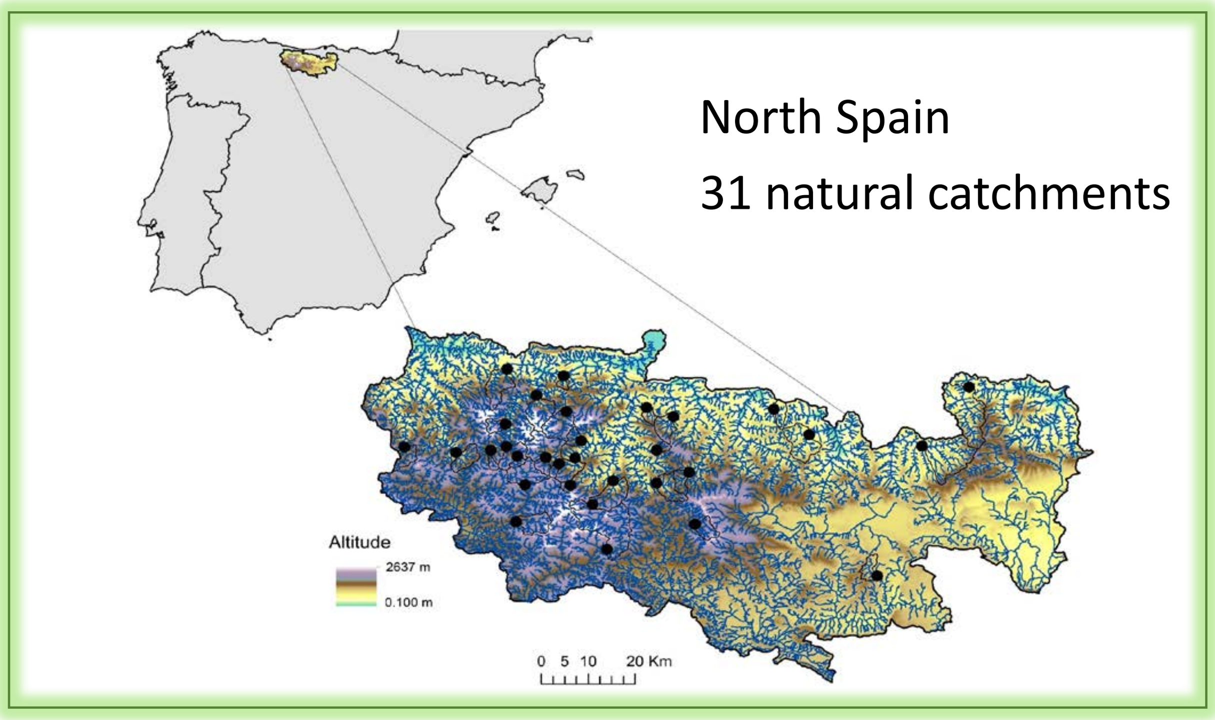
INTRODUCTION

In the last decades, mountainous territories in the North Hemisphere have suffered a dramatic rural exodus and the subsequent abandonment of agricultural land and reduction in grazing in natural communities. This abandonment of the territory has promoted a natural secondary ecological succession characterized by a shrubland increase and forest expansion.

Streams are known to be strongly connected to their watersheds and consequently are highly influenced by the catchment land uses. However, past land uses can have persistent effects on the ecosystem structure and functions, even after terrestrial areas re-vegetate. Since mountain streams play a key role in biodiversity conservation and are sentinel ecosystems for the impacts of global change, the better understanding of the land cover effects on stream food webs may enable scientists, landscape managers and policy makers to improve ecosystem restoration and conservation policies.



STUDY AREA



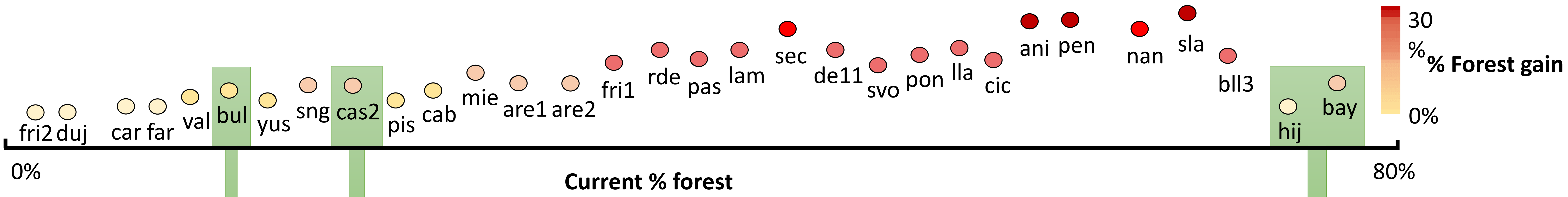
METHODOLOGY

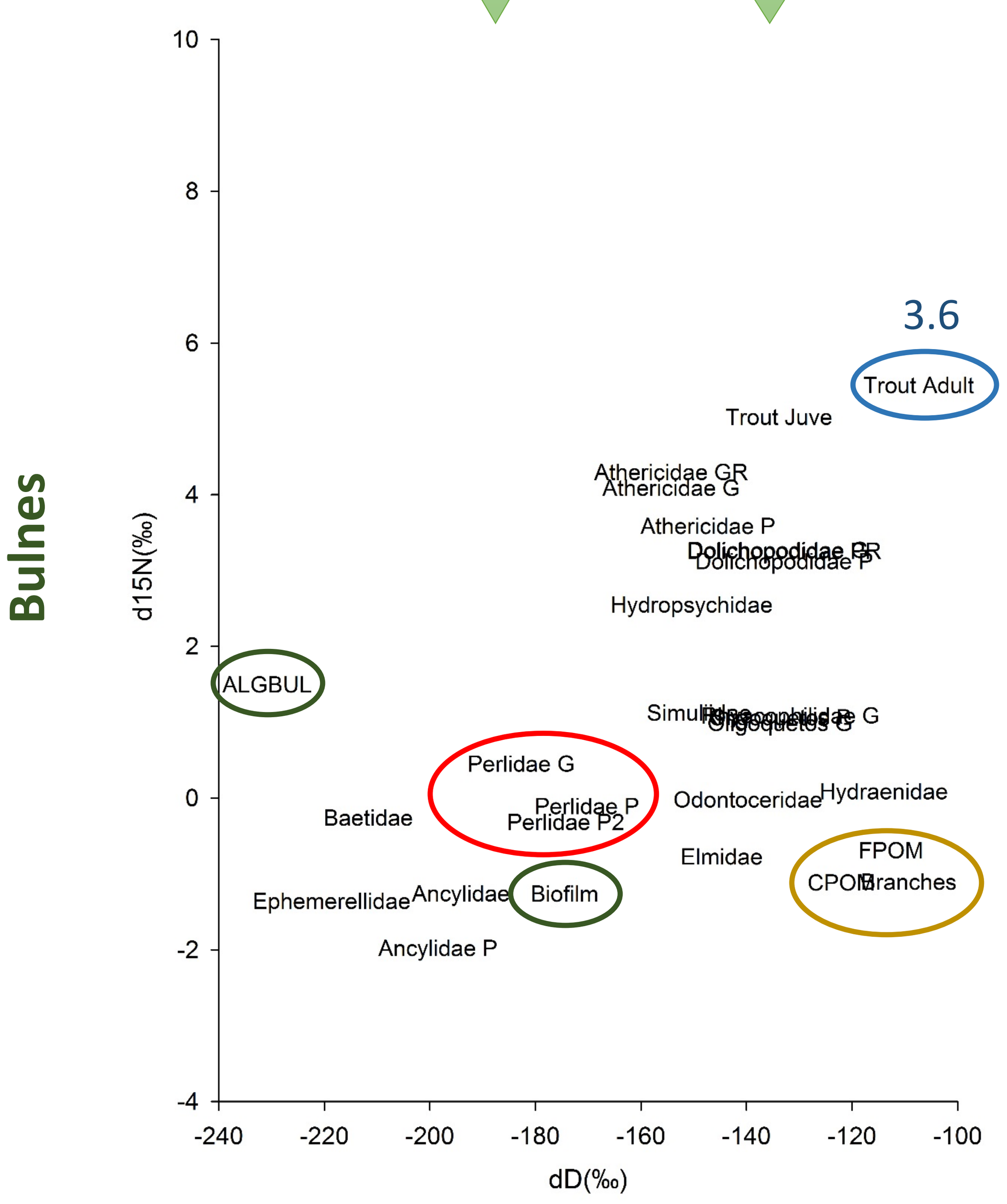
Land use

- Satellite images of the years 1984 and 2009
- 8 category classification (including forest) using a maximum likelihood algorithm
- % forest cover at the pixel level from fuzzy maps
- Forest gain: post-classification comparison methodology

Food webs

- Basal resources + invertebrates+ Fish fins (Acidified)
- δ15N & δD
- FCL: $2+[(d15N)_{top\_pred} - (d15N)_{base})]/3.4$

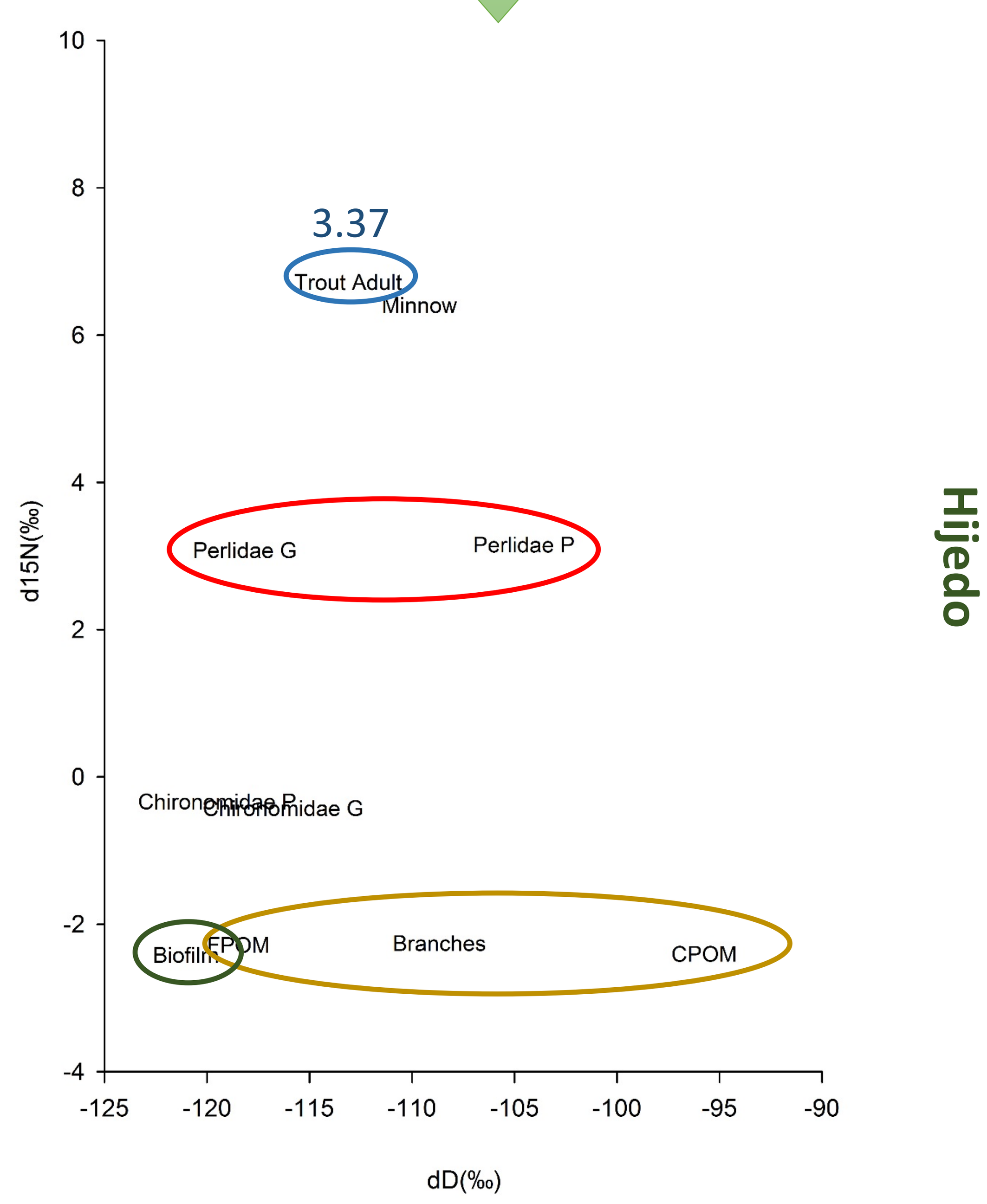




KEY QUESTION

Does land cover in the catchment affect stream food webs?

- Autocthonous food resources
- Allocthonous food resources
- 1st Predators
- Top predators (FCL)



RESULTS

Basal resources

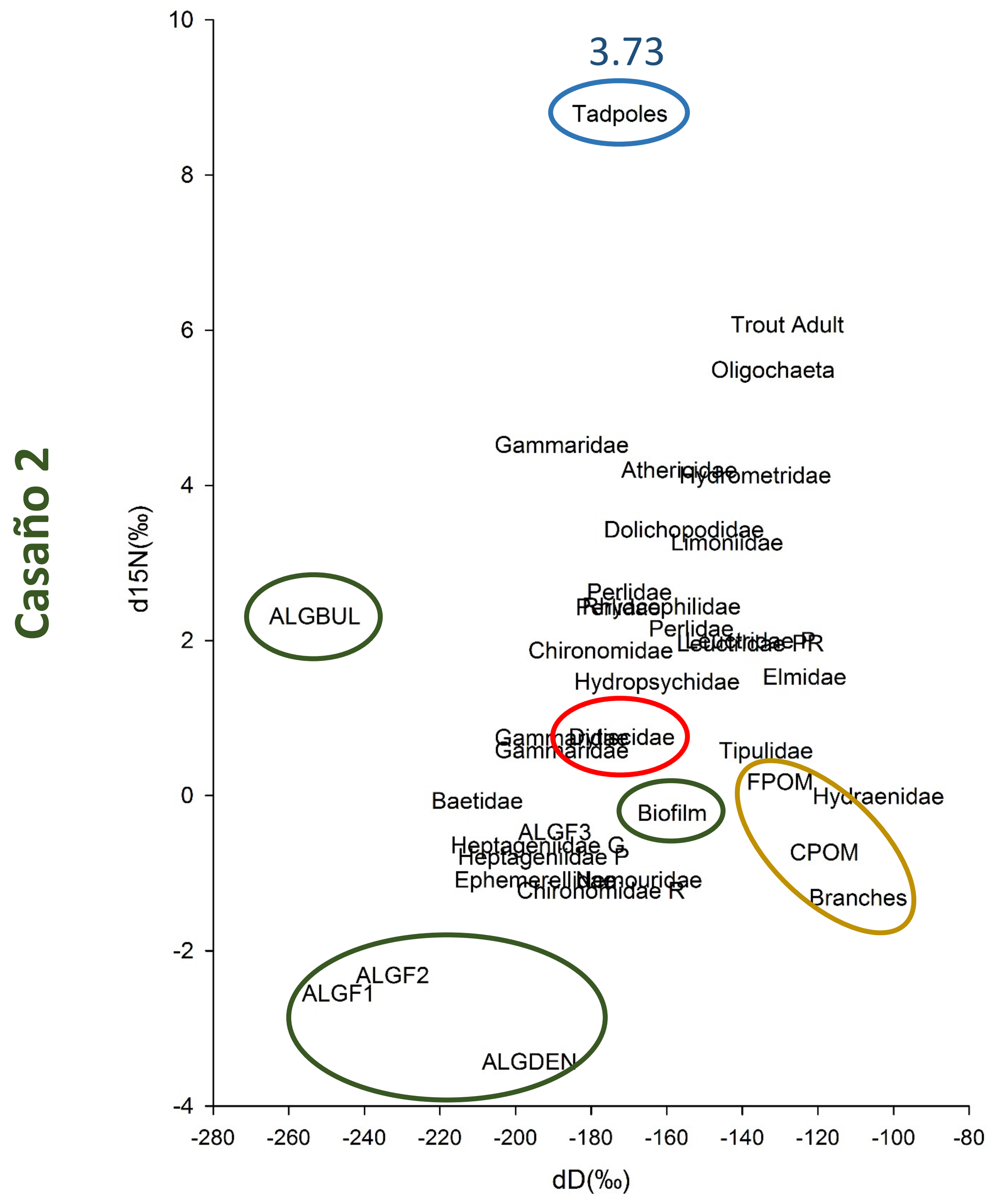
- No algae in forested streams
- Similar isotopic signal of autoc. vs alloc. in forested streams (few biofilm biomass)

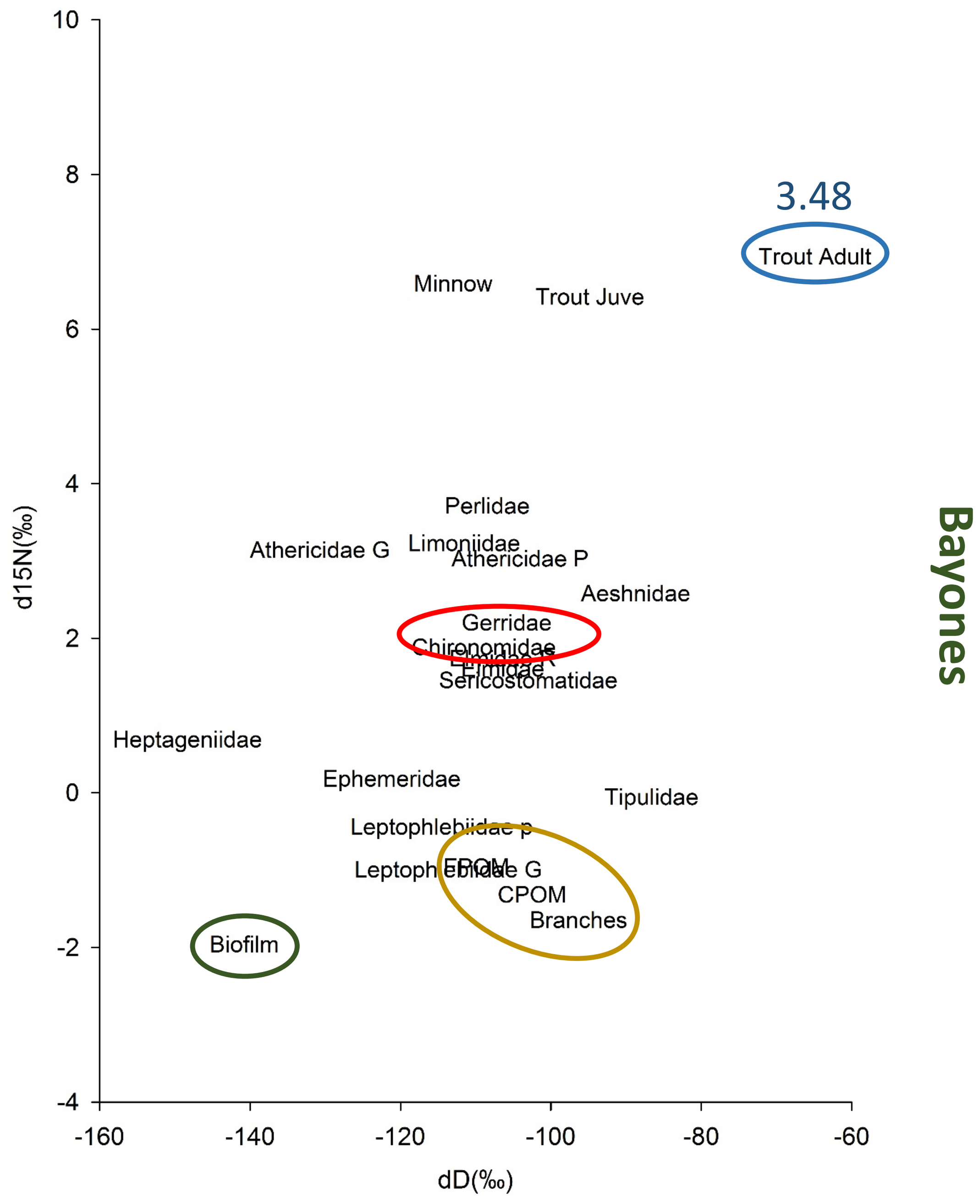
Autochthony vs allochony 1st predators

Site	% Autochthony	% Allochthony
Bulnes	77	23
Casaño 2	48	51
Hijedo	28	73
Bayones	12	88

Food Chain Length
Similar but shorter in more forested streams

Top predator
Trout adults (except for tadpoles in Casaño2)





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