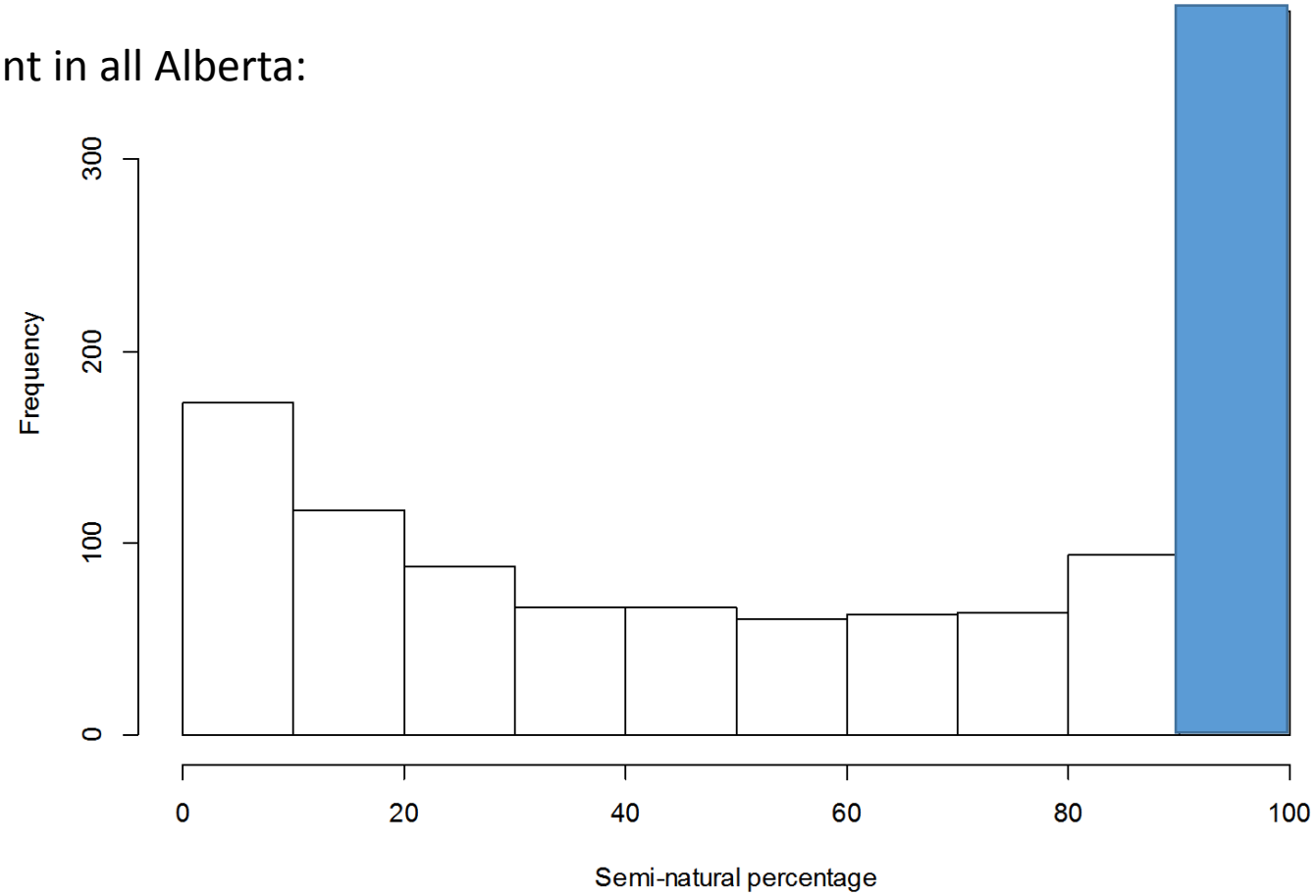
Disturbance – Semi-natural landscape gradient All Alberta

Disturbance gradient Wetlands across Alberta

- Human Footprint disturbance in Boreal or Grassland is of different nature:
  - Boreal more related to Urban/Industrial
  - Grassland more related to Agriculture
- Assumption: HF disturbance affects similarly species → use Semi-natural as an inverse proxy for disturbance, i.e. looking for specialization to semi-natural landscape

- Semi-natural gradient in all Alberta:

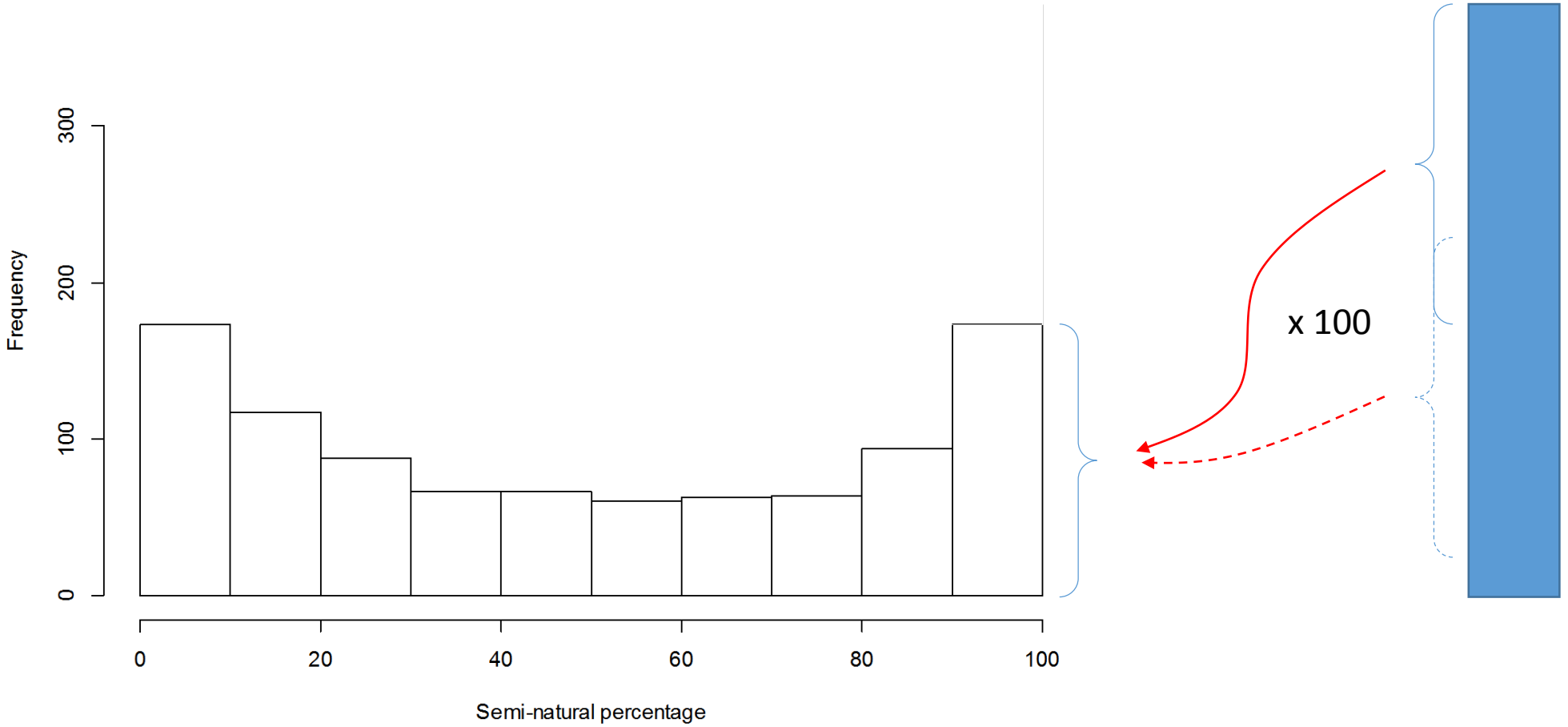


Very uneven distribution of the number of samplings

How to tackle this?

Randomization

- Balanced the distribution of samplings by randomly choose sites with high proportion of semi-natural landscape



« 100 new gradients » more evenly distributed → calculate SSI values on these different gradients and look at SSI correlations

Creating the 10 gradient categories

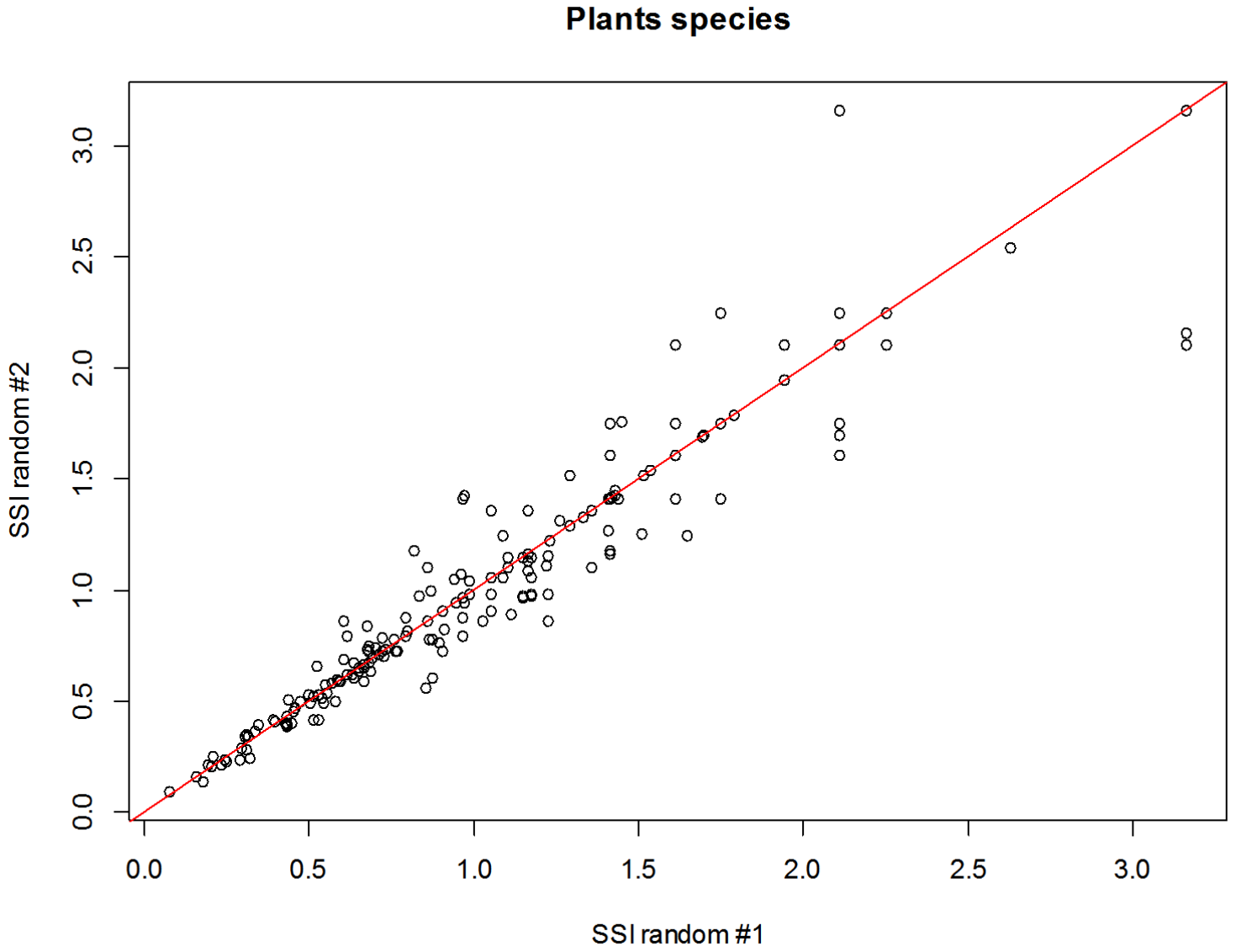
- Cut each random new dataset (n = 100) into 10 evenly distributed categories, i.e. same number of samplings
  - e.g. 850 samplings = 10 categories with 85 samplings → range of gradient values of each category will vary

# categories	Range of values	Minimum value range	Maximum value range	# samplings	# unique species
10	5.2	0.0	5.2	85	166
10	6.9	5.3	12.2	85	137
10	9.2	12.3	21.5	85	156
10	11.2	21.5	32.7	85	147
10	14.5	32.7	47.2	85	141
10	16.4	47.7	64.1	85	148
10	11.2	64.3	75.5	85	134
10	11.3	75.6	86.9	85	150
10	12.6	87.2	99.8	85	146
10	0.2	99.8	100.0	85	144

- Should we have the same number of samplings for each categories or same range of value or a trade-off?

Calculate SSI on the 10 categories for each random dataset - Plants

- Look at correlations between the calculated SSI (n = 100)
  - mean correlation values = 0.94 ± 0.01

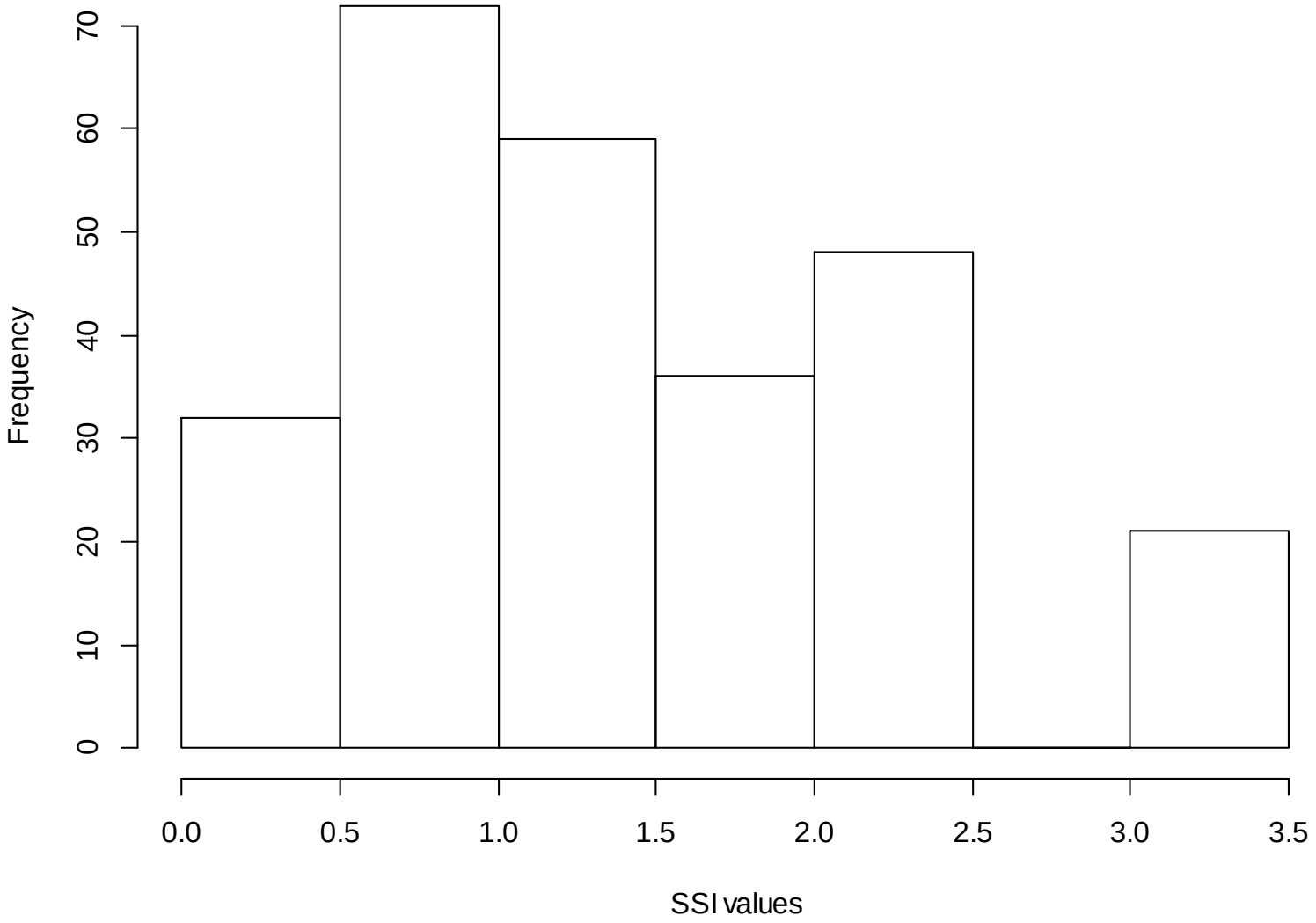


Good correlations

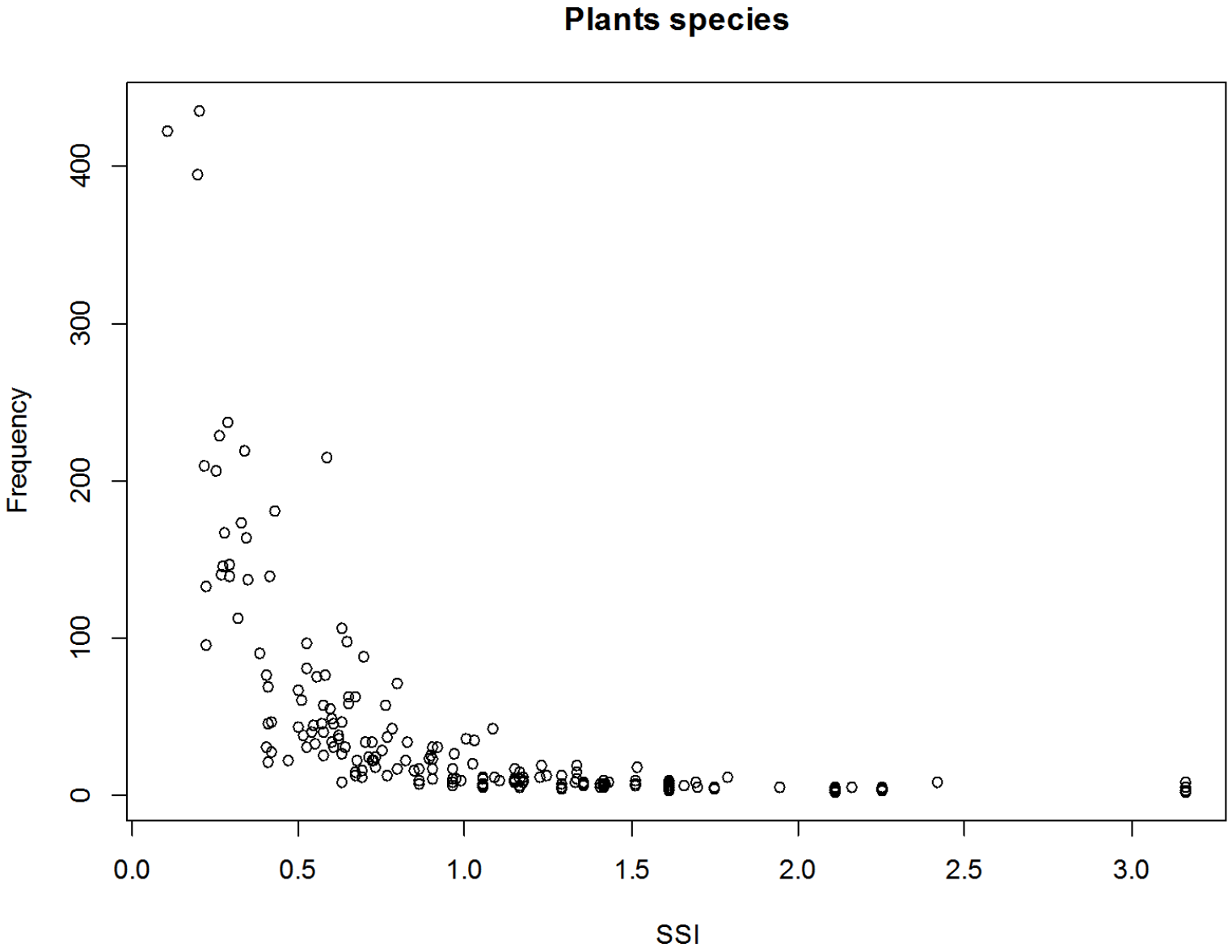
→Take one of the random calculation of SSI for next analyses (?)

Results similar for invertebrates.

Distribution of SSI values (randomly chosen from the hundred calculated) - Plants



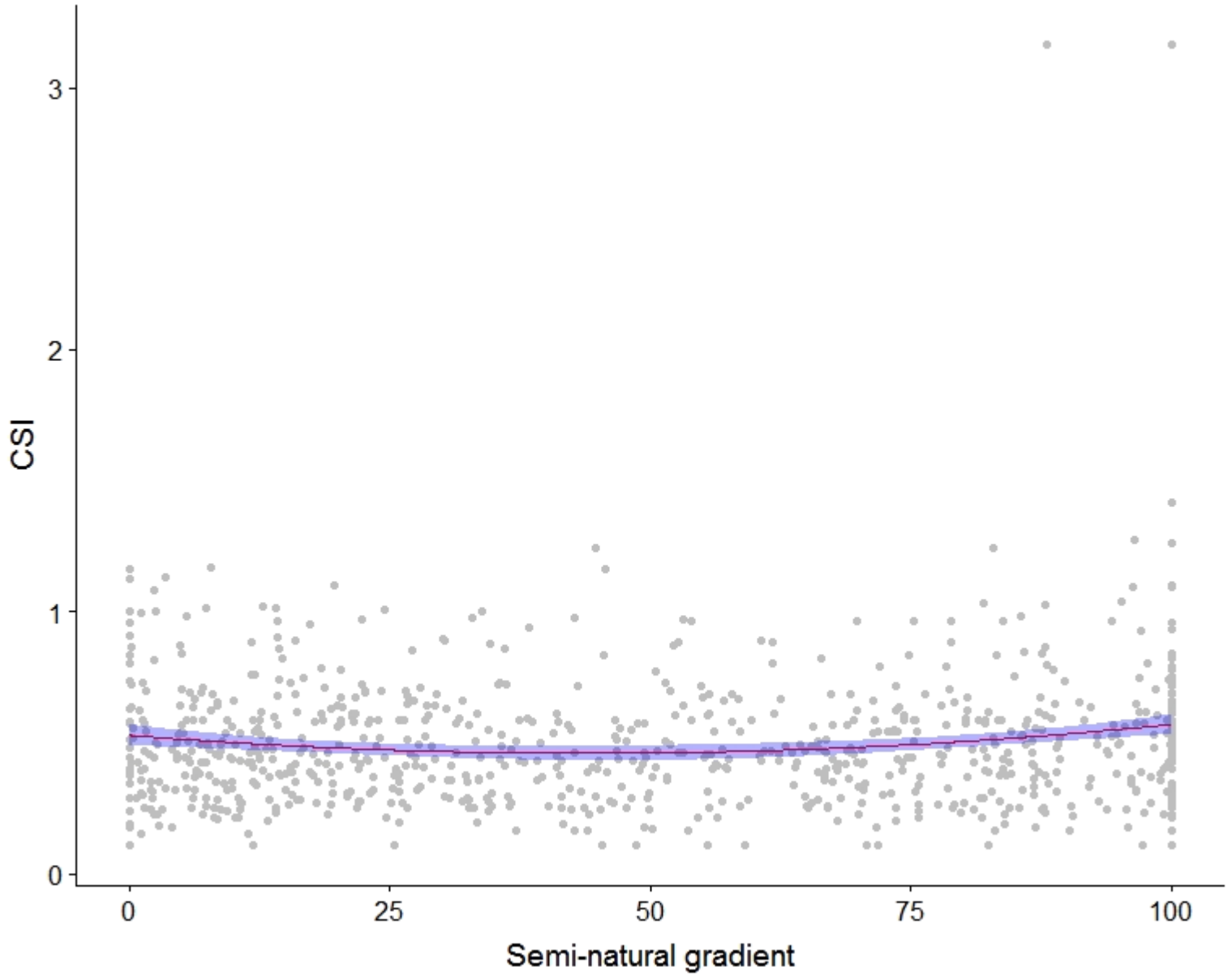
SSI values are related to species frequency (expected)



Results similar for invertebrates but less species.

Calculation of CSI values - Plants

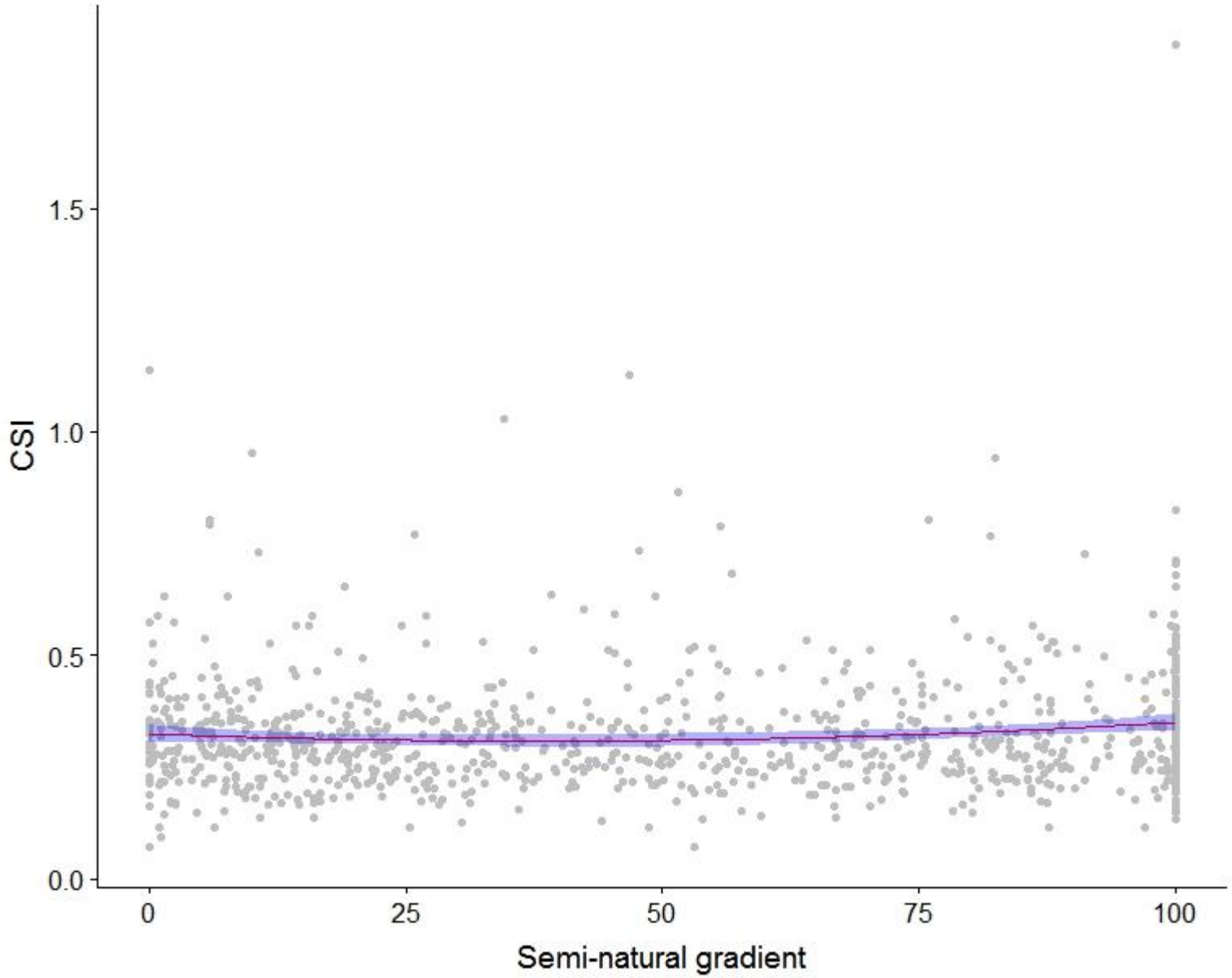
- CSI = Community specialization index = mean of SSI present in each community



- No U-curve pattern, i.e. most of the communities are “generalist” along the gradient

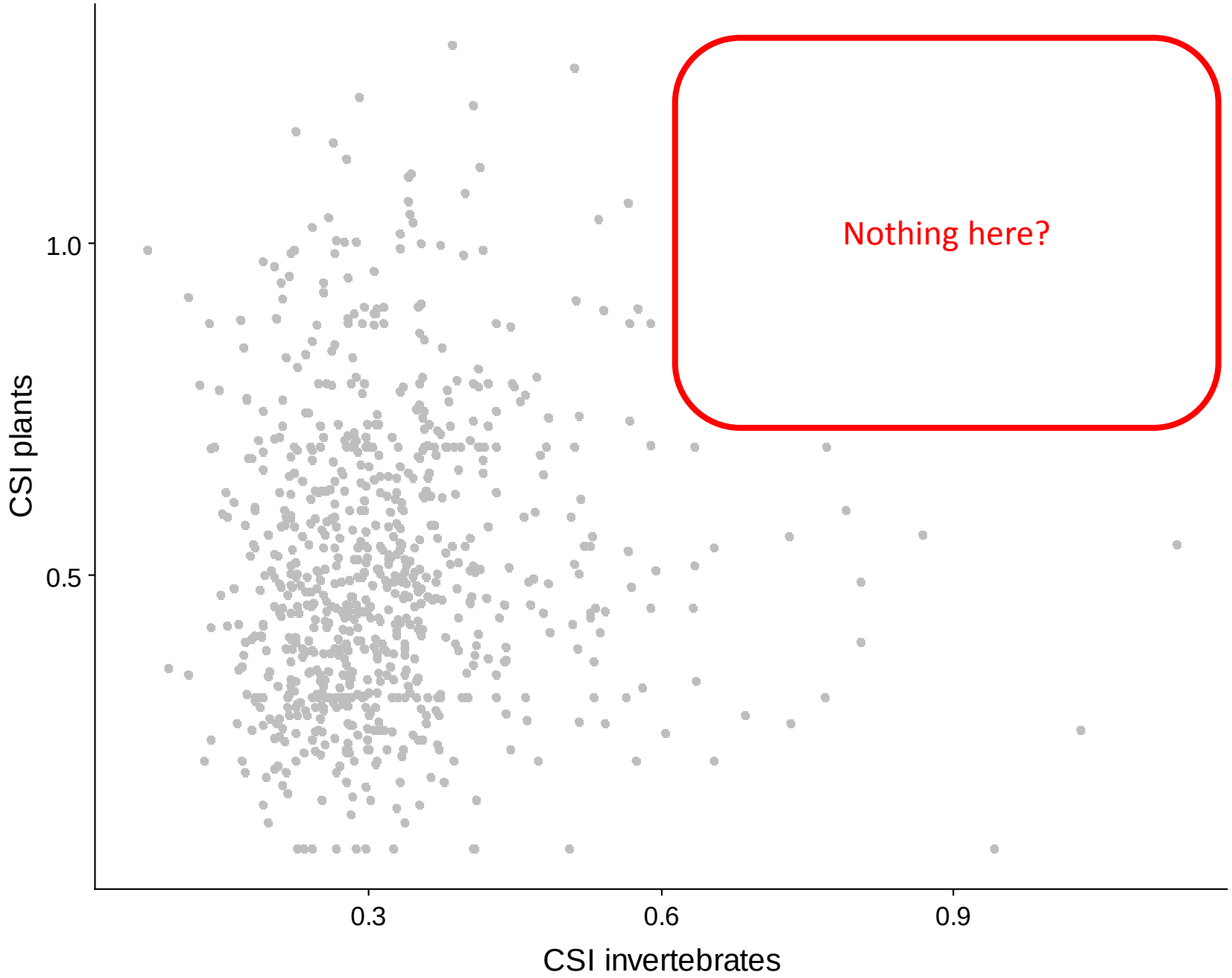
Calculation of CSI values - Invertebrates

- CSI = Community specialization index = mean of SSI present in each community



- Same result, even “worst”

Relationships between plants and invertebrates CSI values

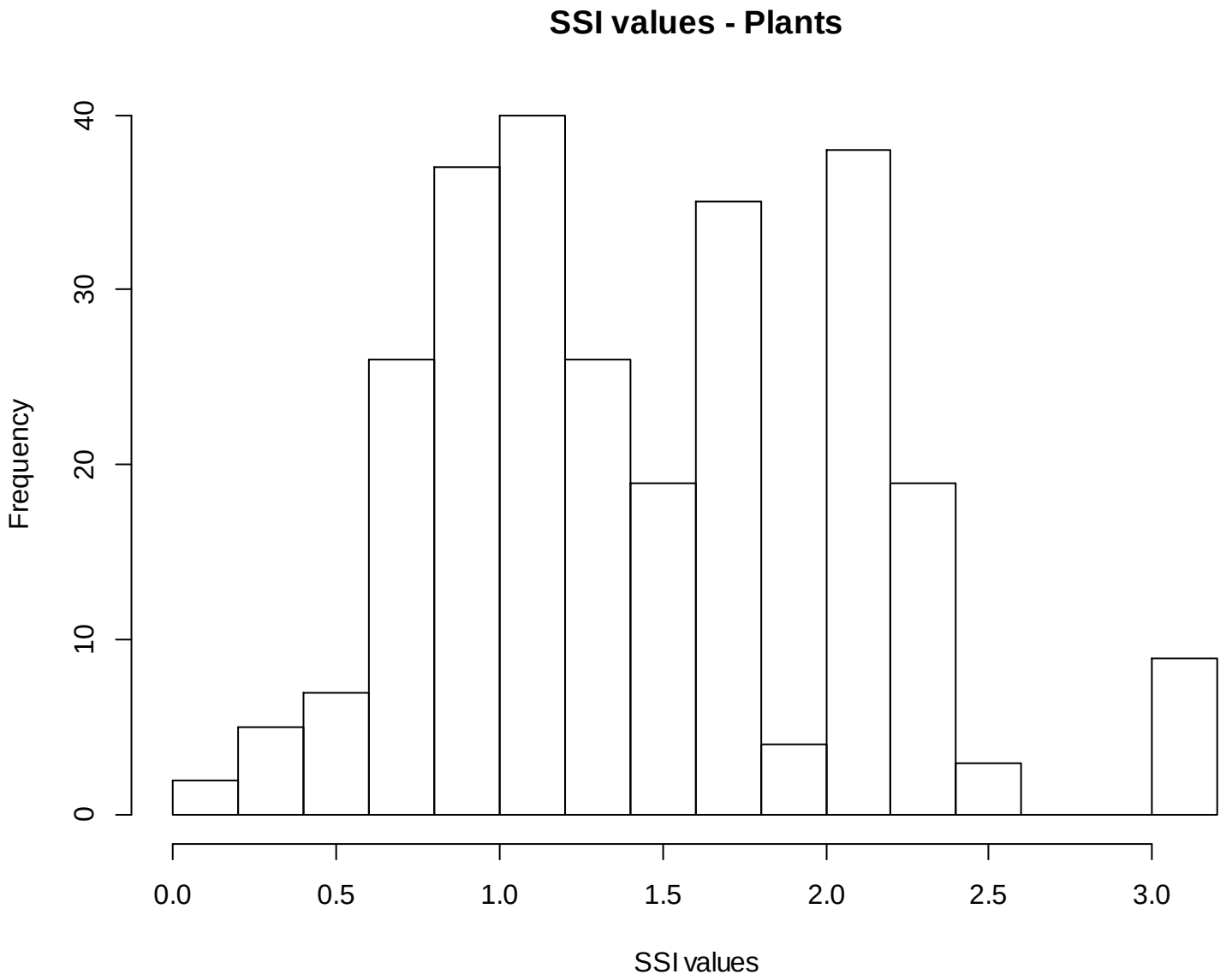


- Removed outlier values for both (plants: 1 CSI value > 3 and inverts: 1 CSI > 1.5)
- On a same gradient, highly specialized communities for one group does not imply highly specialized community for the other group

Climate – MAT gradient

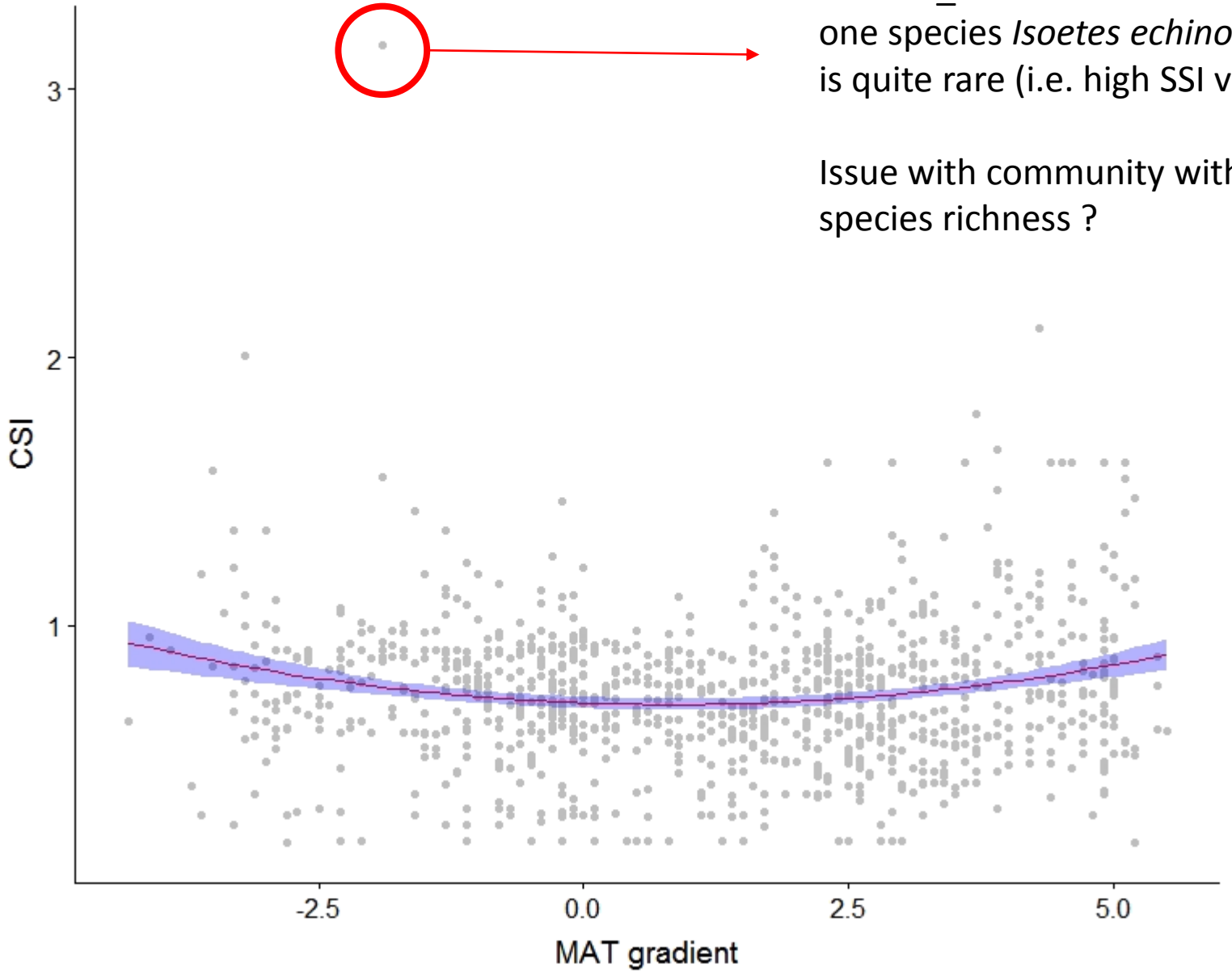
Climate (MAT) gradient – Plants

- SSI values



Climate (MAT) gradient – Plants

- CSI relationships with MAT gradient - Plants



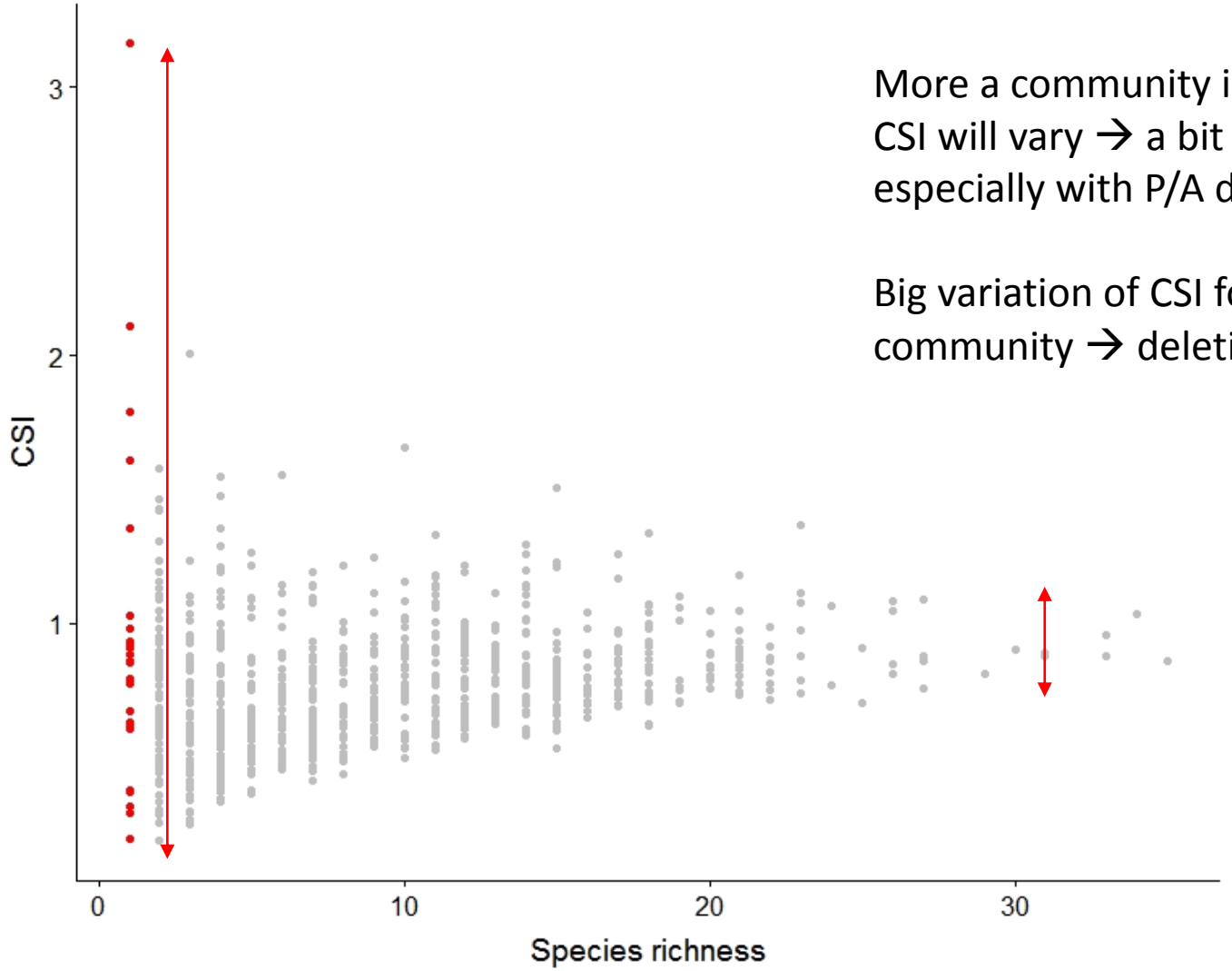
ID “182_2012” → “community” of one species *Isoetes echinospora* that is quite rare (i.e. high SSI value)

Issue with community with low species richness ?

U-curve pattern seems less visible than in your previous analyses

Climate (MAT) gradient – Plants

- CSI relationships with Species richness - Plants

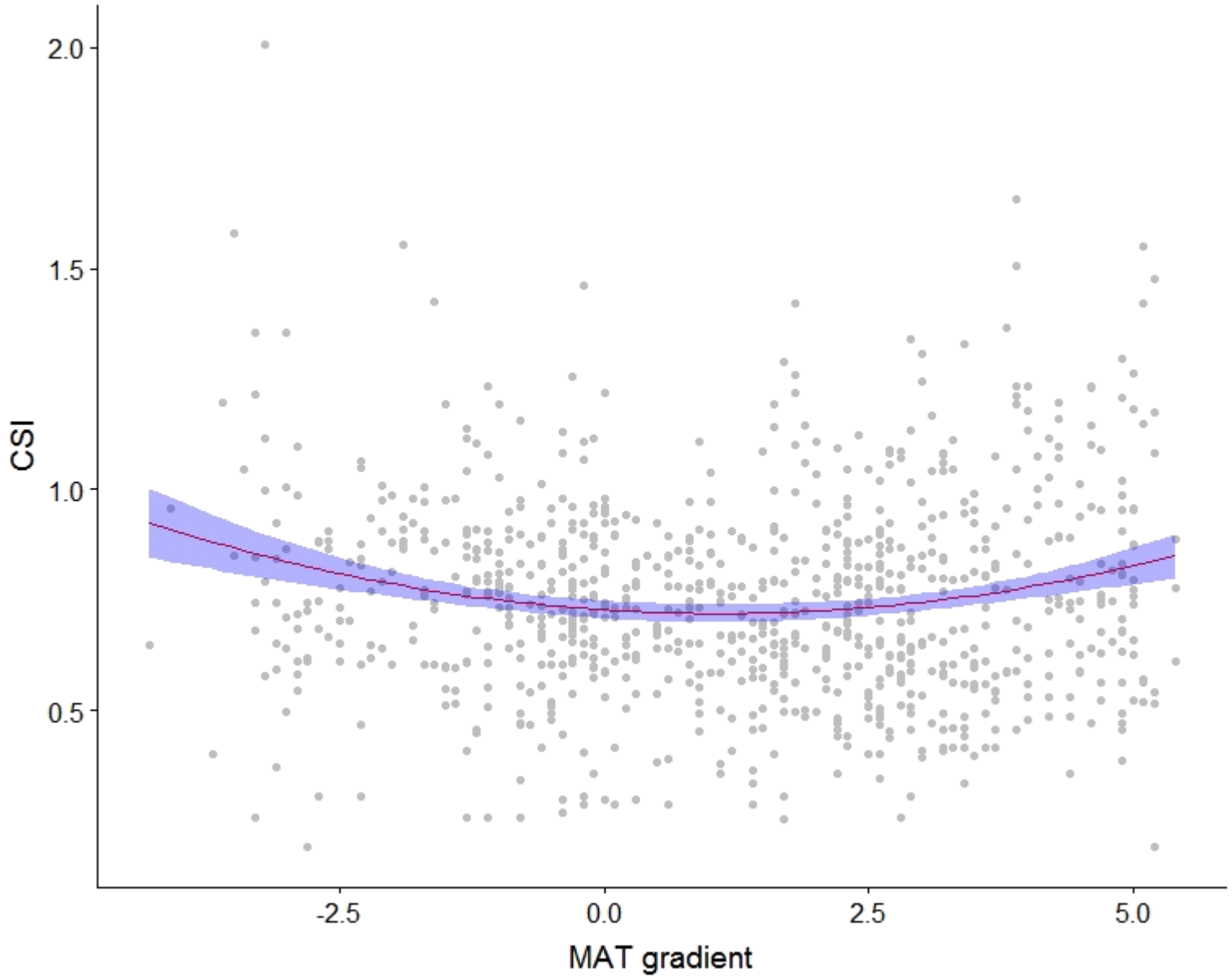


More a community is rich, less the CSI will vary → a bit expected, especially with P/A data

Big variation of CSI for “one-species” community → deleting them?

Climate (MAT) gradient – Plants

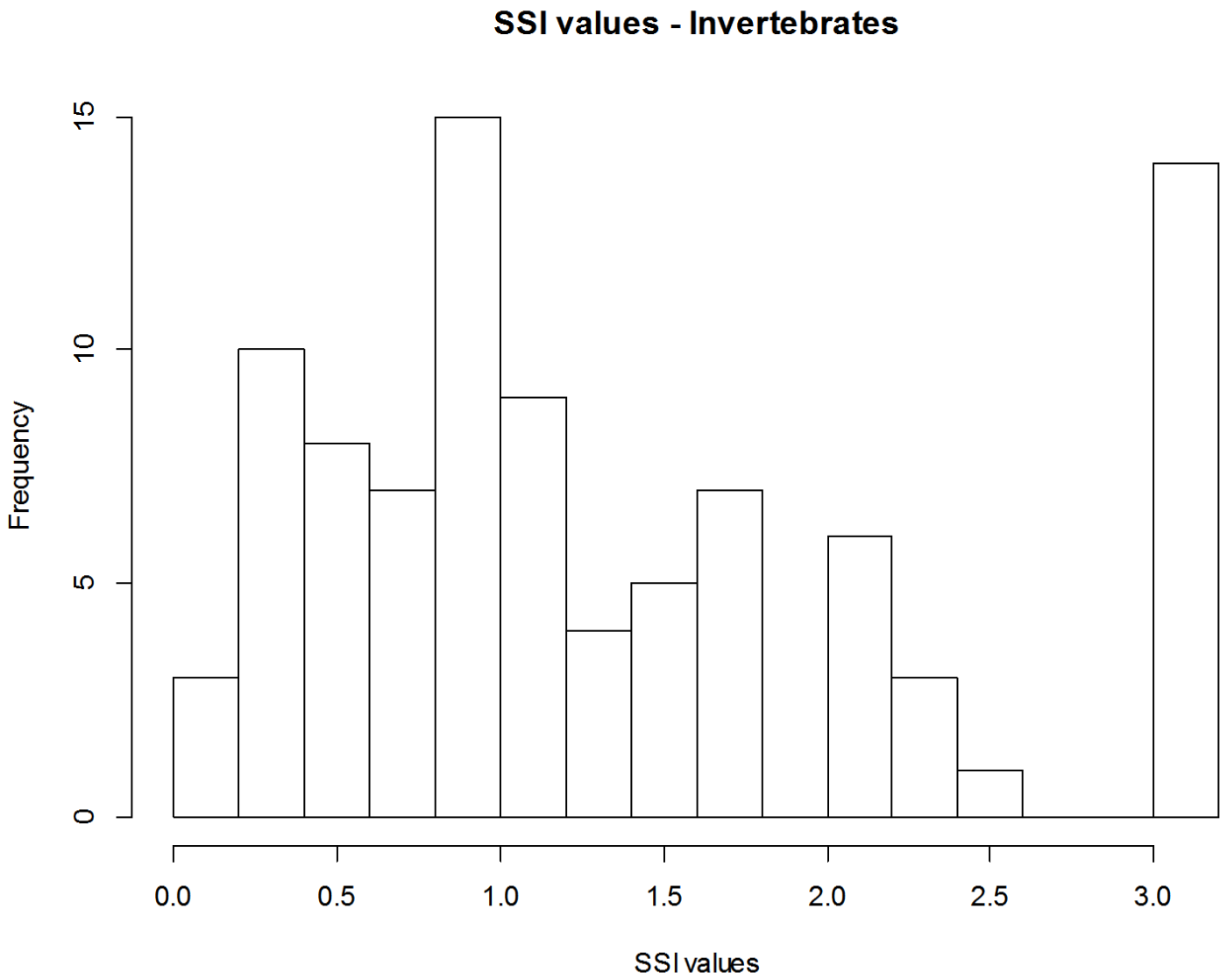
- CSI relationships with MAT gradient – without “one-species” community - Plants



U-curve relationship is a bit better without the “one-species” community but still quite low

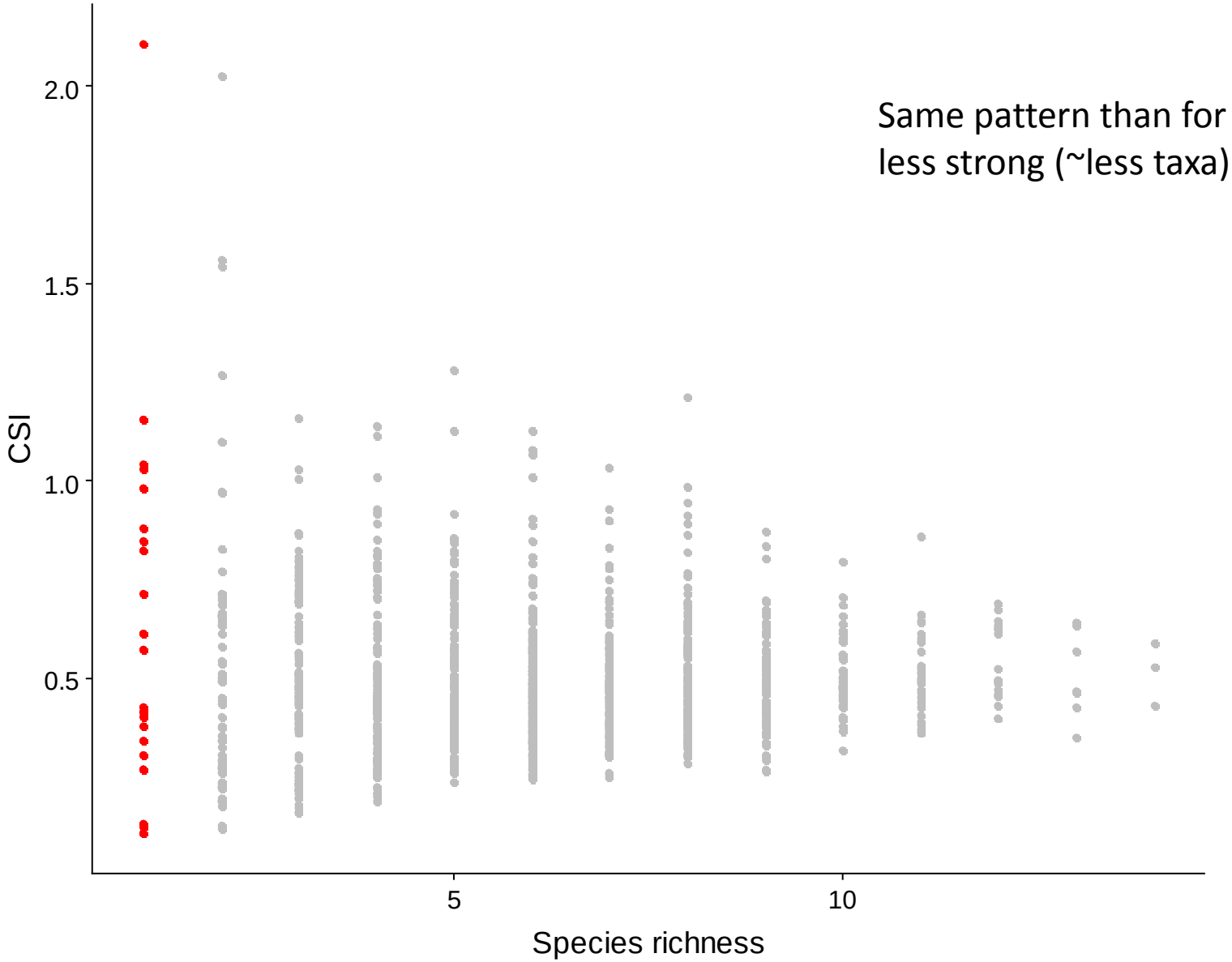
Climate (MAT) gradient – Invertebrates (Genus level)

- SSI values



Climate (MAT) gradient – Invertebrates

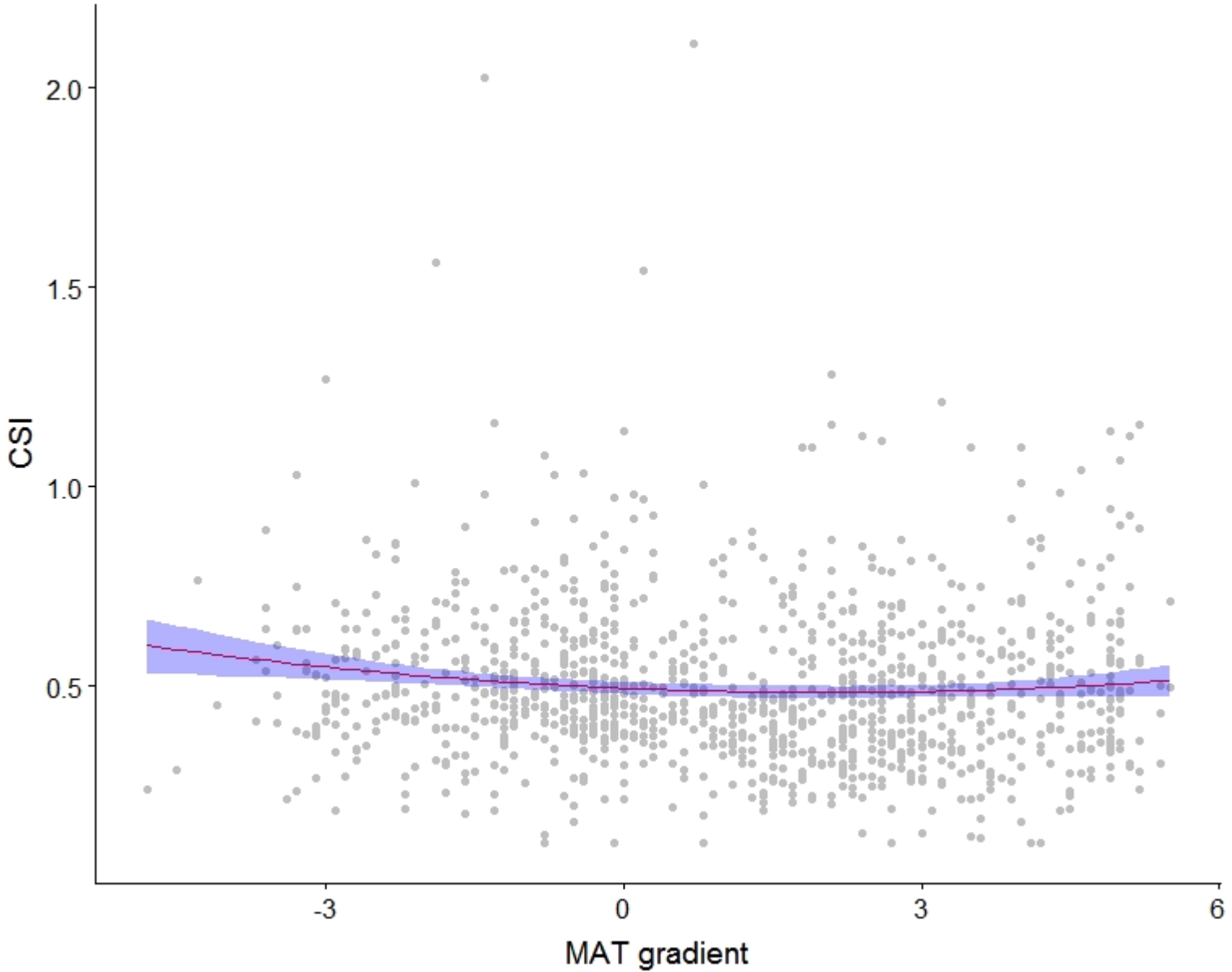
- CSI relationships with Species richness - Invertebrates



Same pattern than for plants even if less strong (~less taxa)

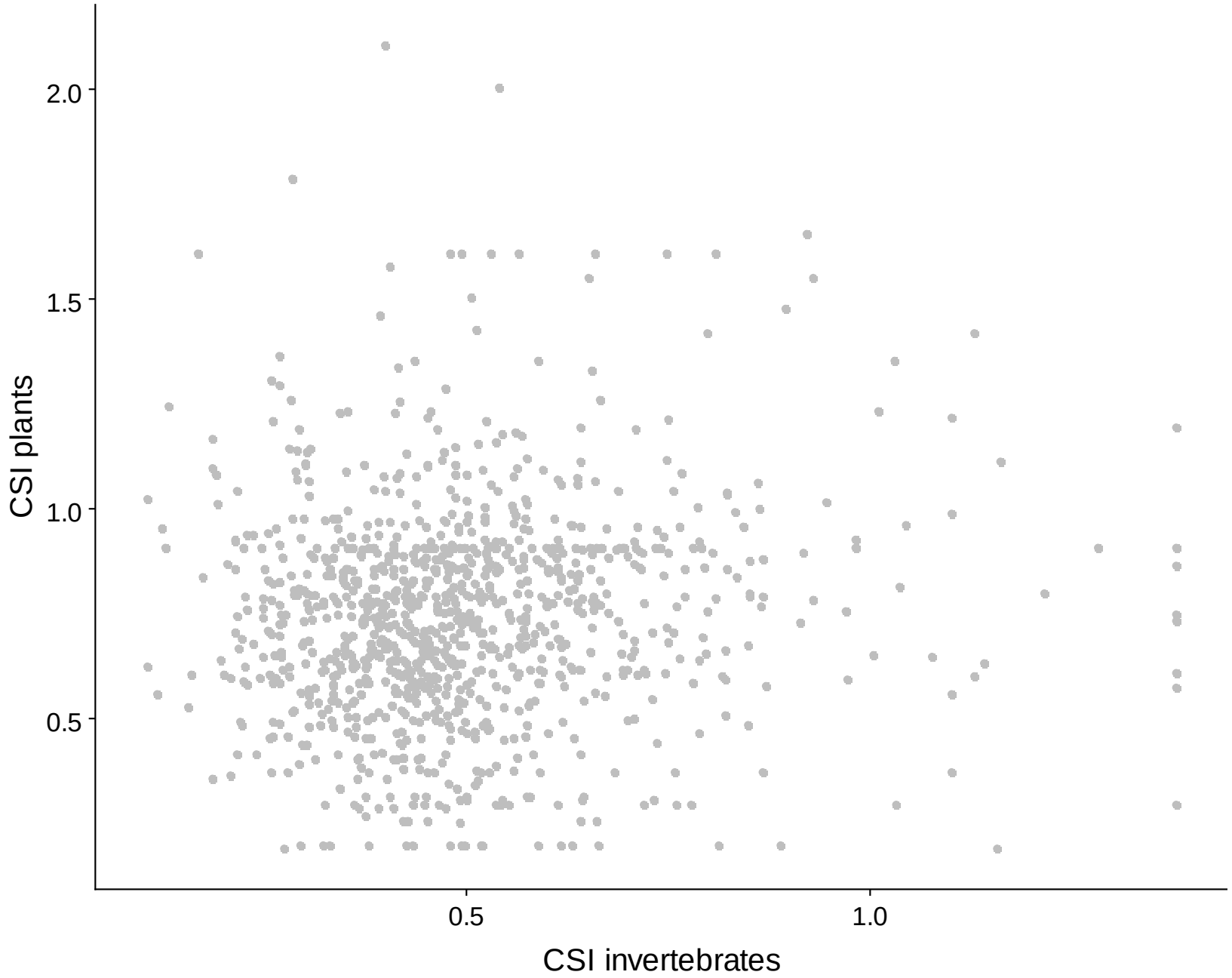
Climate (MAT) gradient – Invertebrates

- CSI relationships with MAT gradient - Invertebrates



Relationship is mostly flat.

Relationships between plants and invertebrates CSI values



- Removed outlier values for both (plants: 1 CSI value > 3 and inverts: 1 CSI > 1.5)

Miscellaneous

Miscellaneous thoughts

- Use P/A data for both plants and invertebrates. Using pseudo-abundance (plants) or abundance (inverts) does not change the patterns, mainly magnitude of values

- Plants data: only use plants data in Open-Water and Emergent zones → extend to all zones? Are you already using all zones?

- Still have to look at “preferences” along the gradient and relationships with specialization.