



Diversity and species composition of riparian plant communities at the local and regional scale

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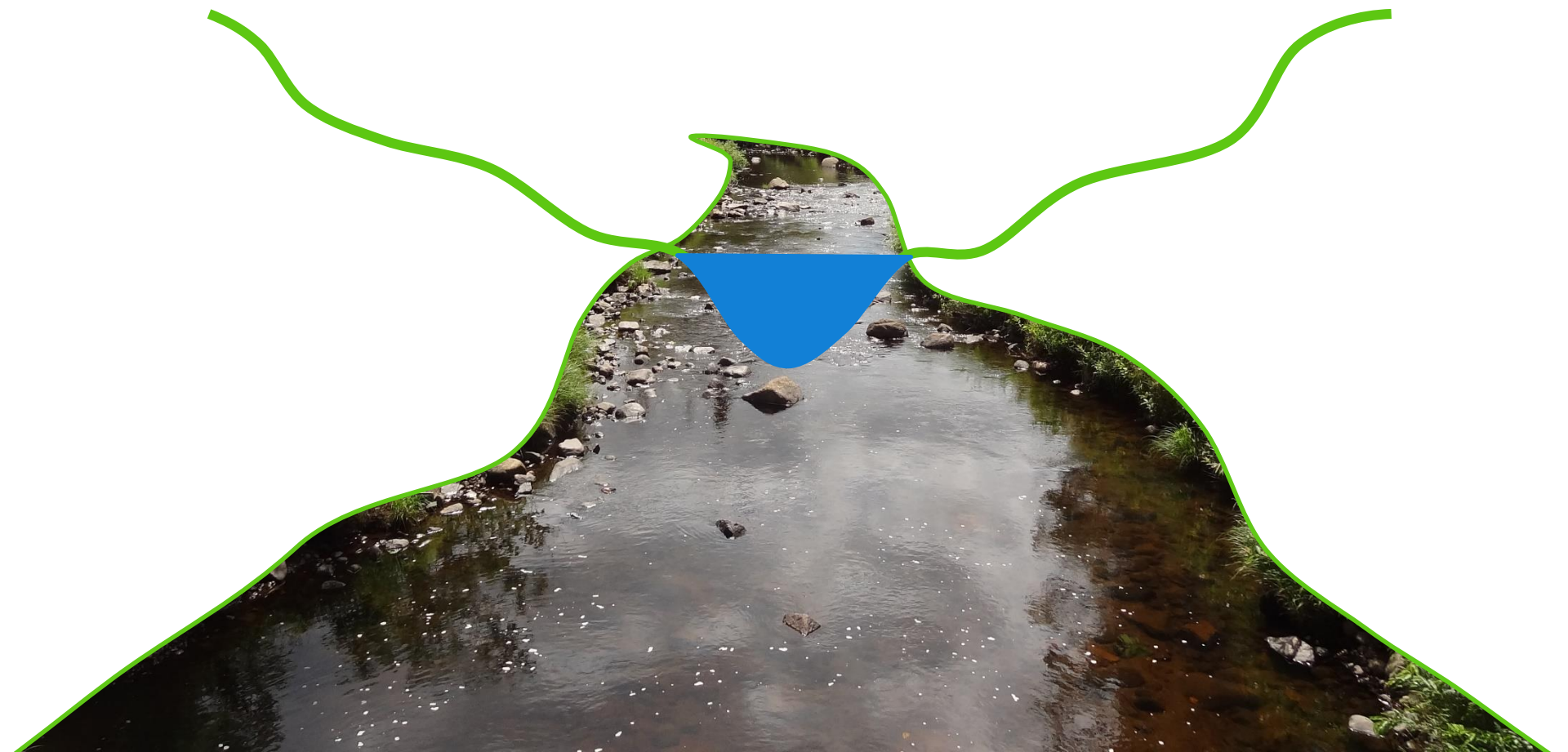


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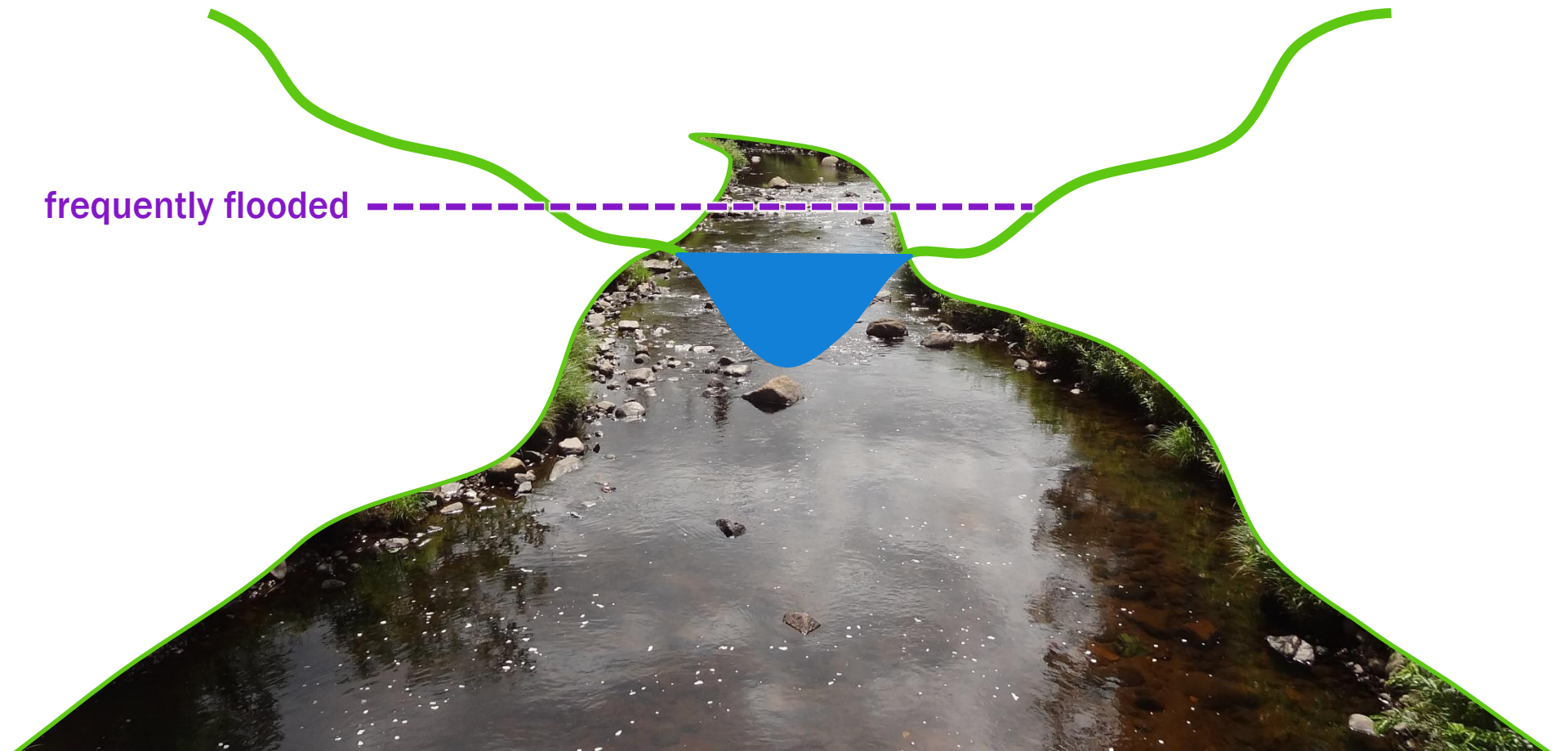
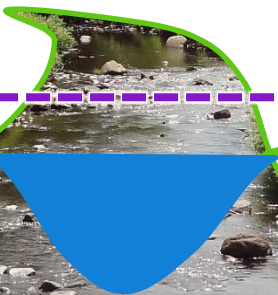


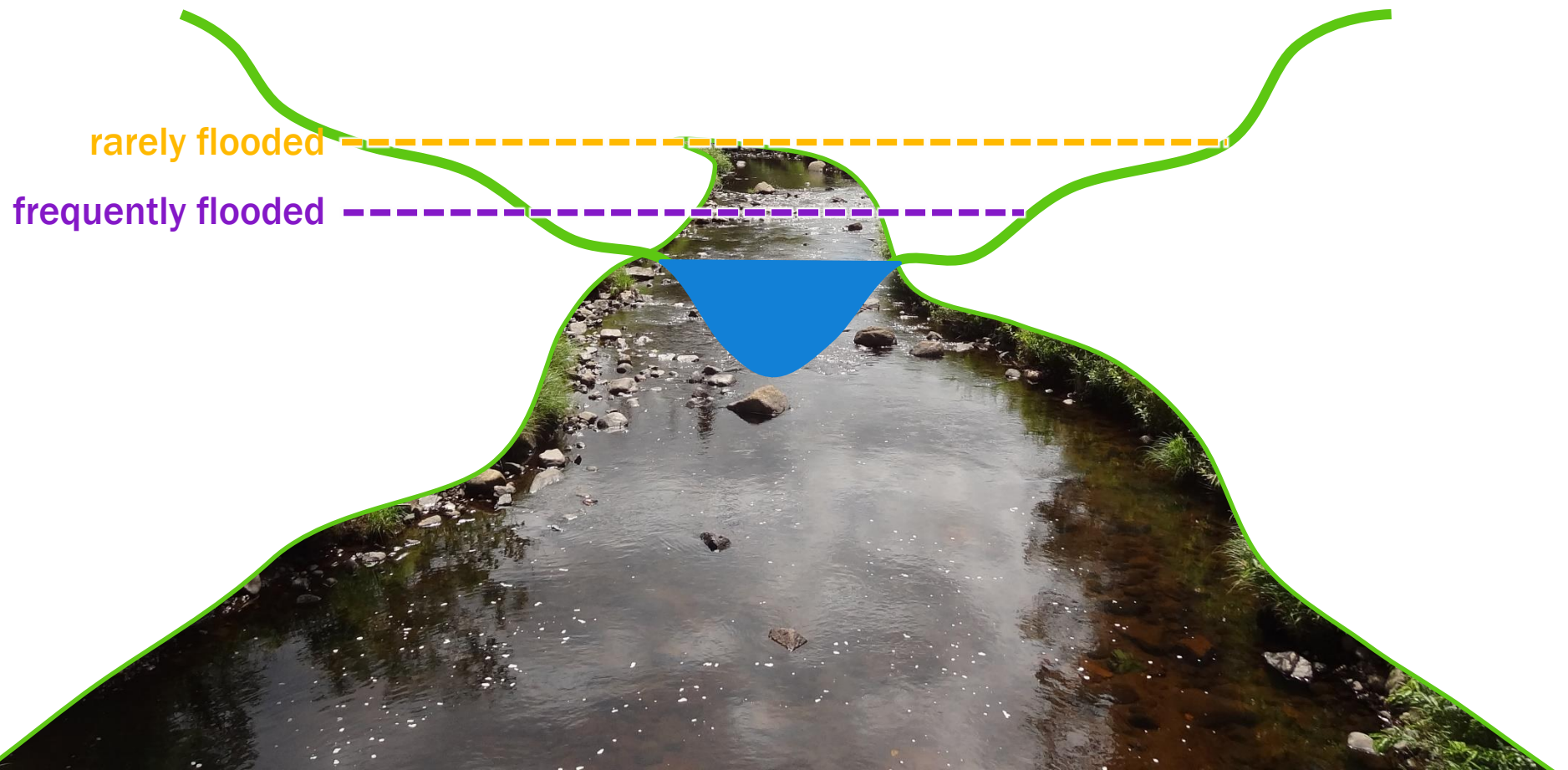
Ecology & Evolution





frequently flooded

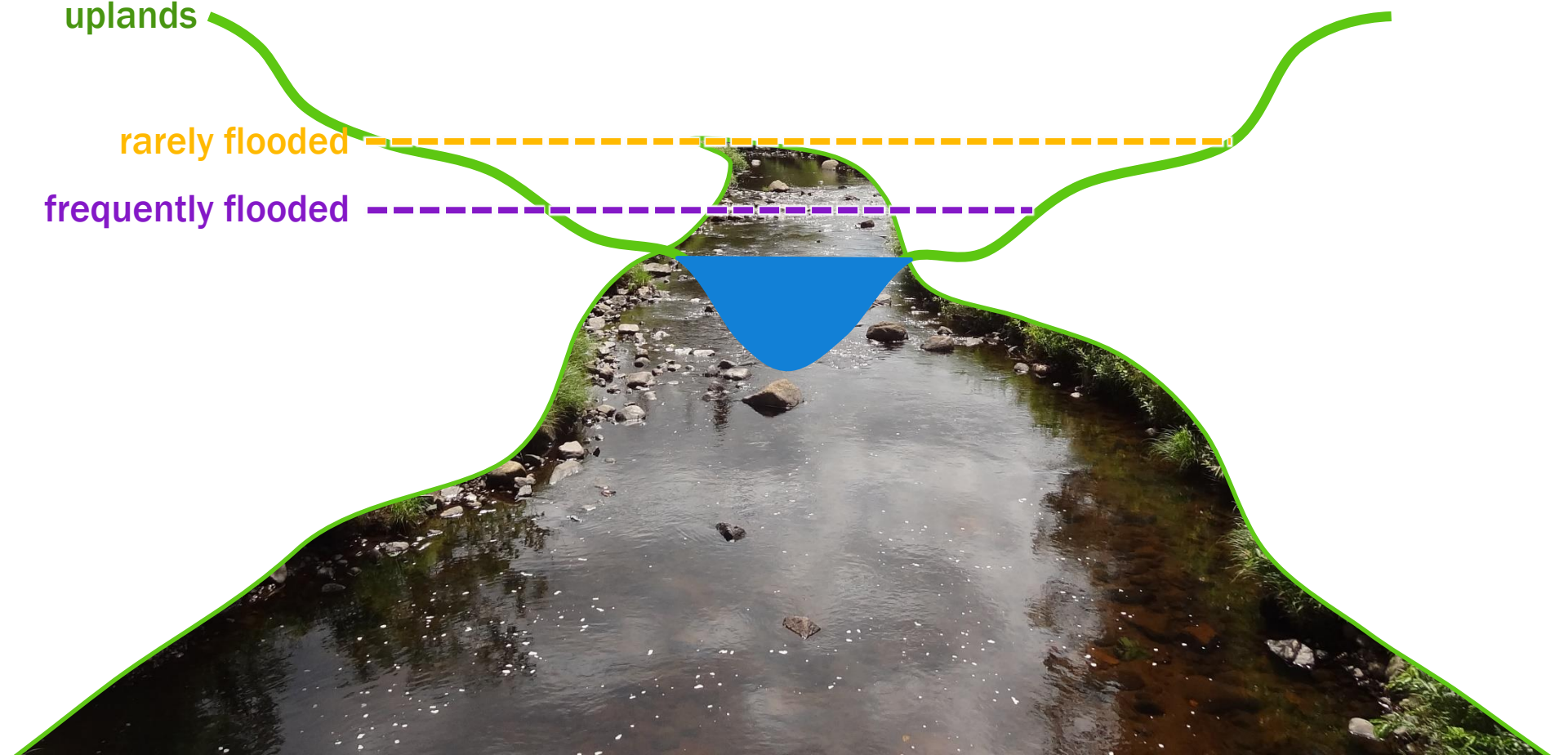




uplands

rarely flooded

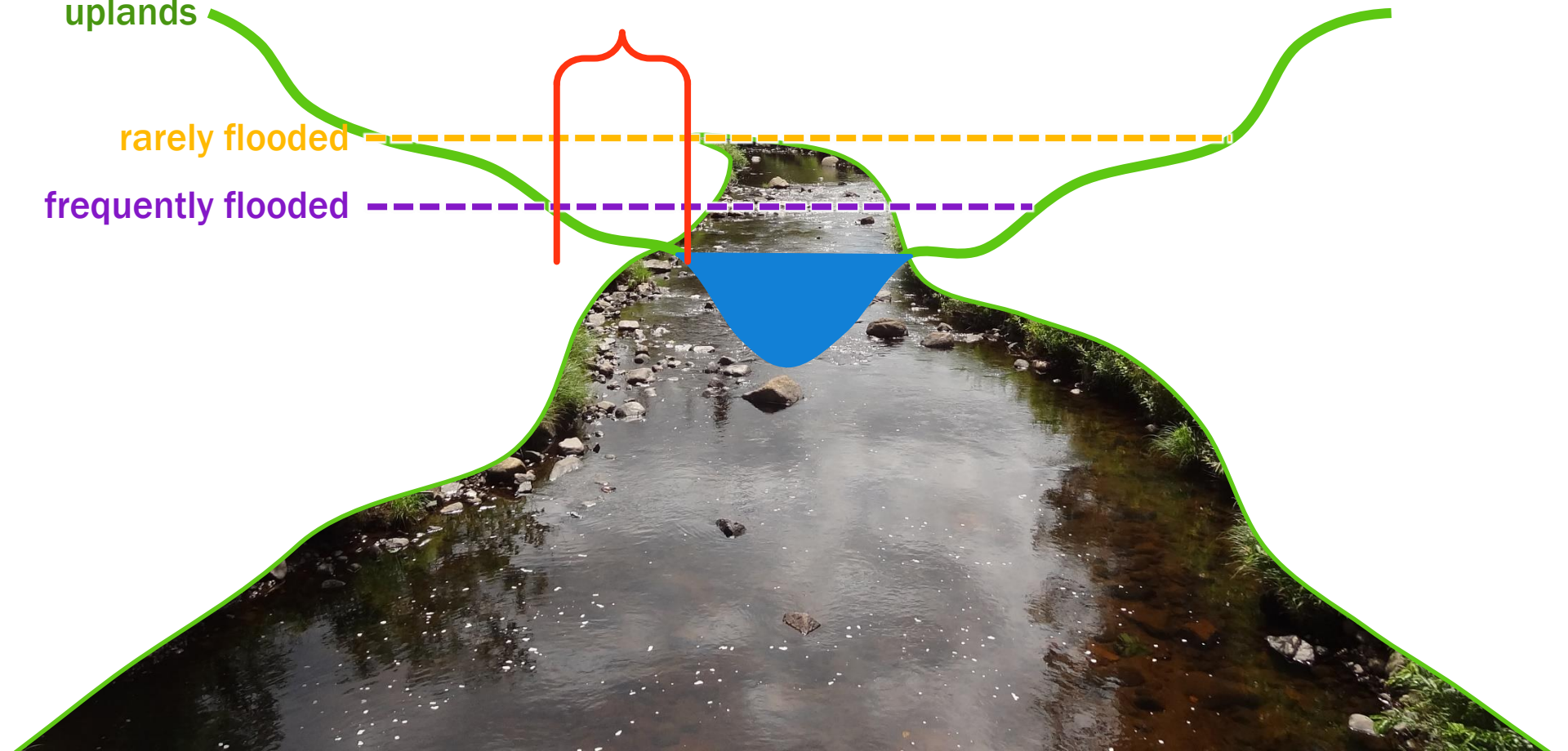
frequently flooded



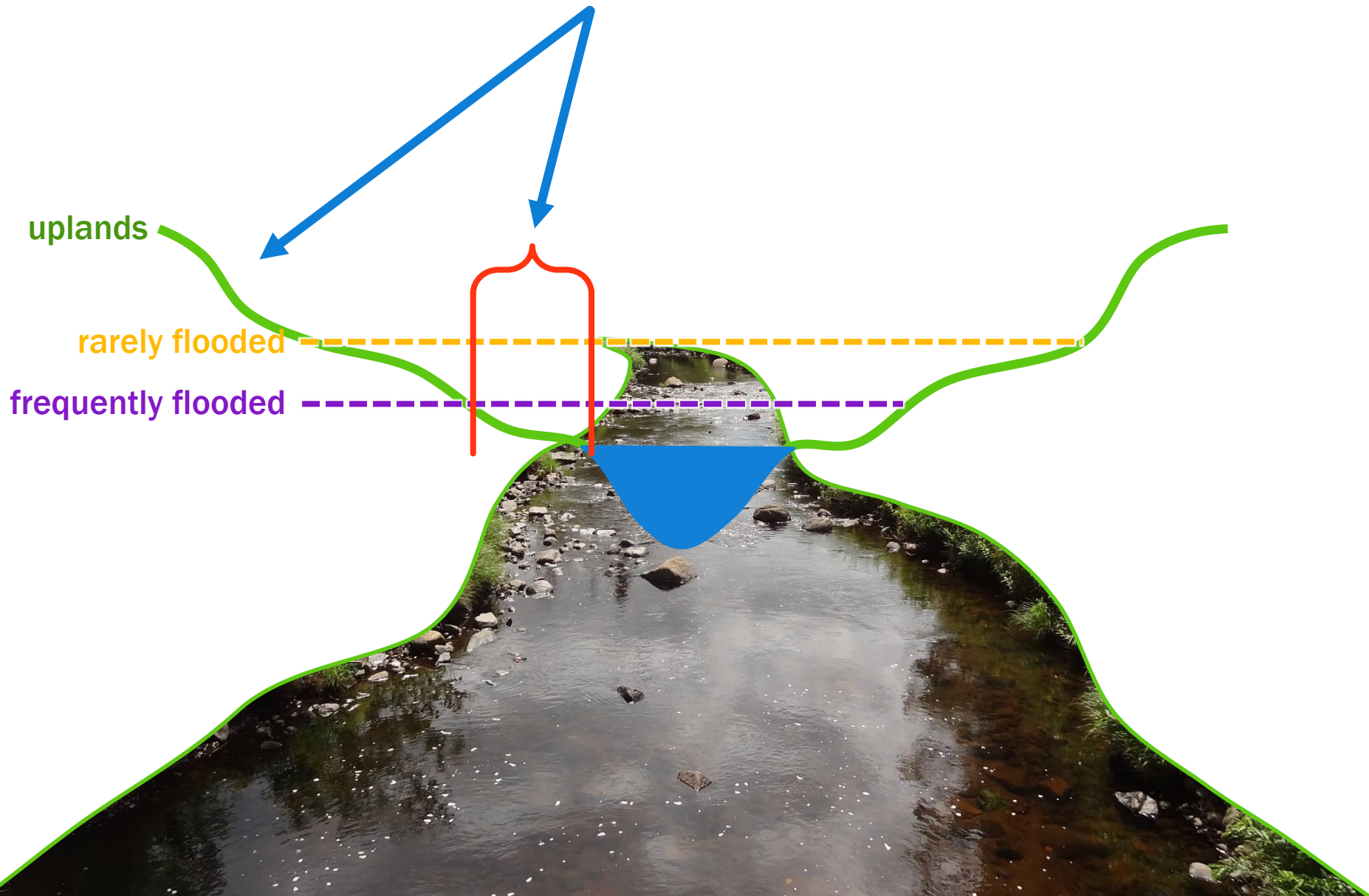
uplands

rarely flooded

frequently flooded

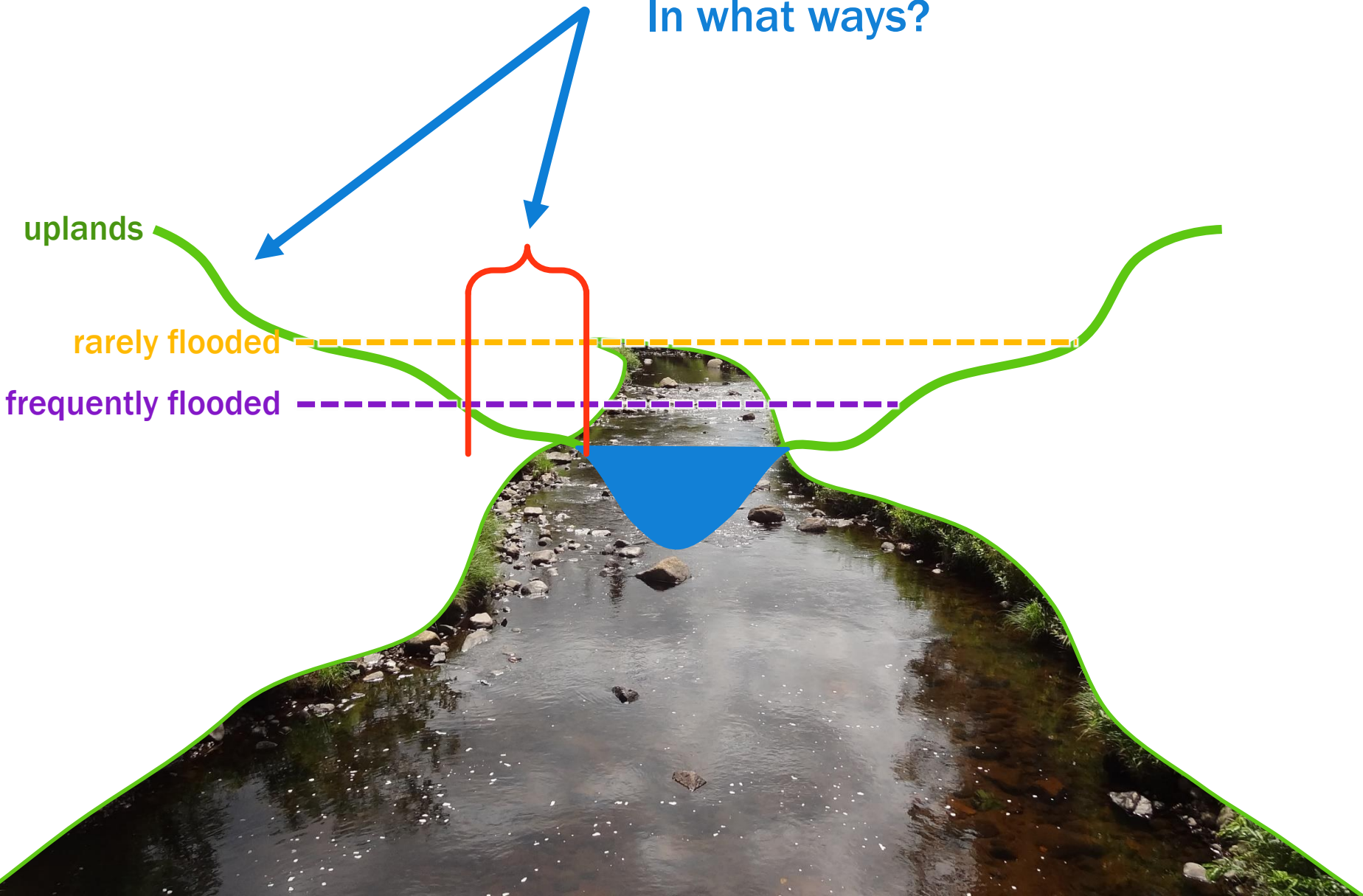


Are these plant communities different?



Are these plant communities different?

In what ways?



Riparian plant communities are often very diverse.



One possibility is that **flood disturbances** help to maintain diversity.



Riparian plant communities are often very diverse.



One possibility is that **flood disturbances** help to maintain diversity.



Introduced species can be abundant in riparian zones.



Disturbance may also facilitate the establishment and success of introduced species.

What patterns occur along small streams?

The relationship between diversity and disturbance varies

The flood regime in small streams differs substantially from that of larger rivers

This might produce different patterns in community composition than have been observed elsewhere

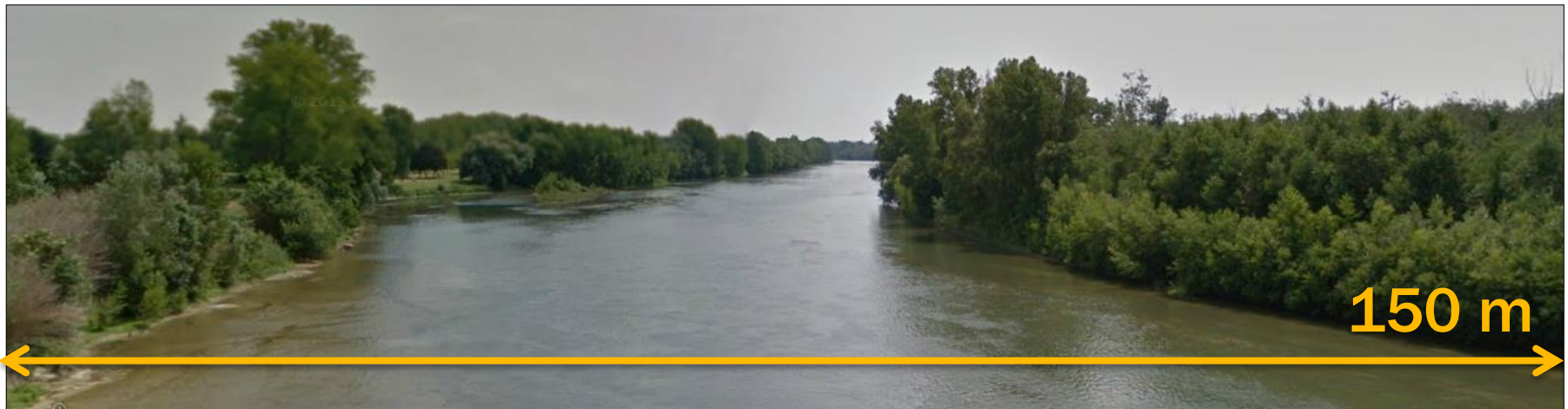


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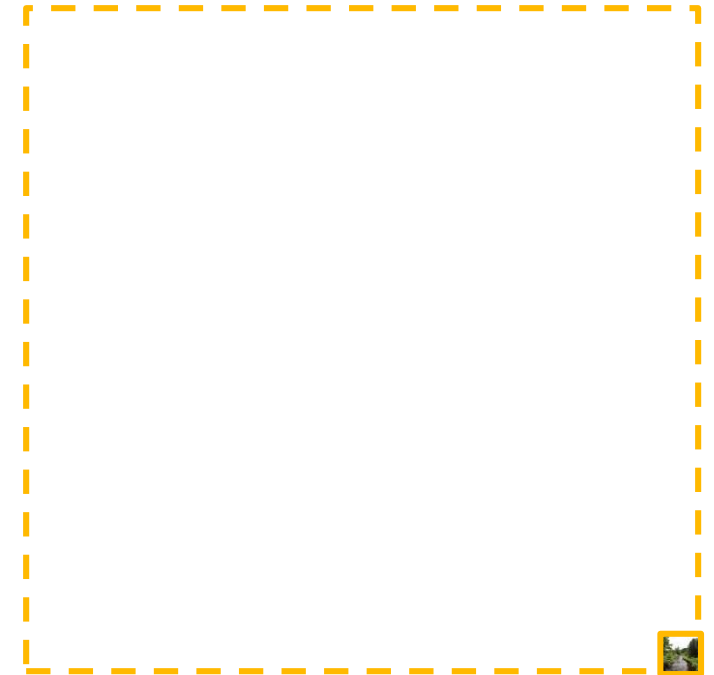


What patterns occur along small streams?

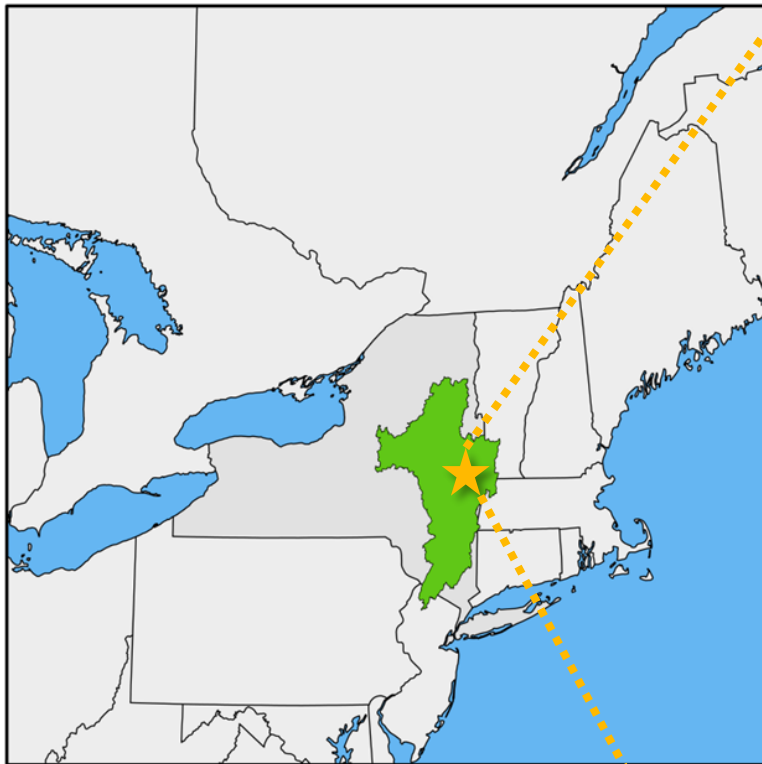
The relationship between diversity and disturbance varies

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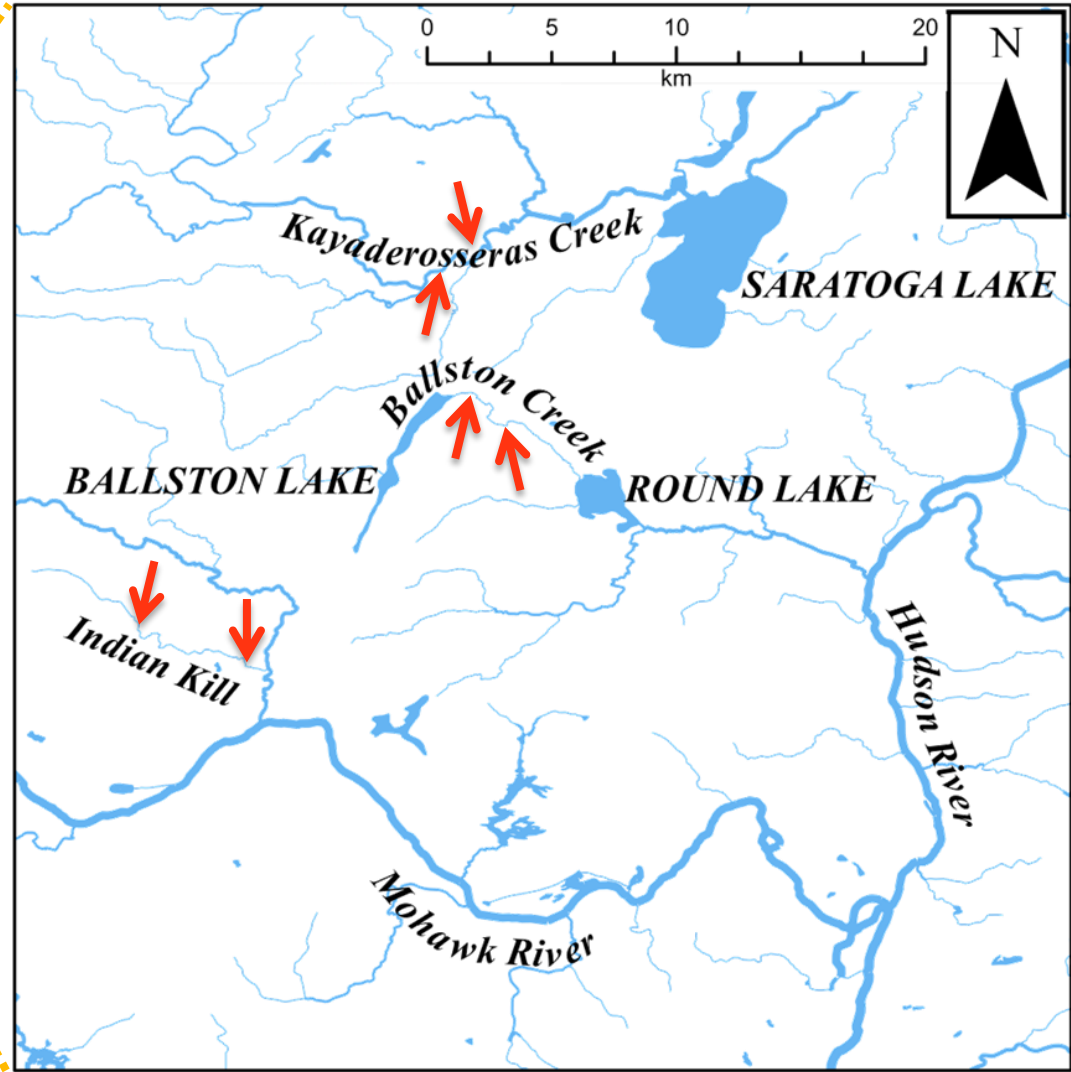
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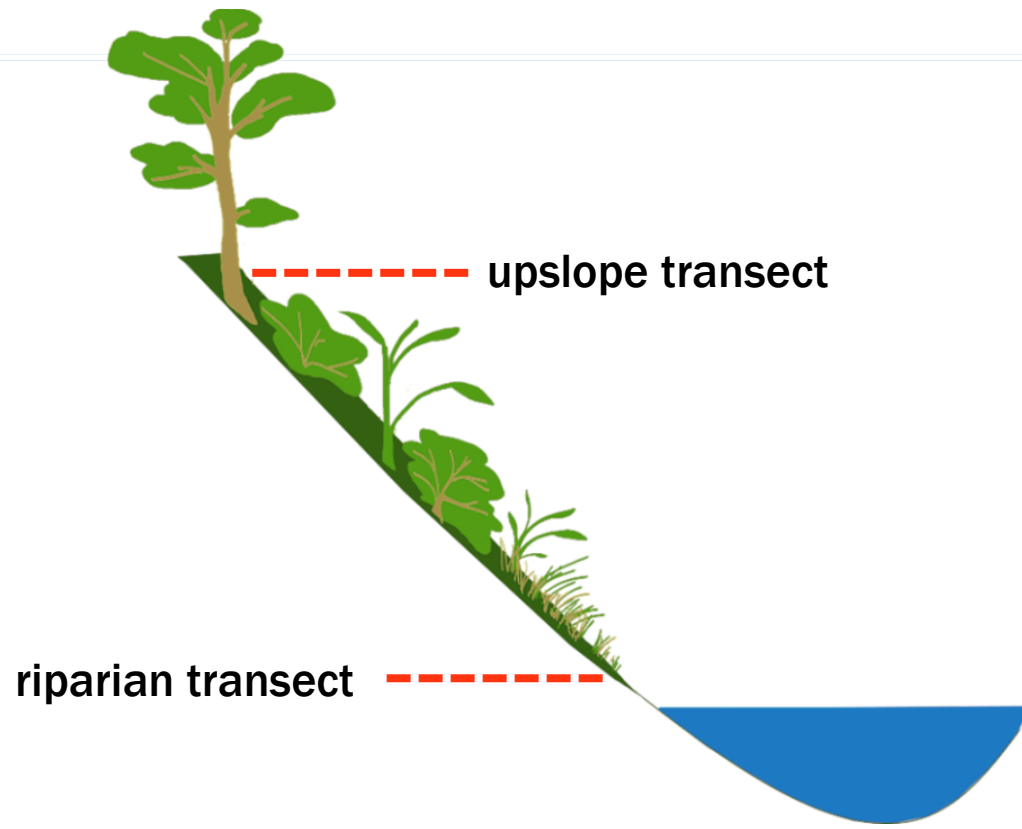


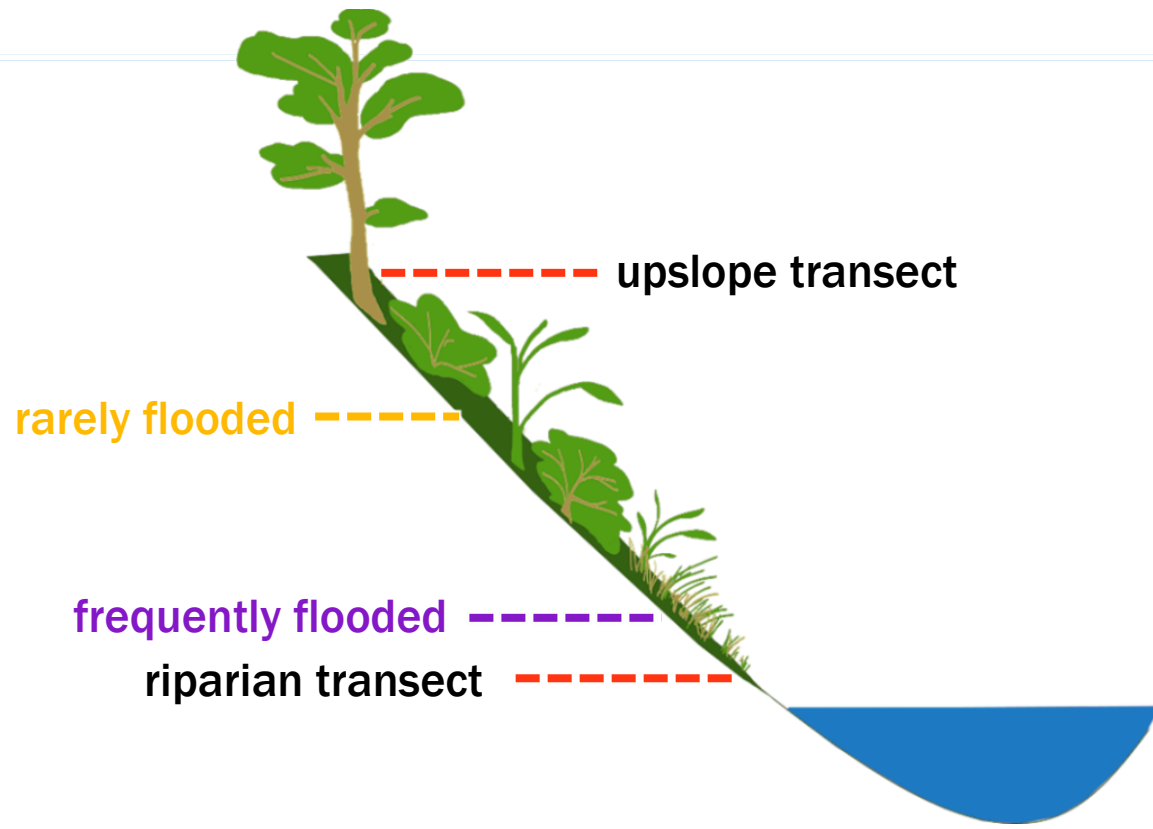
The Upper Hudson watershed



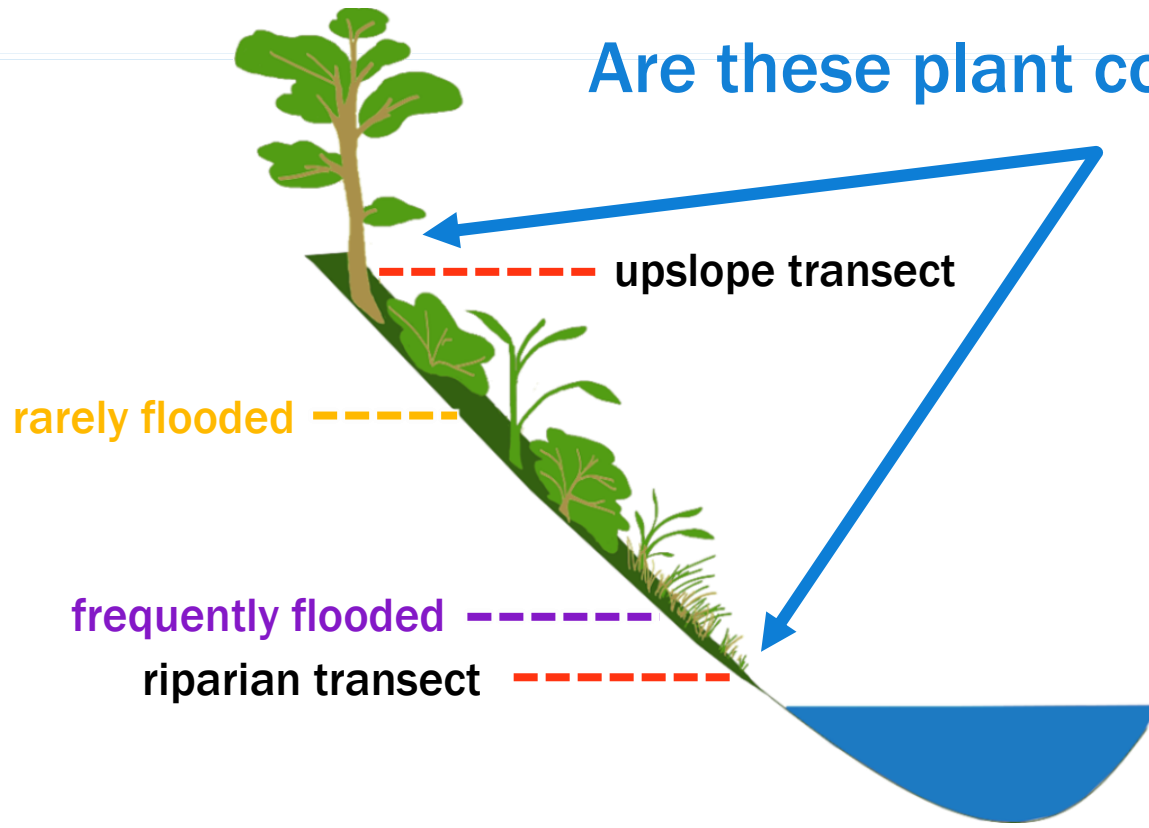
- ★ study area
- ➔ study site



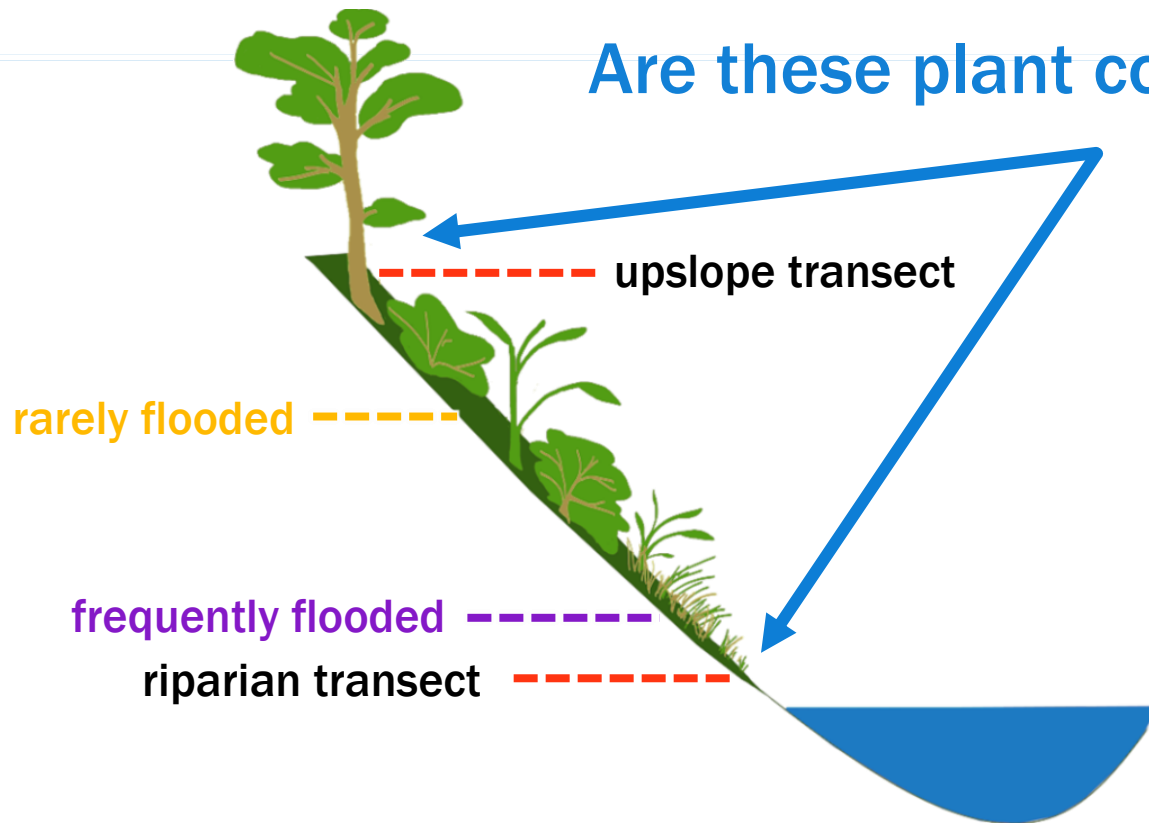




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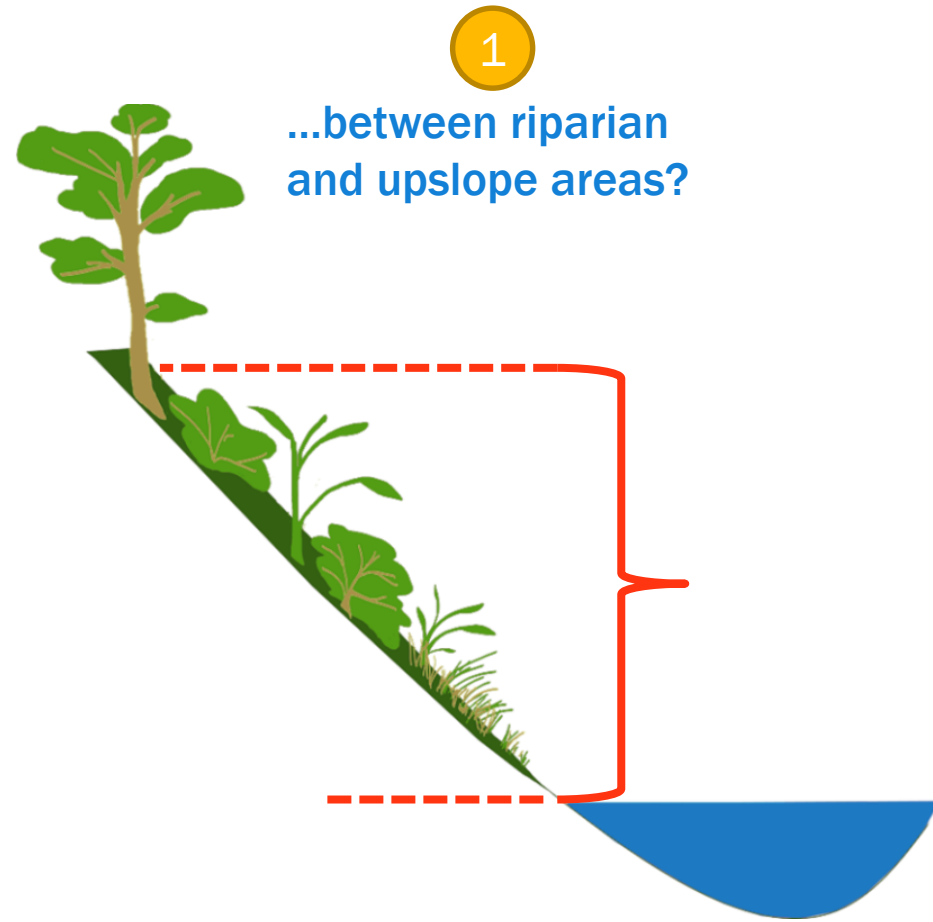
Community composition measures

- Number of species (and identity of each)
- Number of individuals of each species
- Ground cover of each herbaceous species

(How) do plant communities differ...

1

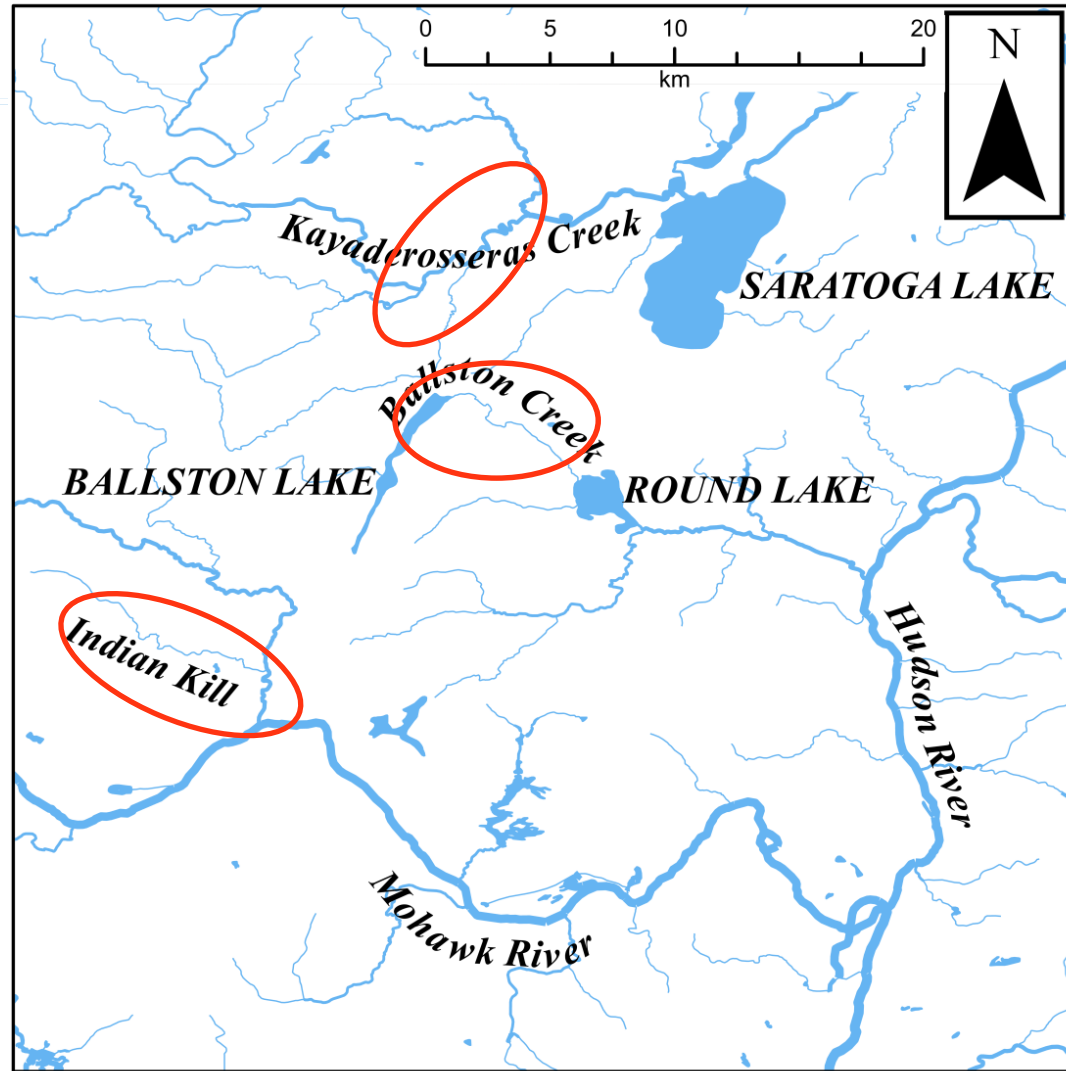
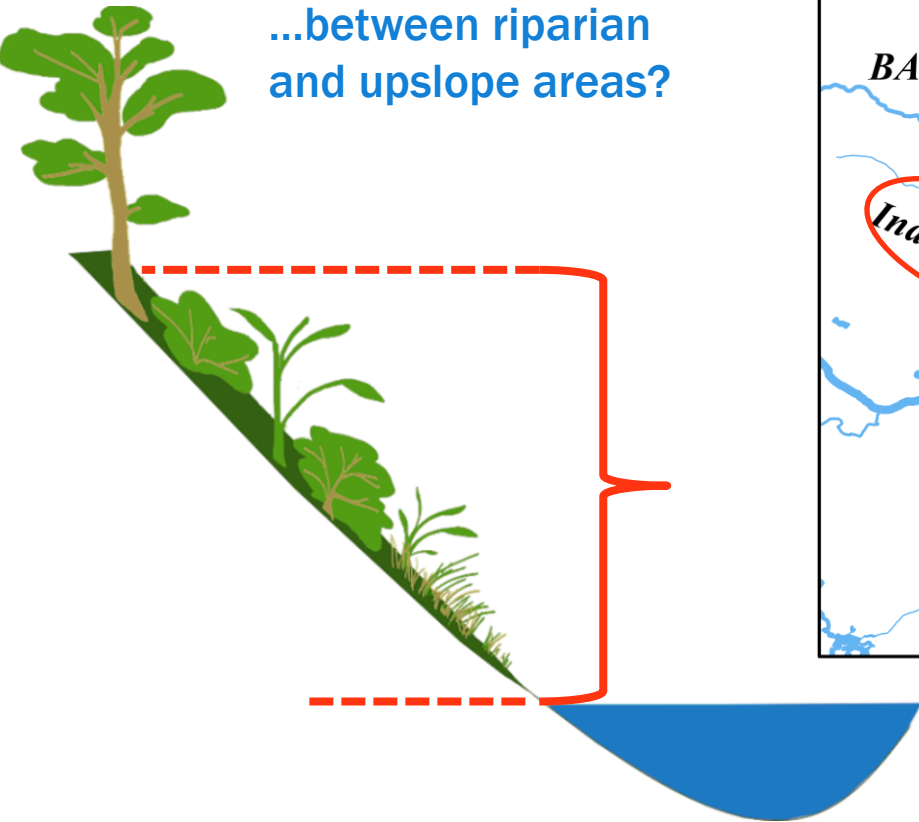
...between riparian
and upslope areas?



(How) do plant communities differ...

1

...between riparian and upslope areas?



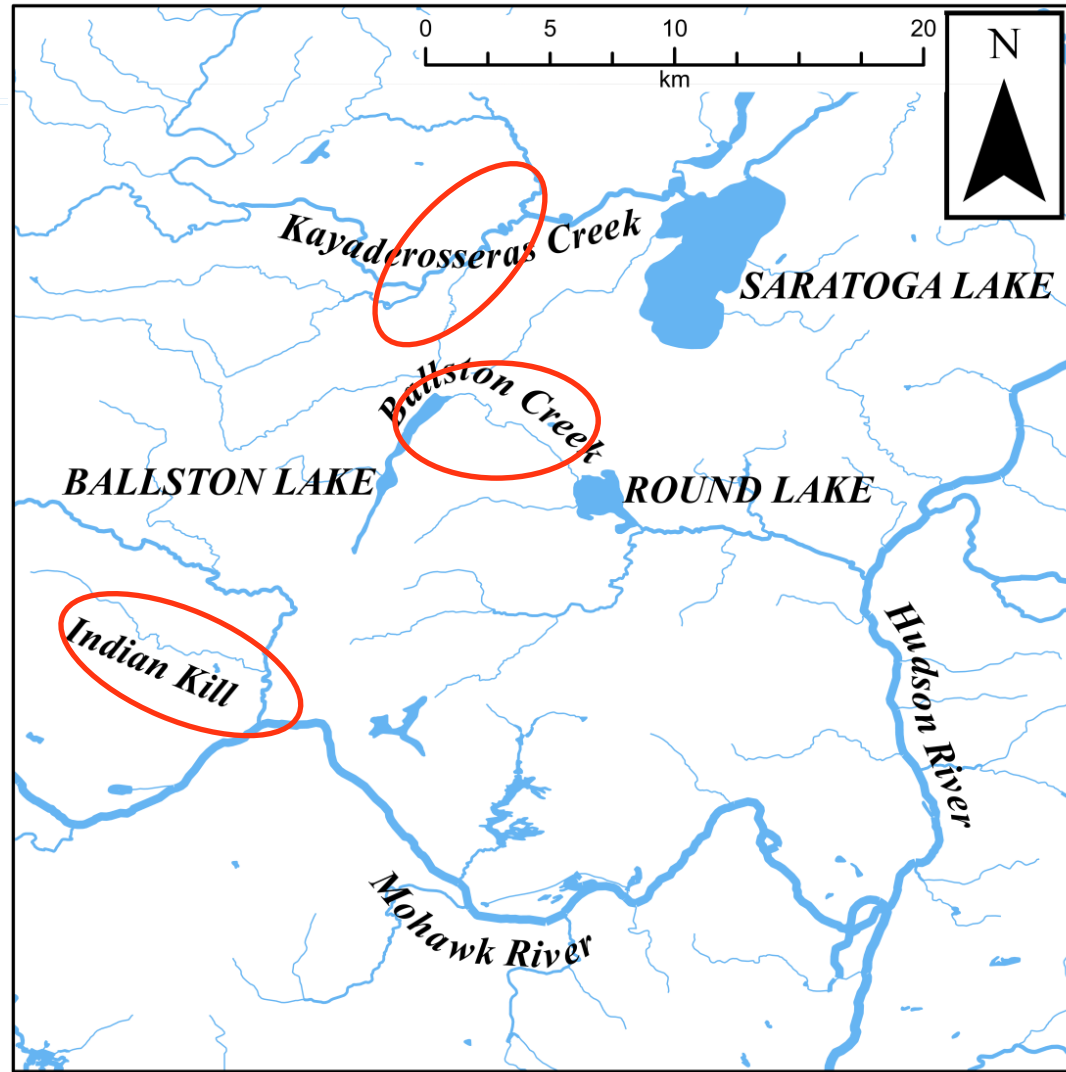
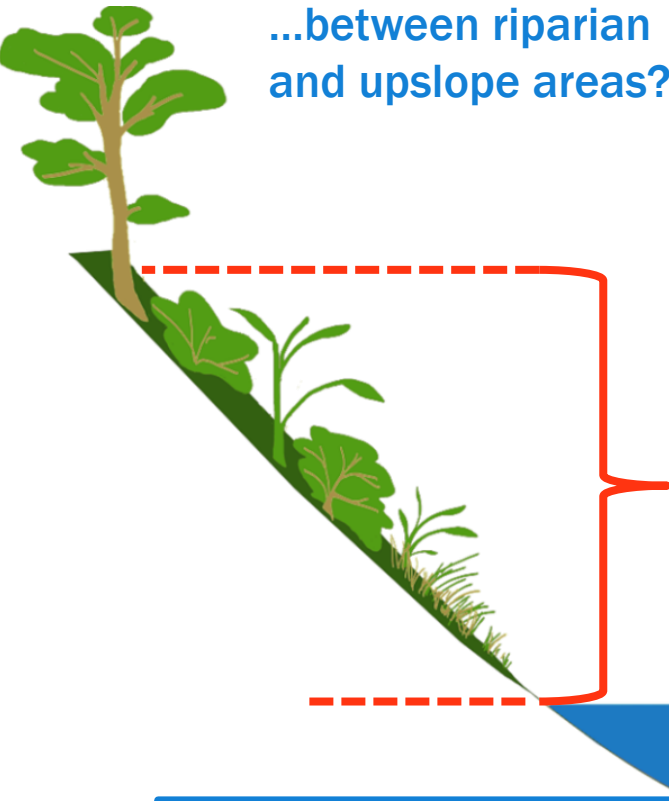
2

...among the three streams?

(How) do plant communities differ...

1

...between riparian and upslope areas?



2

...among the three streams?

3

Are introduced species disproportionately common in the riparian zone?

(How) do plant communities differ...

- 1 ...between riverbanks and upslope areas (locally) ?
- 2 ...among the three streams (regionally)?

Abundance/diversity measures

1. Species richness
2. Number of individuals
3. Ground cover (herbaceous plants)
4. Shannon diversity

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MANOVA

	df	Wilks' Lambda	Approx. F	Num. df	Den. df	P
(Intercept)	1	0.017916	123.338	4	9	7.743e-08 ***
Stream	2	0.236565	2.376	8	18	0.06070
Site	3	0.158279	2.023	12	24.103	0.06832
Bank	6	0.083724	1.407	24	32.607	0.17994
Residuals	12					

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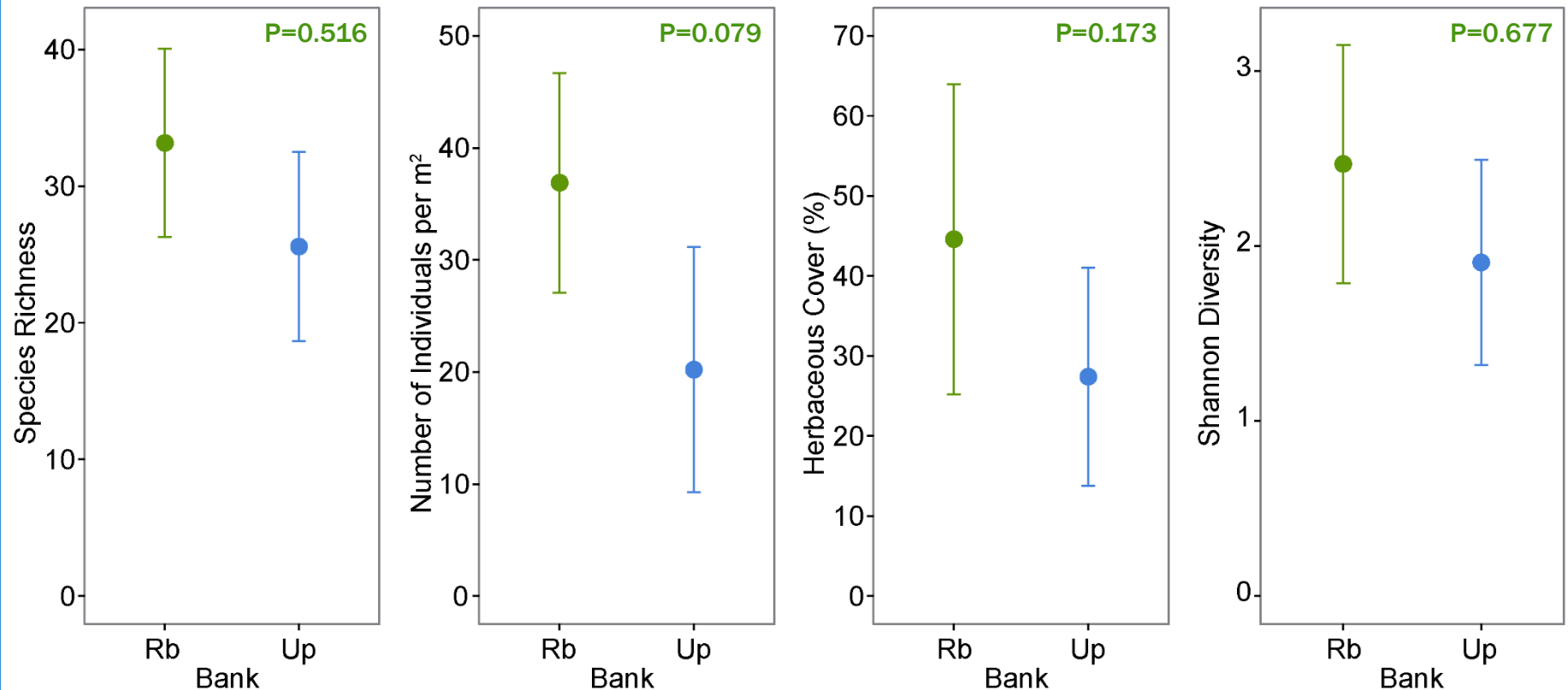
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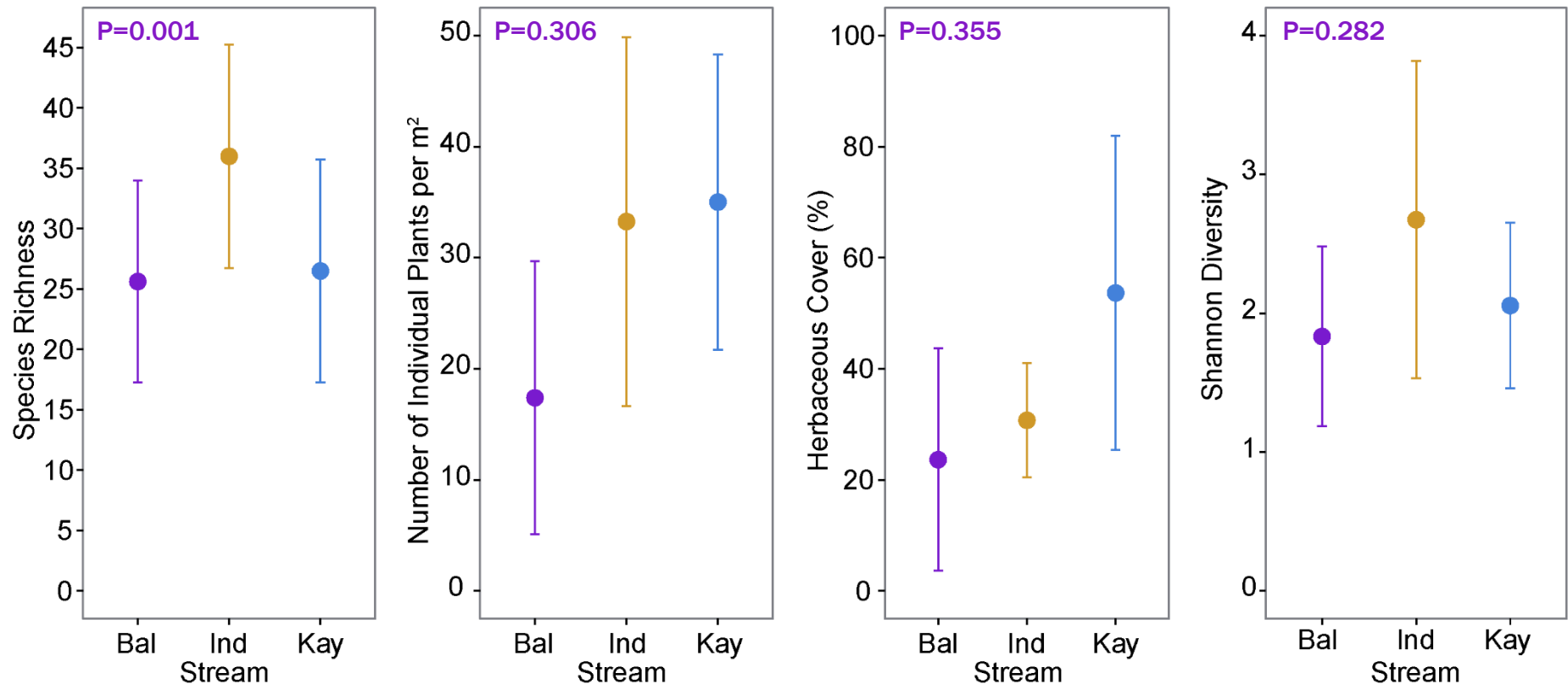
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Residuals	12					

Plant communities in riparian zones and upslope

Mean ± 95% CI

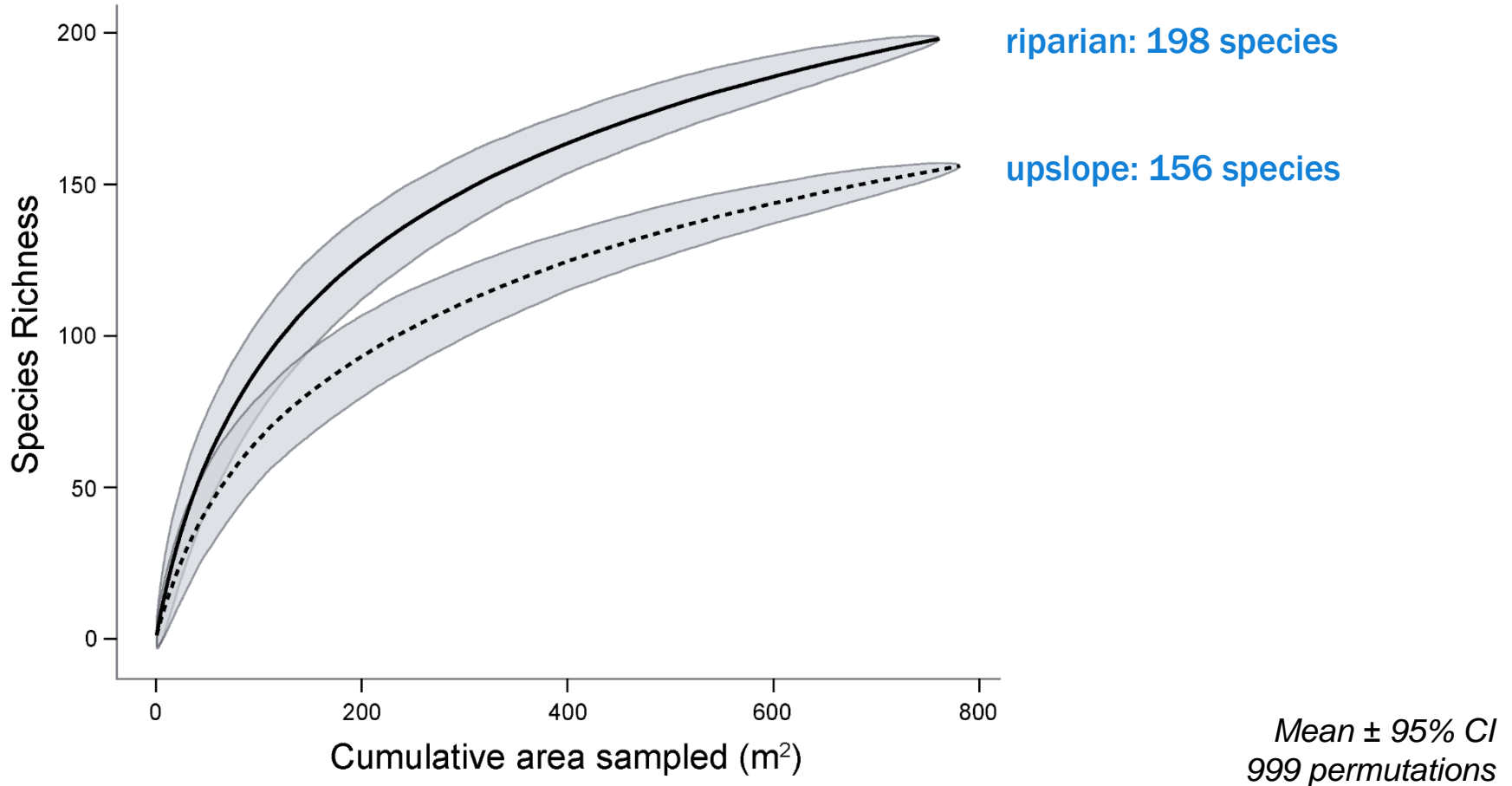
The data trend toward higher plant abundance & diversity in riparian zones, but this is not statistically significant.

Plant communities among streams

Mean \pm 95% CI

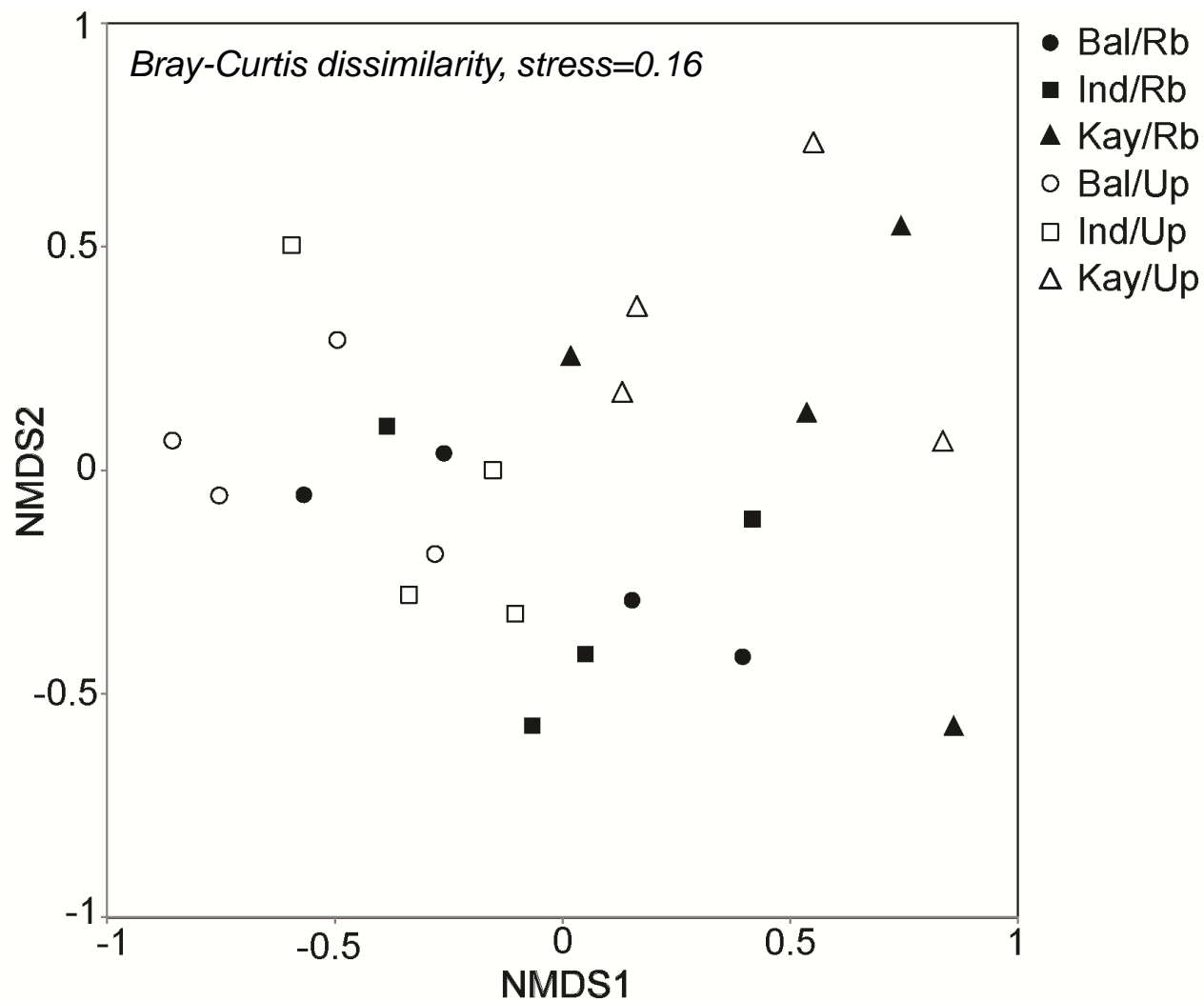
There are no consistent patterns in species abundance or diversity among the three streams.

Regional diversity in riparian zones vs. upslope

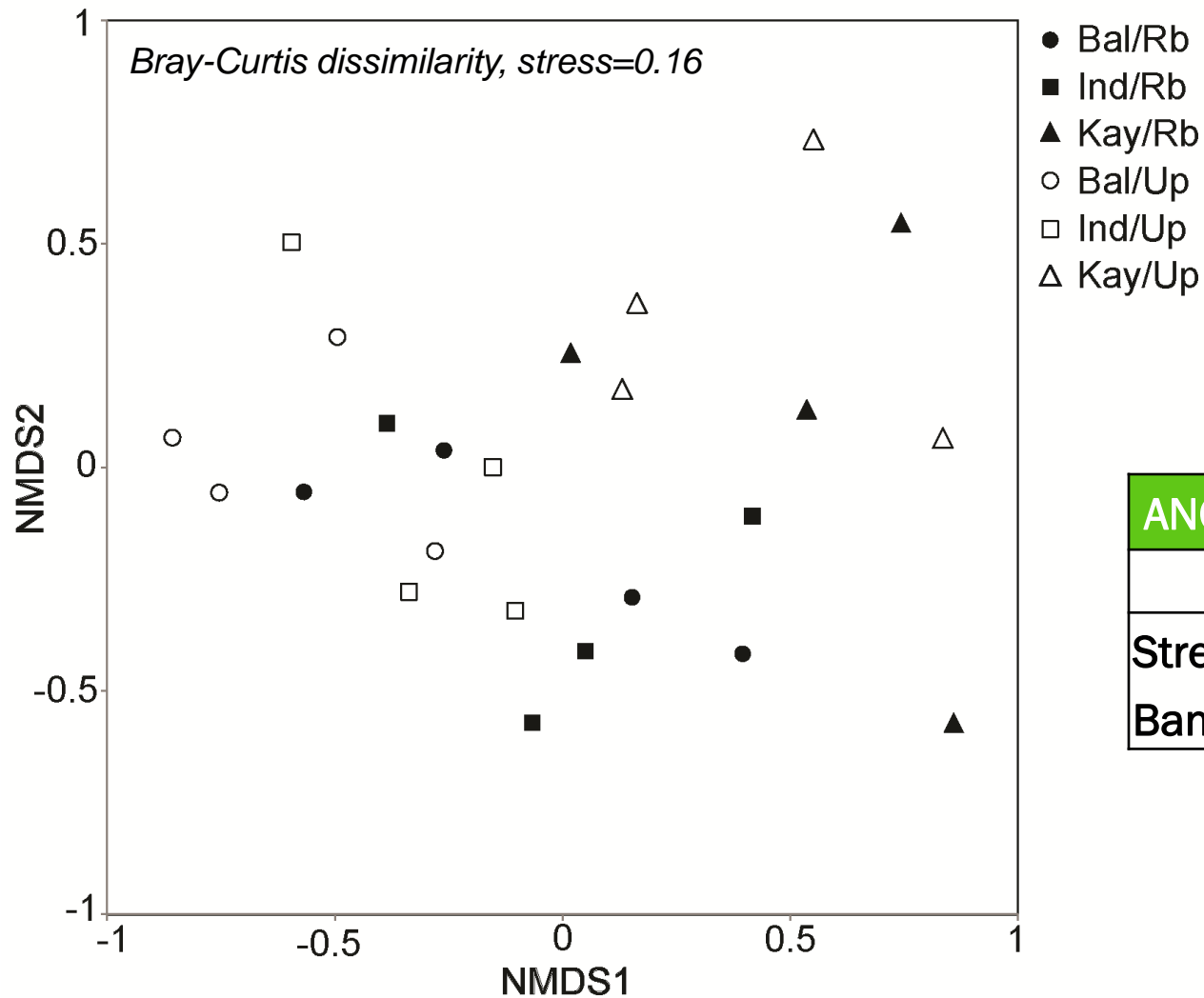


Cumulatively, there are more species in riparian communities.

Species identity at local and regional scales



Species identity at local and regional scales



ANOSIM

	R	P
Stream	0.365	0.001 **
Bank	0.064	0.128

3

Are introduced species disproportionately common in riparian zones?

Partitioned by
species origin
(native/introduced)

Abundance/diversity measures

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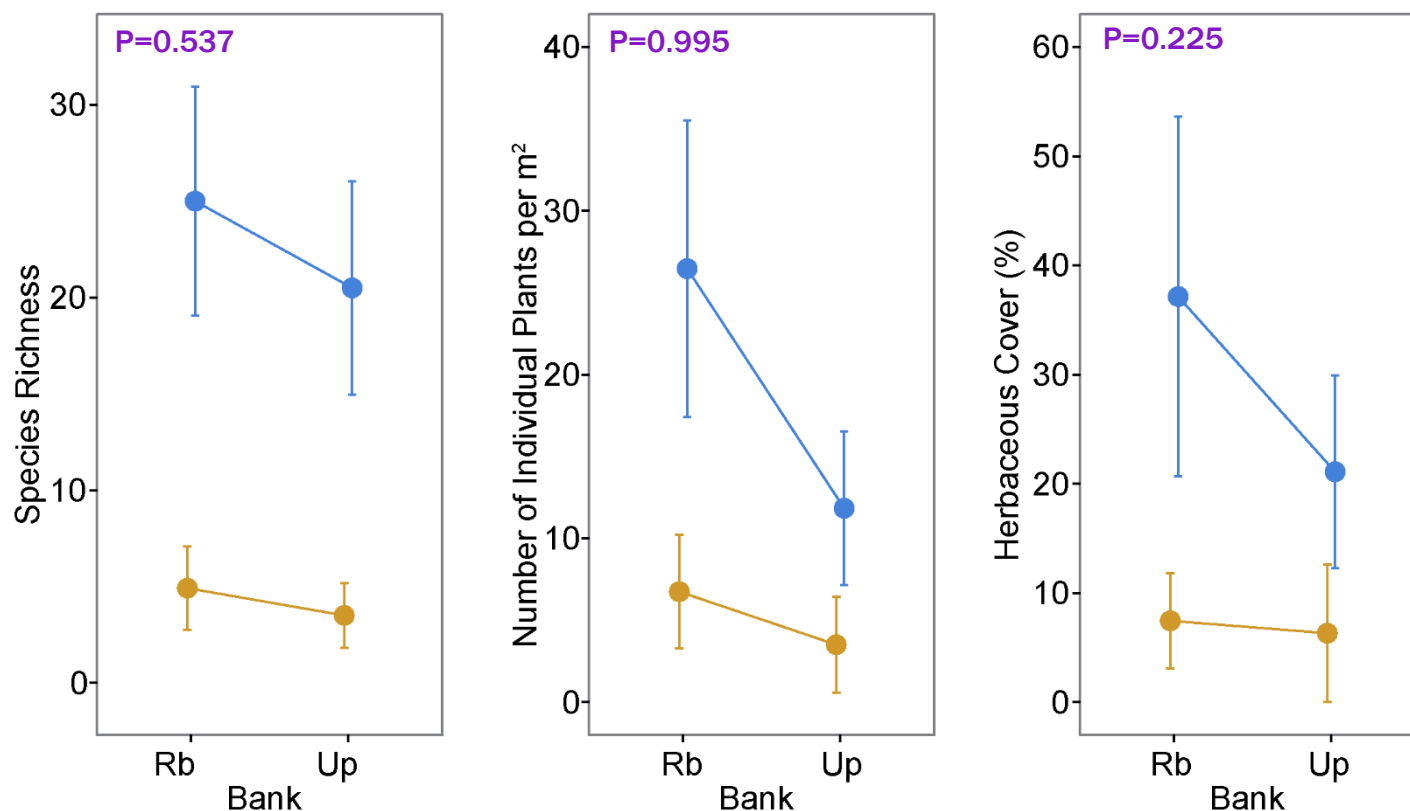
Abundance/diversity measures

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MANOVA

	df	Wilks' Lambda	Approx. F	Num. df	Den. df	P
<i>(Intercept)</i>	1	0.0636	186.54	3	38	<2.2e-16***
Origin	1	0.2680	34.61	3	38	5.88e-11***
Origin x Bank	1	0.9293	0.96	3	38	0.420
Origin x Stream	2	0.7430	2.03	6	76	0.072
<i>Residuals</i>	12					

Introduced species along riverbanks and upslope



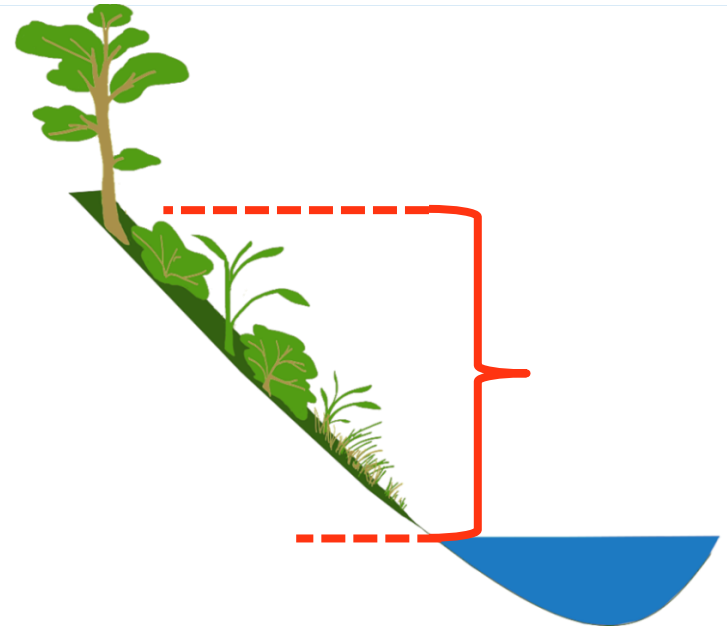
Introduced species are not disproportionately abundant along riverbanks.

Conclusions

- 1 (How) do plant communities differ between riparian and upslope areas?

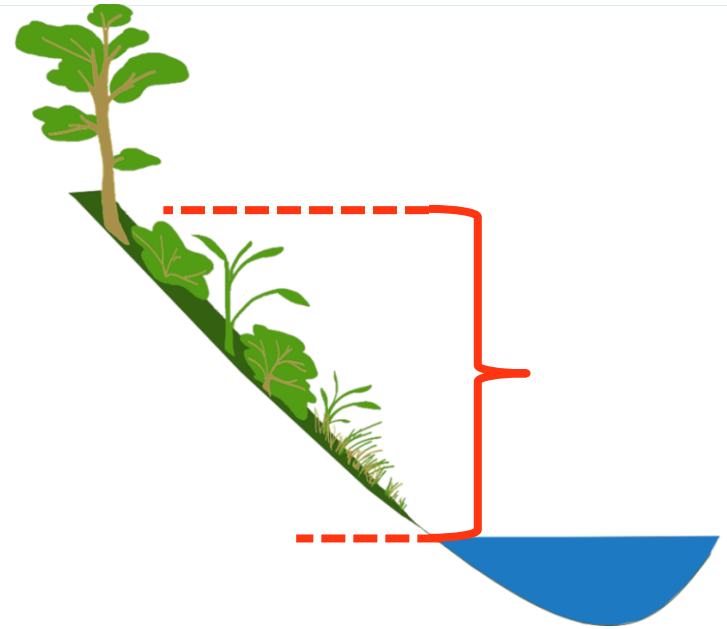
Species abundance & diversity

Species identity



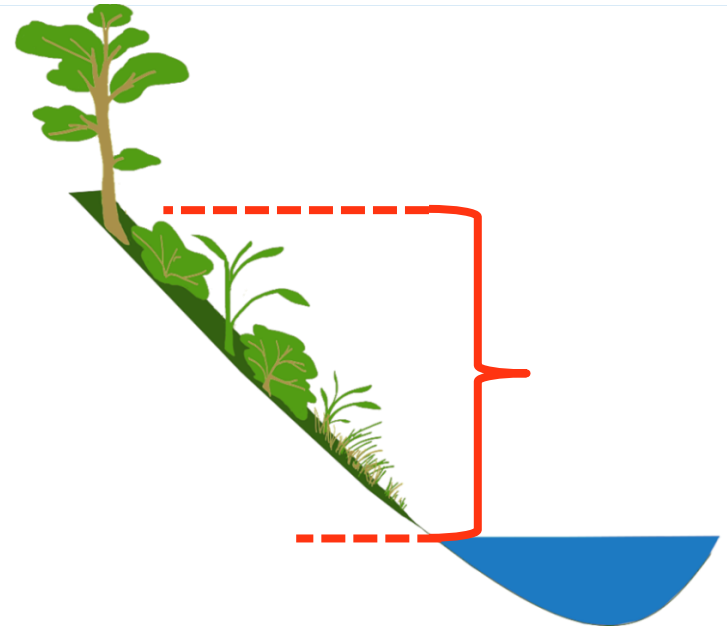
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- 1 (How) do plant communities differ between riparian and upslope areas?
 - ~ Species abundance & diversity
 - Species identity



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Conclusions

1

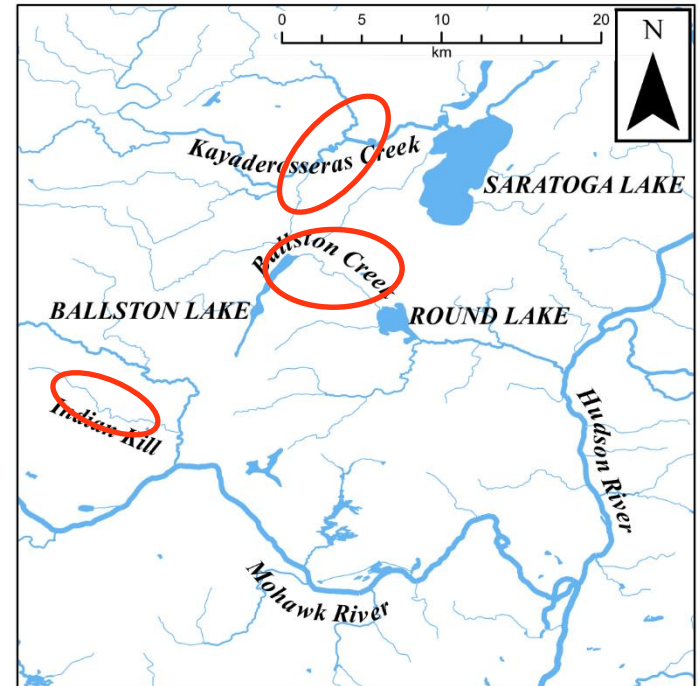
(How) do plant communities differ between riparian and upslope areas?

- ~ Species abundance & diversity
- ~ Species identity

2

(How) do plant communities differ among the three streams?

- Species abundance & diversity
- Species identity



Conclusions

1

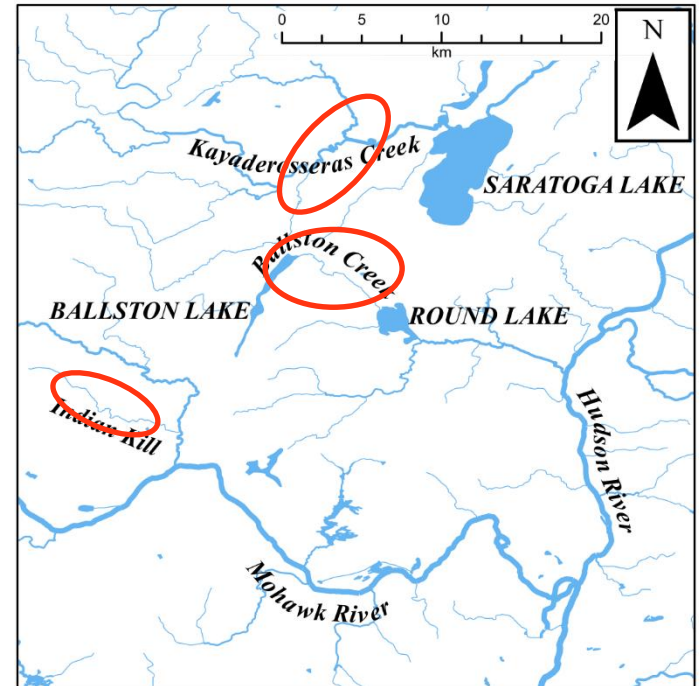
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Conclusions

1

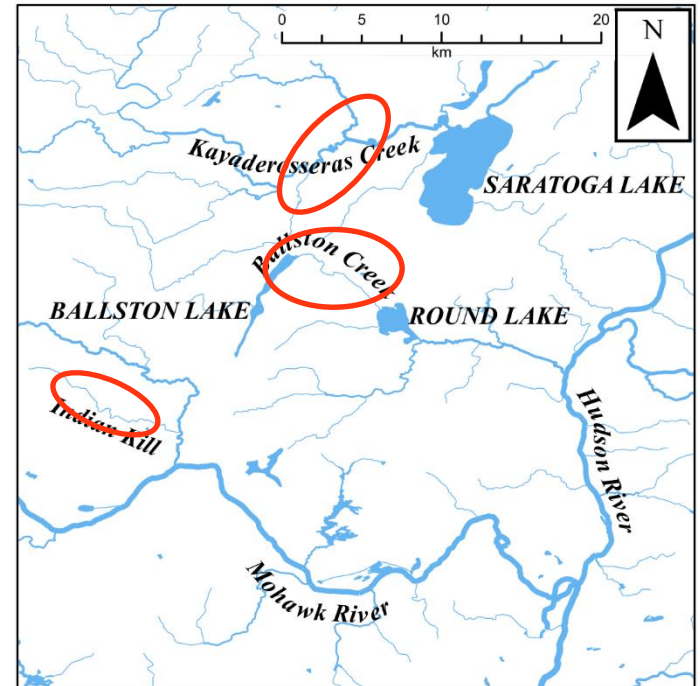
(How) do plant communities differ between riparian and upslope areas?

- ~ Species abundance & diversity
- ~ Species identity

2

(How) do plant communities differ among the three streams?

- ~ Species abundance & diversity
- ✓ Species identity



Conclusions

- 1 (How) do plant communities differ between riparian and upslope areas?
 - ~ Species abundance & diversity
 - ~ Species identity
- 2 (How) do plant communities differ among the three streams?
 - ~ Species abundance & diversity
 - ✓ Species identity
- 3 Are introduced species disproportionately common in the riparian zone?

Riverbanks vs. upslope



Conclusions

- 1 (How) do plant communities differ between riparian and upslope areas?
 - ~ Species abundance & diversity
 - ~ Species identity
- 2 (How) do plant communities differ among the three streams?
 - ~ Species abundance & diversity
 - ✓ Species identity
- 3 Are introduced species disproportionately common in the riparian zone?
 - ✗ Riverbanks vs. upslope



Acknowledgements



My dissertation committee: Jessica Gurevitch (SBU), Dianna Padilla (SBU), Heather Lynch (SBU)

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For comments on previous drafts of this talk: Dana Opulente (SBU), Mary Alldred (SBU), Susan Tsang (CUNY)

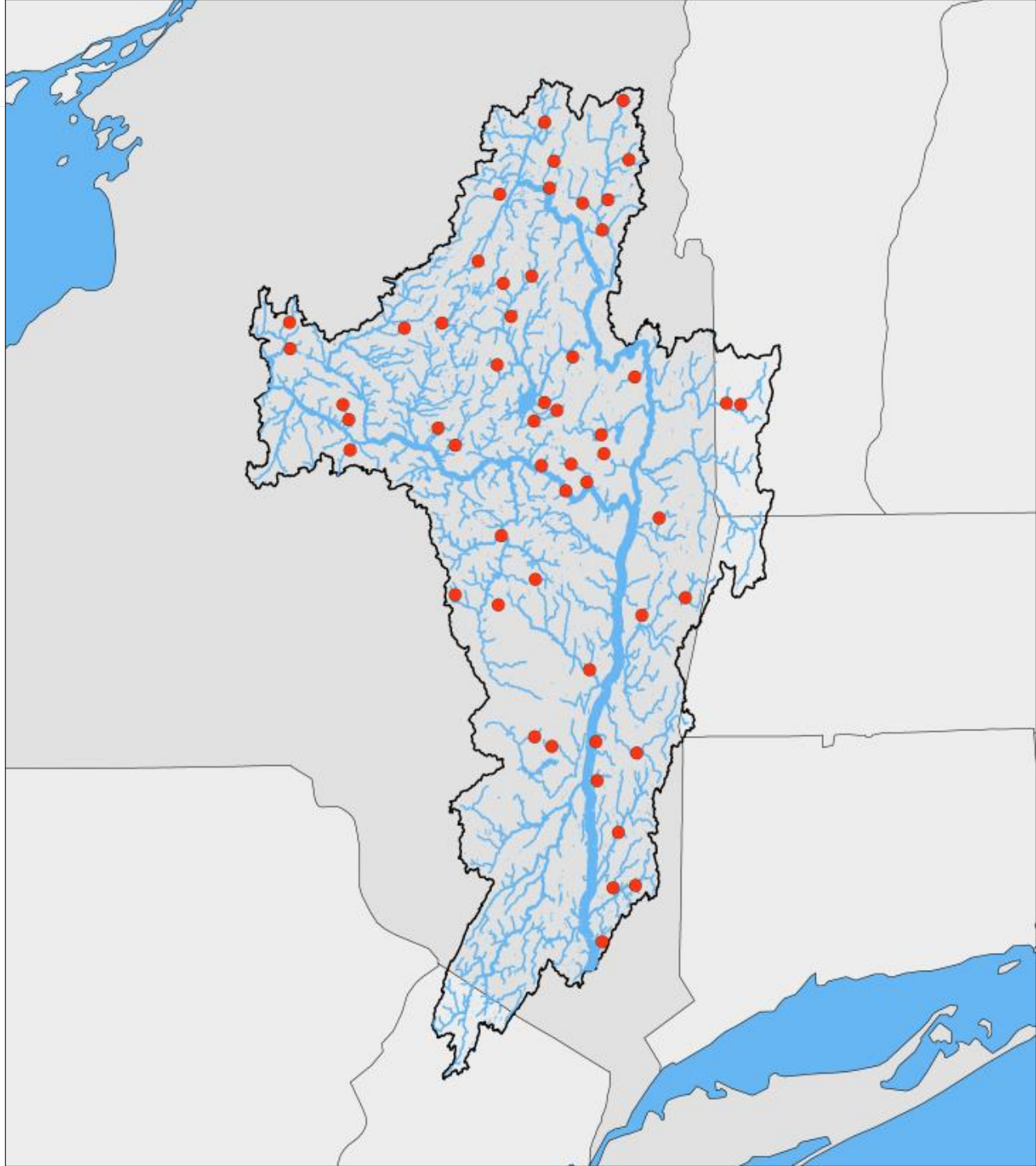
Funding: National Science Foundation Graduate Research Fellowship; Stony Brook University Department of Ecology & Evolution



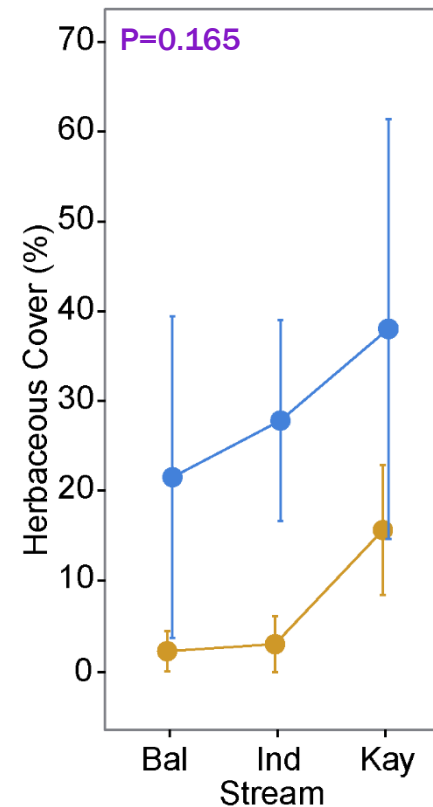
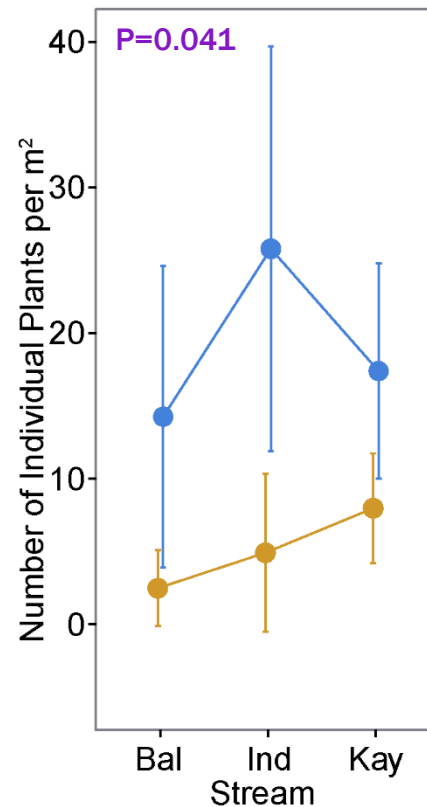
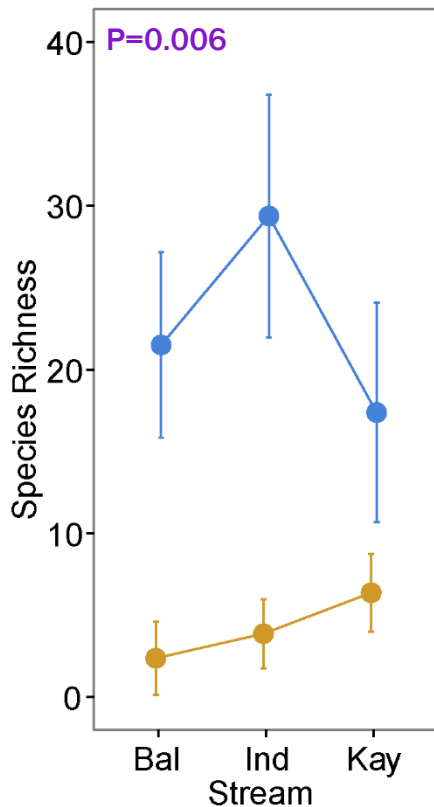
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Introduced species among streams



Native
Introduced

Mean \pm 95% CI
 P shown for interaction

Introduced species abundance appears to vary among streams (but again, not statistically significant).

47

unique to upslope

89

unique to riverbank

109

found in both

