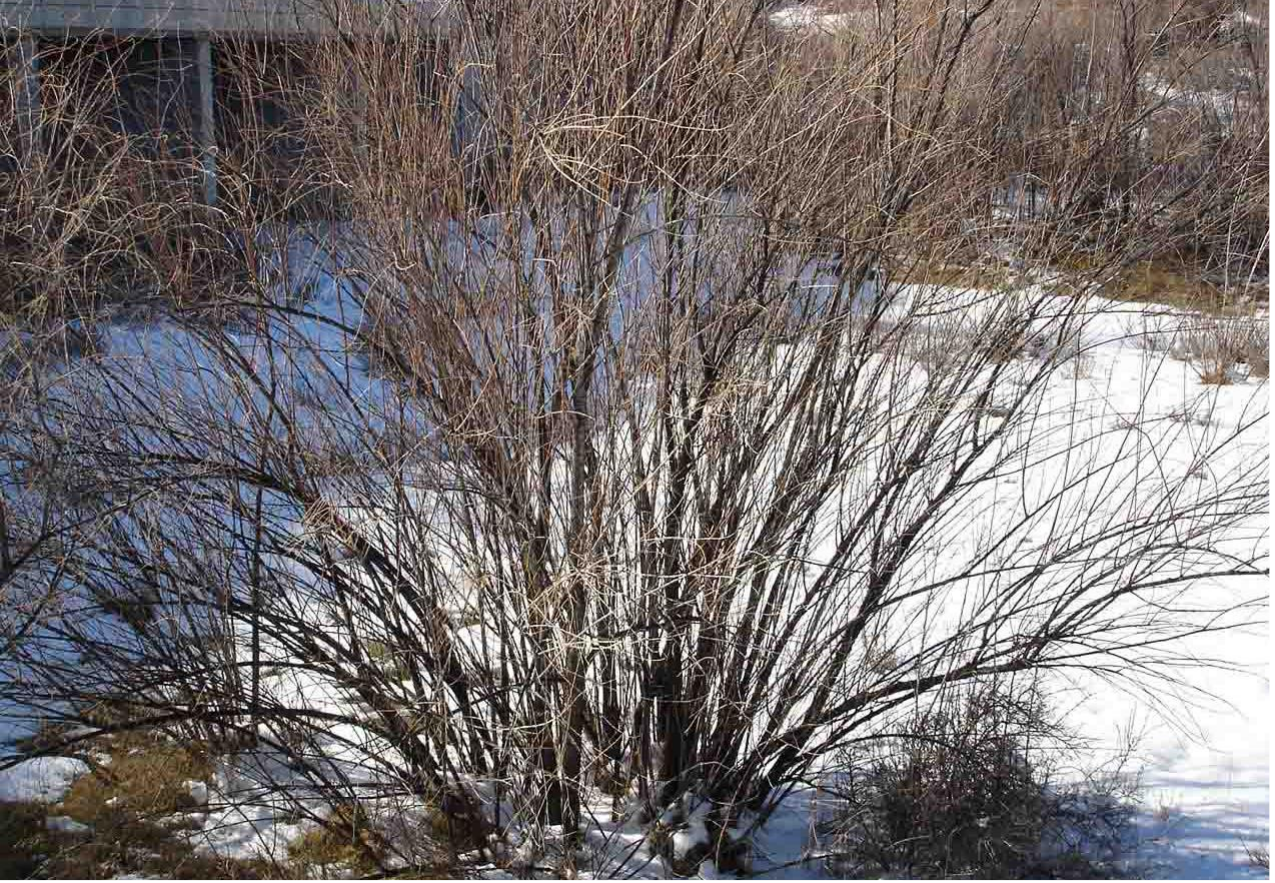

Carbon Savers and Spenders

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University of California, Santa Barbara

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  - **Carla D'Antonio, Tom Dudley, Kevin Hultine, Adam Lambert, Doug McCauley**
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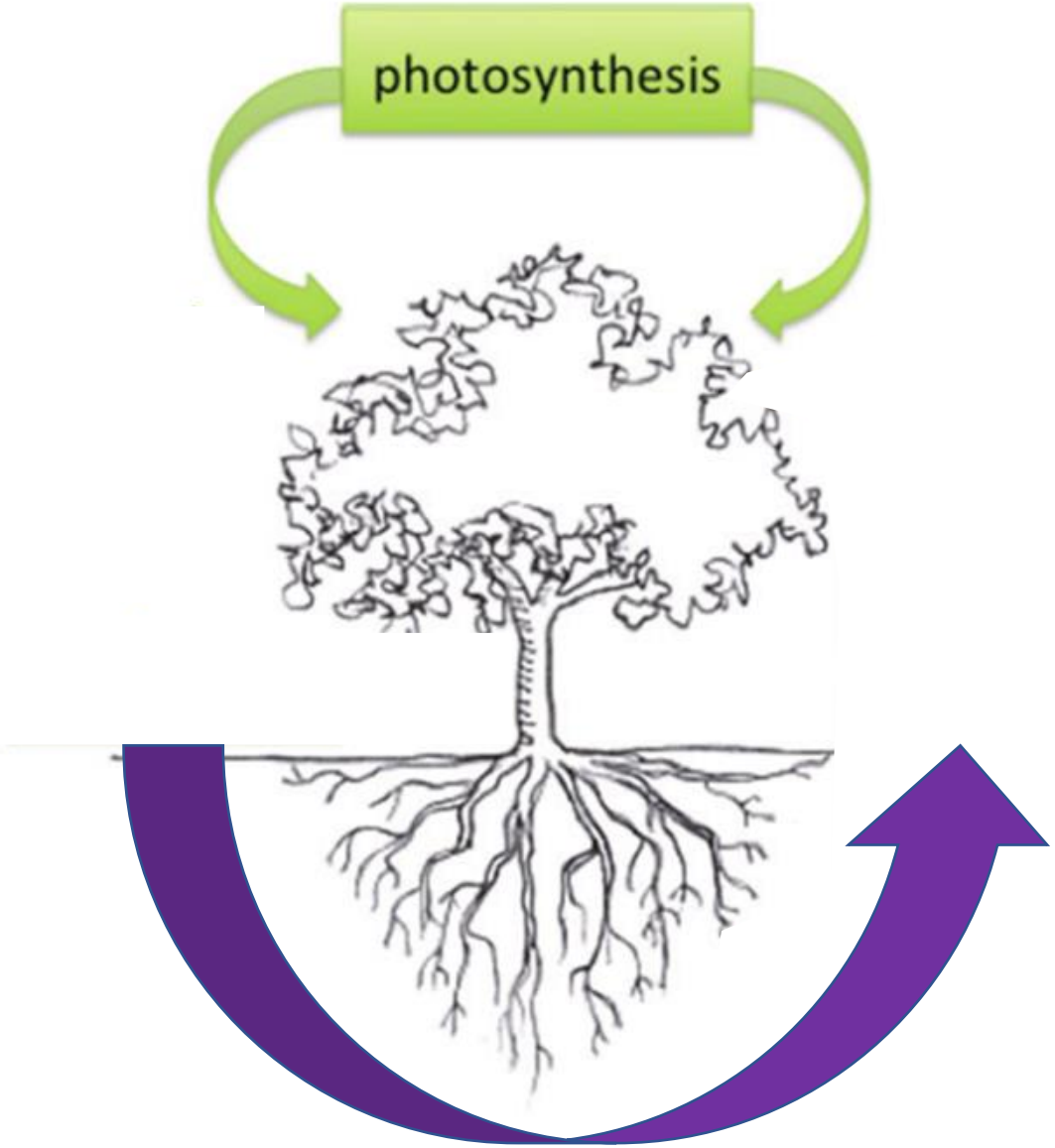
  - **UCSB**
- **Collaborators**
  - **Susan Bush, Dan Koepke, Davis Blasani**
- **Many Undergrads…**

Carbon Allocation Patterns

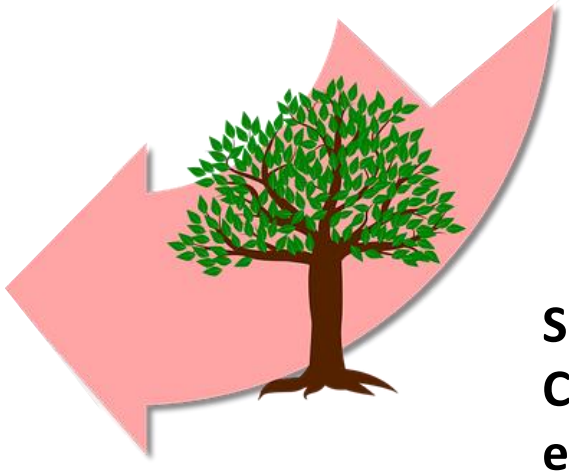


Long *et al.* 2017 Conservation Physiology

Seasonal Dynamics: Deciduous Trees

Winter:
Dormant, little supply or demand of carbon

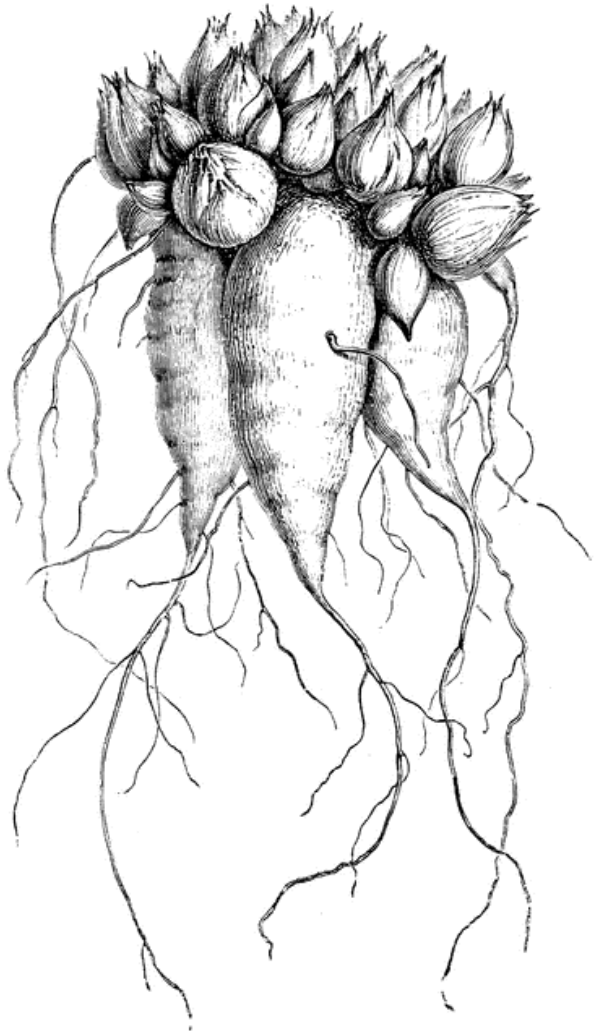
Spring:
Carbon demand Exceeds supply, NSCs used for growth



Fall:
Lower carbon demand, NSCs accumulate

Summer:
Carbon supply exceeds demand, NSCs accumulate

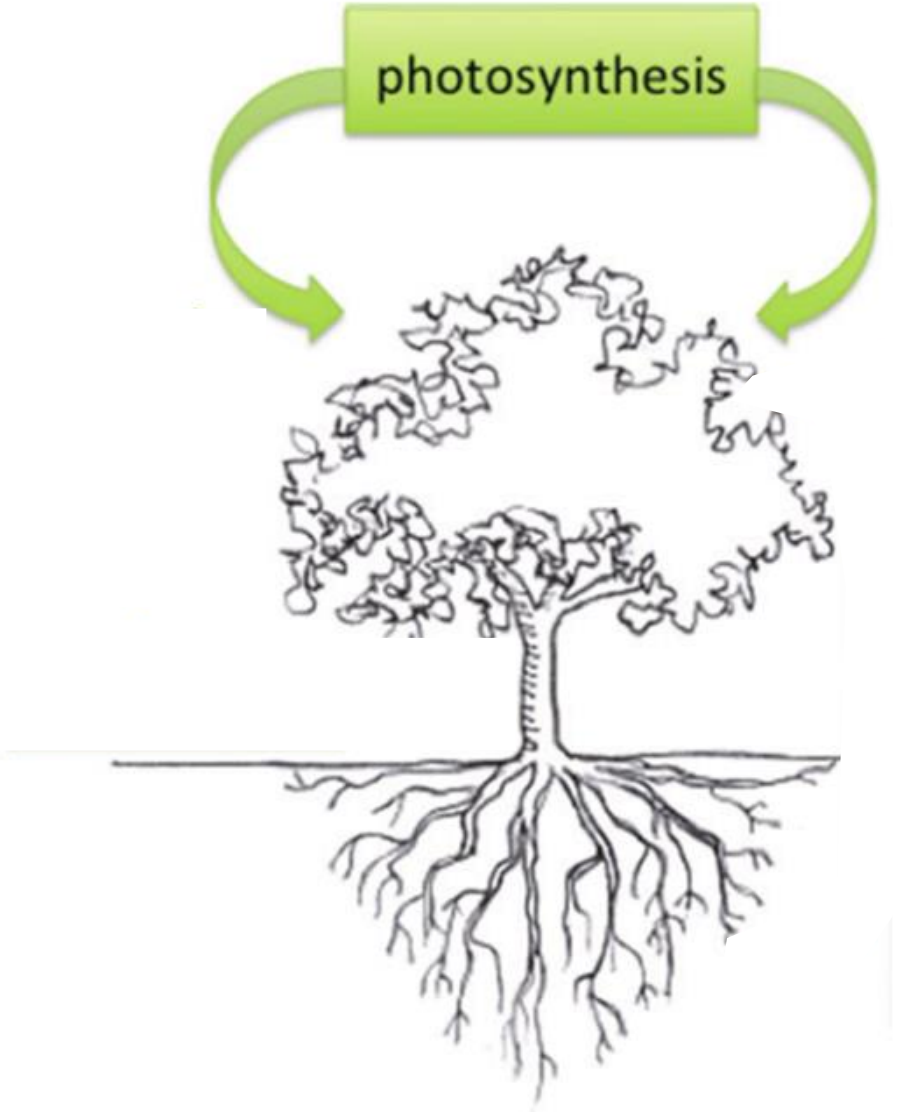
Storage organs: Active storage



NSCs and Episodic Defoliation Events

Tradeoffs?

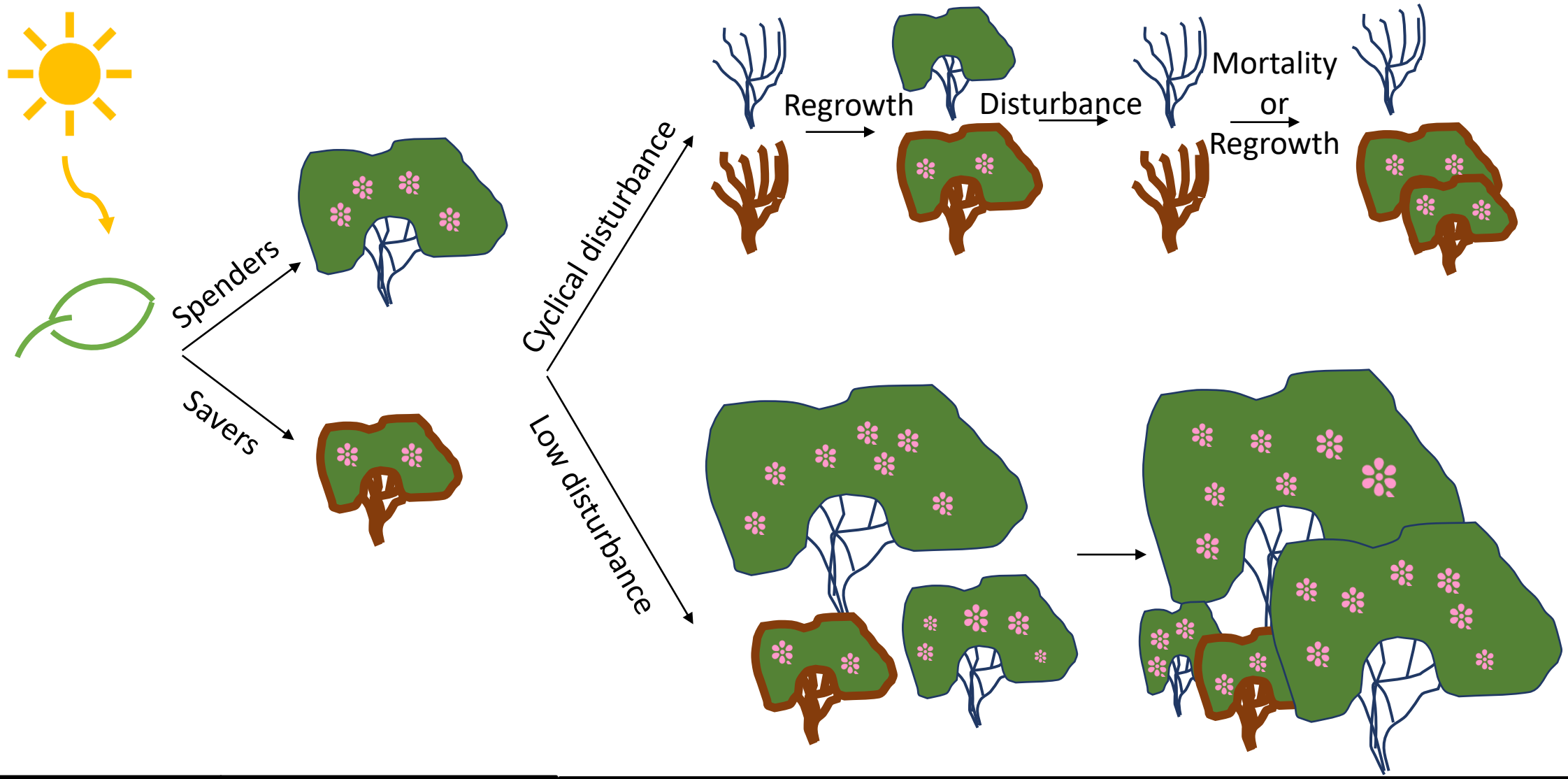
- Carbon is a limited resource
- Allocation to storage reduces carbon for growth



Are there spenders and savers?

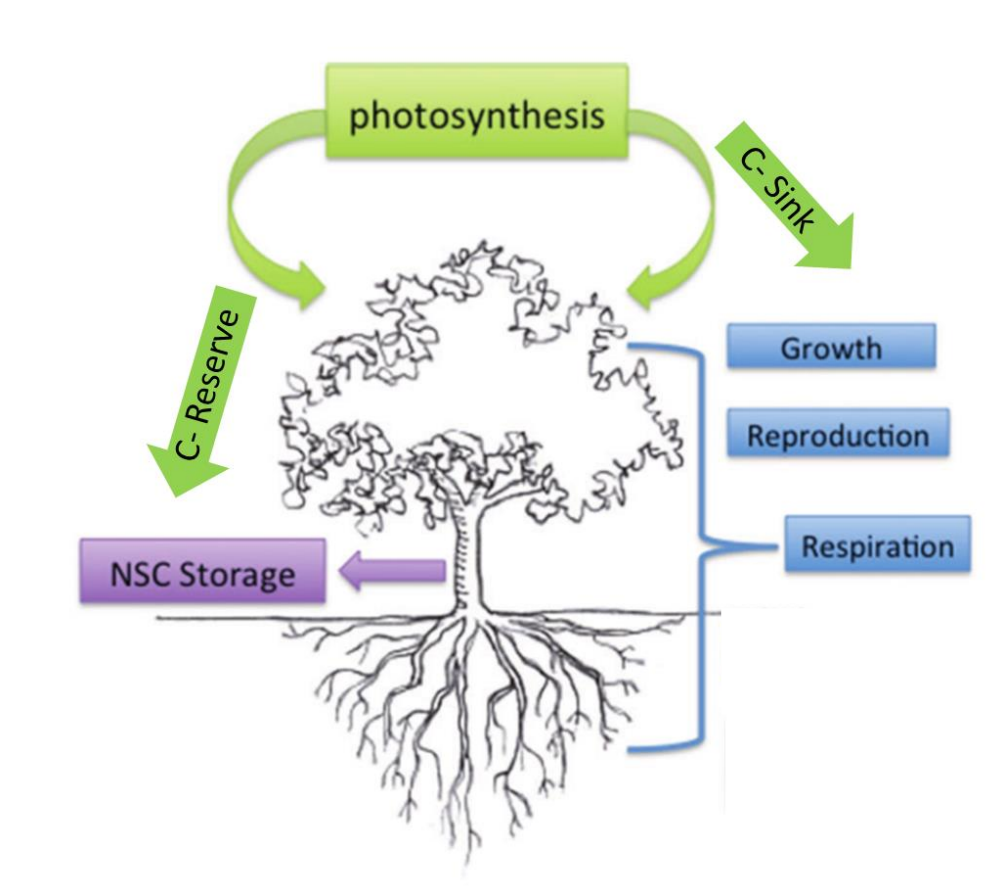
H – There are tradeoffs between carbon sinks and storage

- **Greater carbon storage will result in lower growth rates**
- **Cyclical disturbance events will select for greater storage**



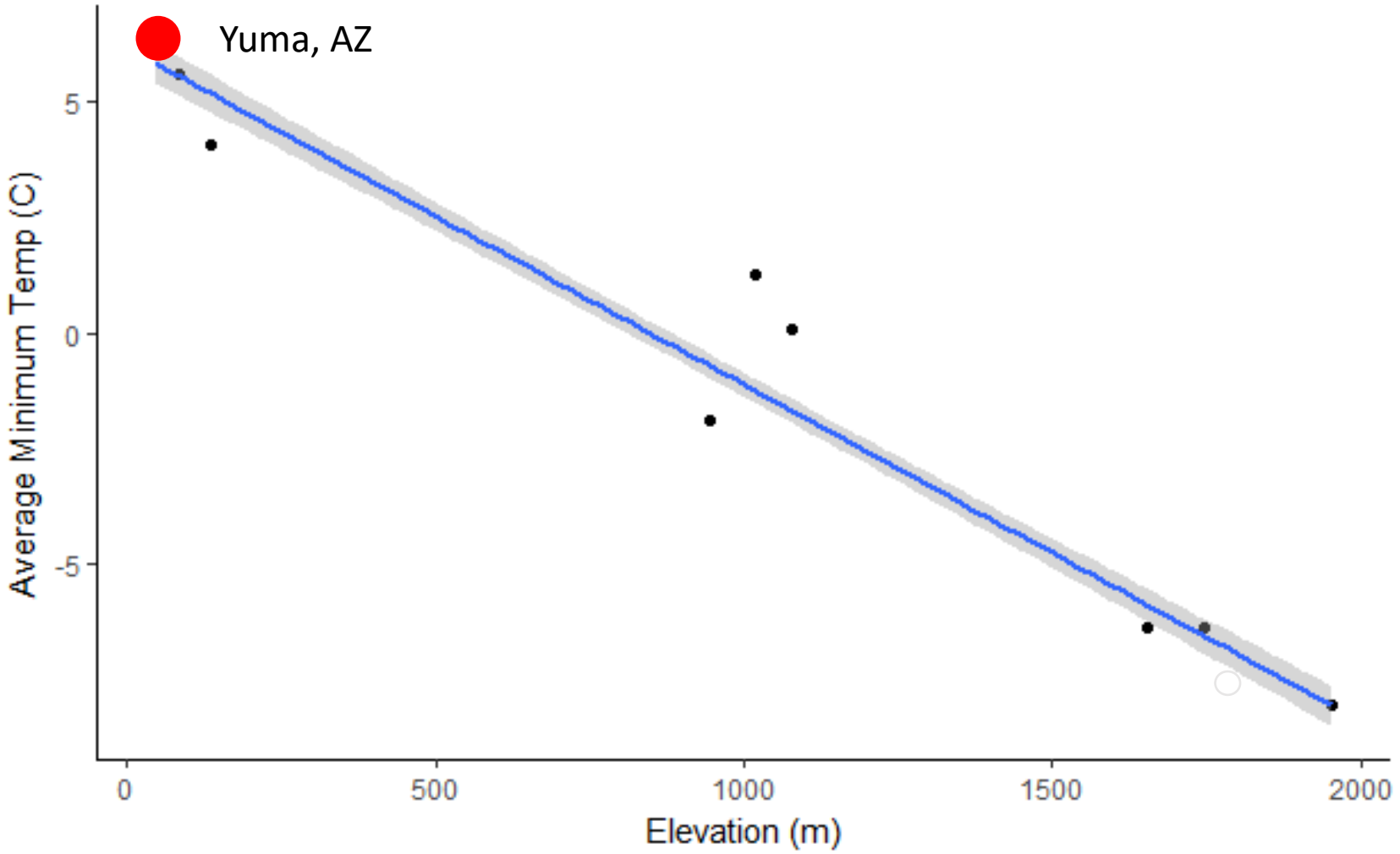
Carbon Acquisition	Intrapopulation differences	Low disturbance sites become dominated by spenders, sites with cyclical disturbances become dominated by savers

Local Adaptation in Tamarisk?

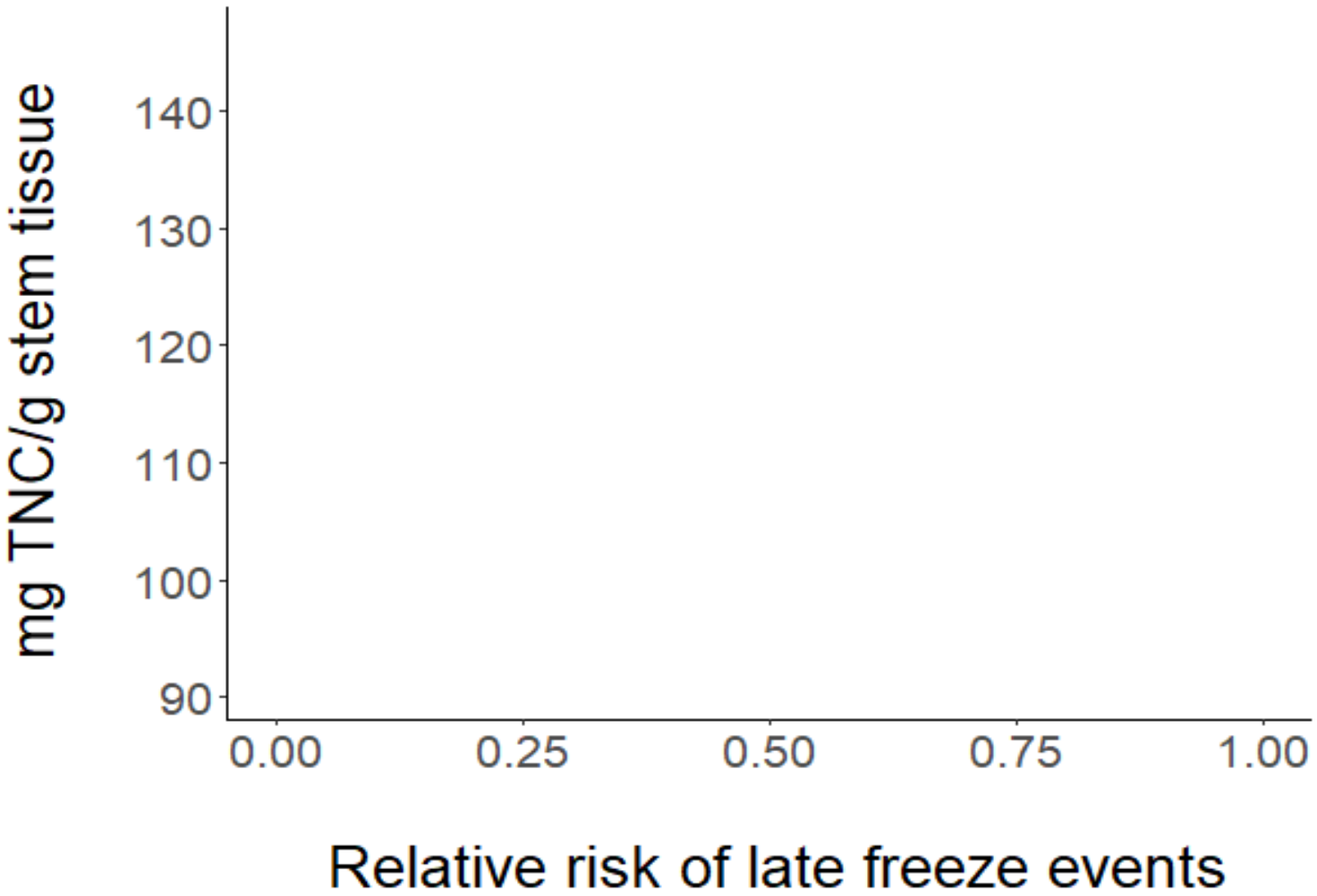


Extreme cold and late freeze

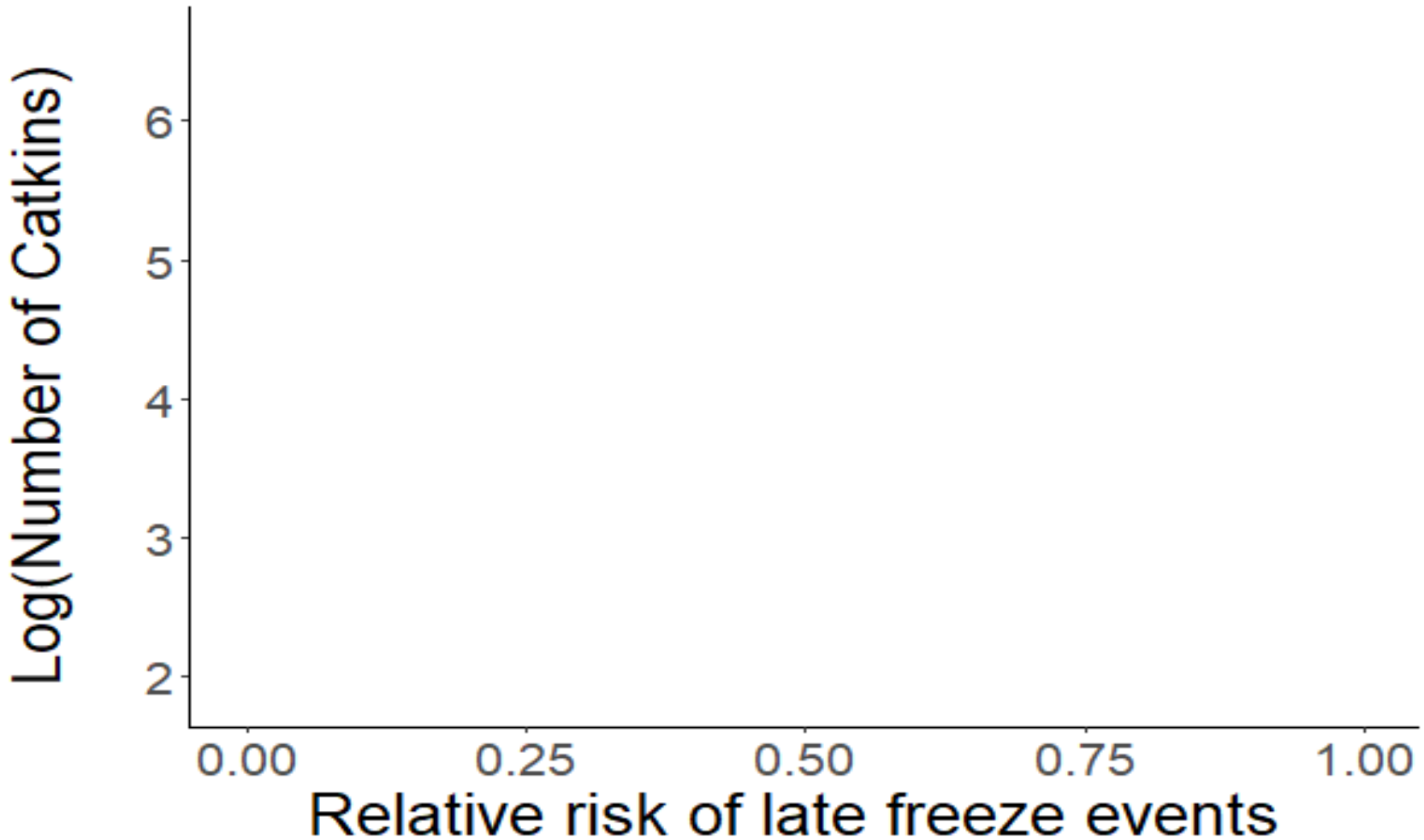
Tamarisk Common Garden (Yuma, AZ)

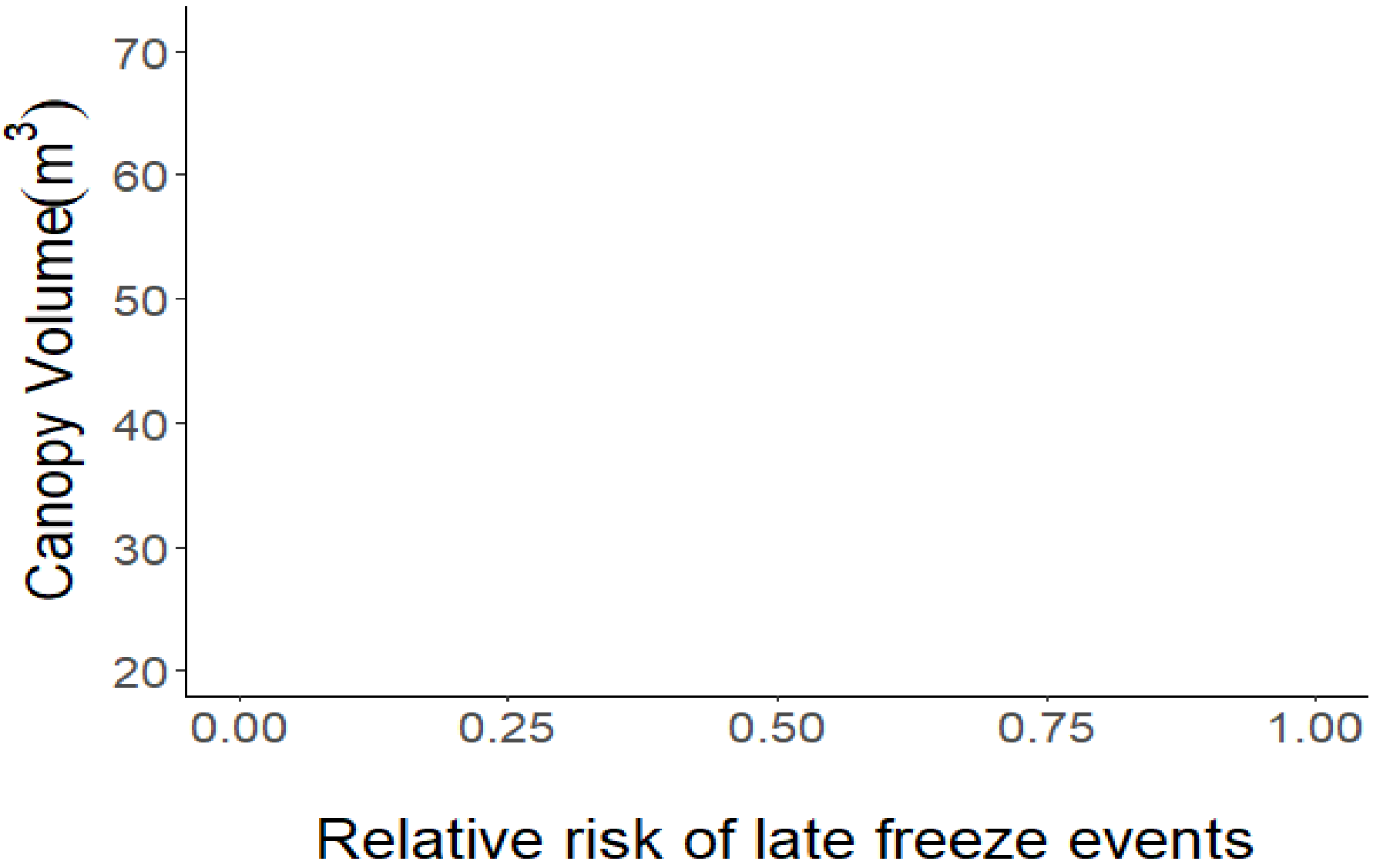


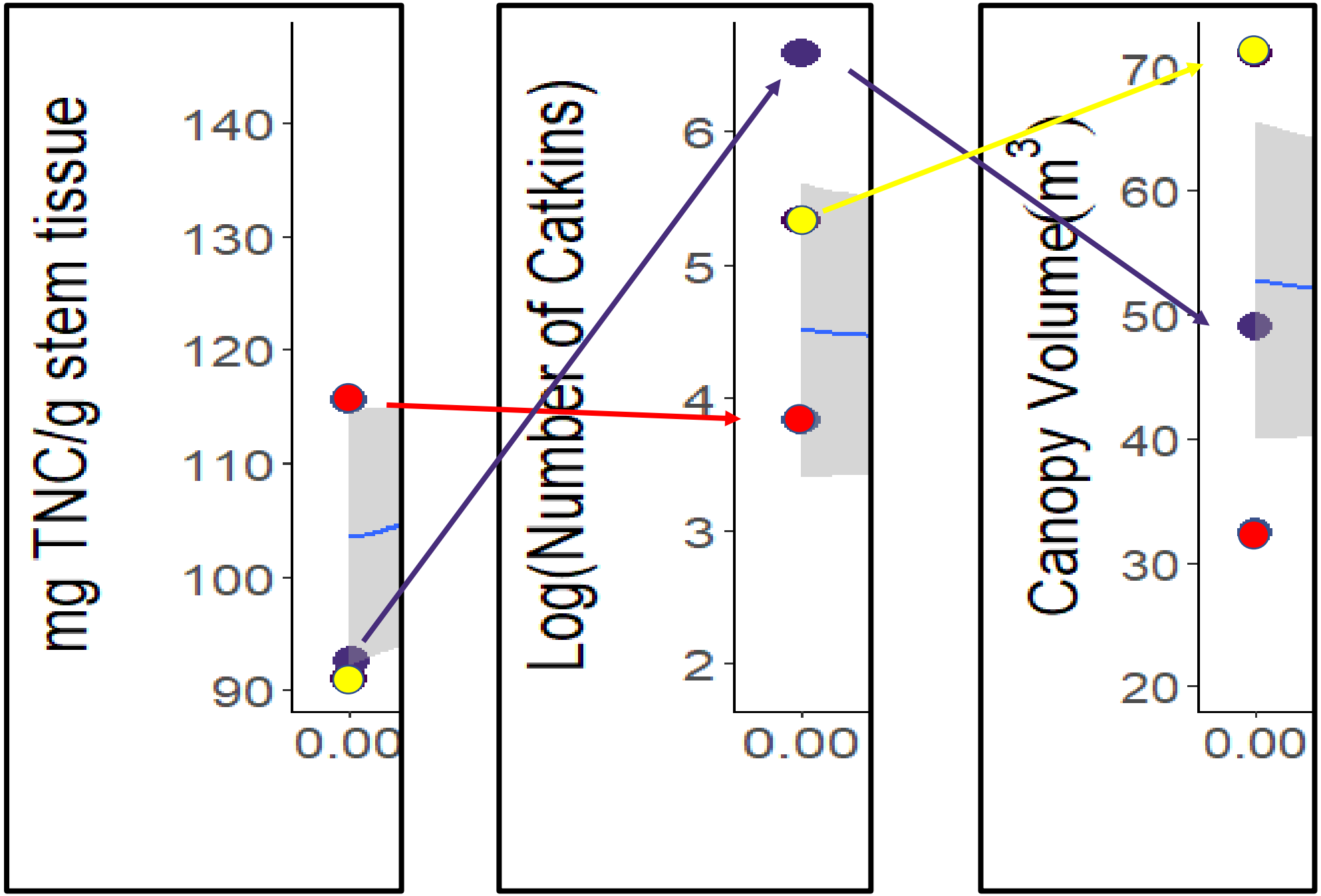
Altitudinal Gradient

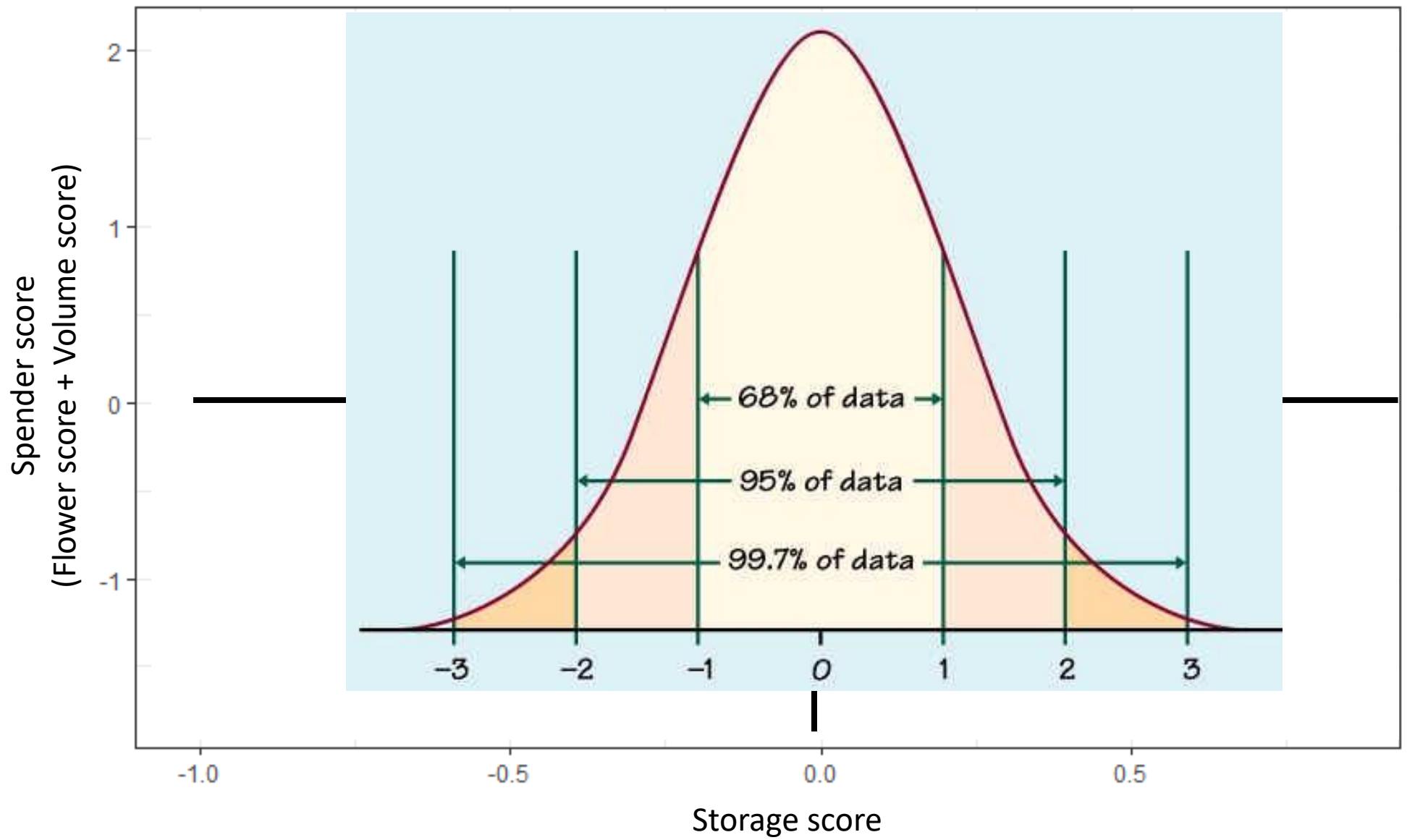


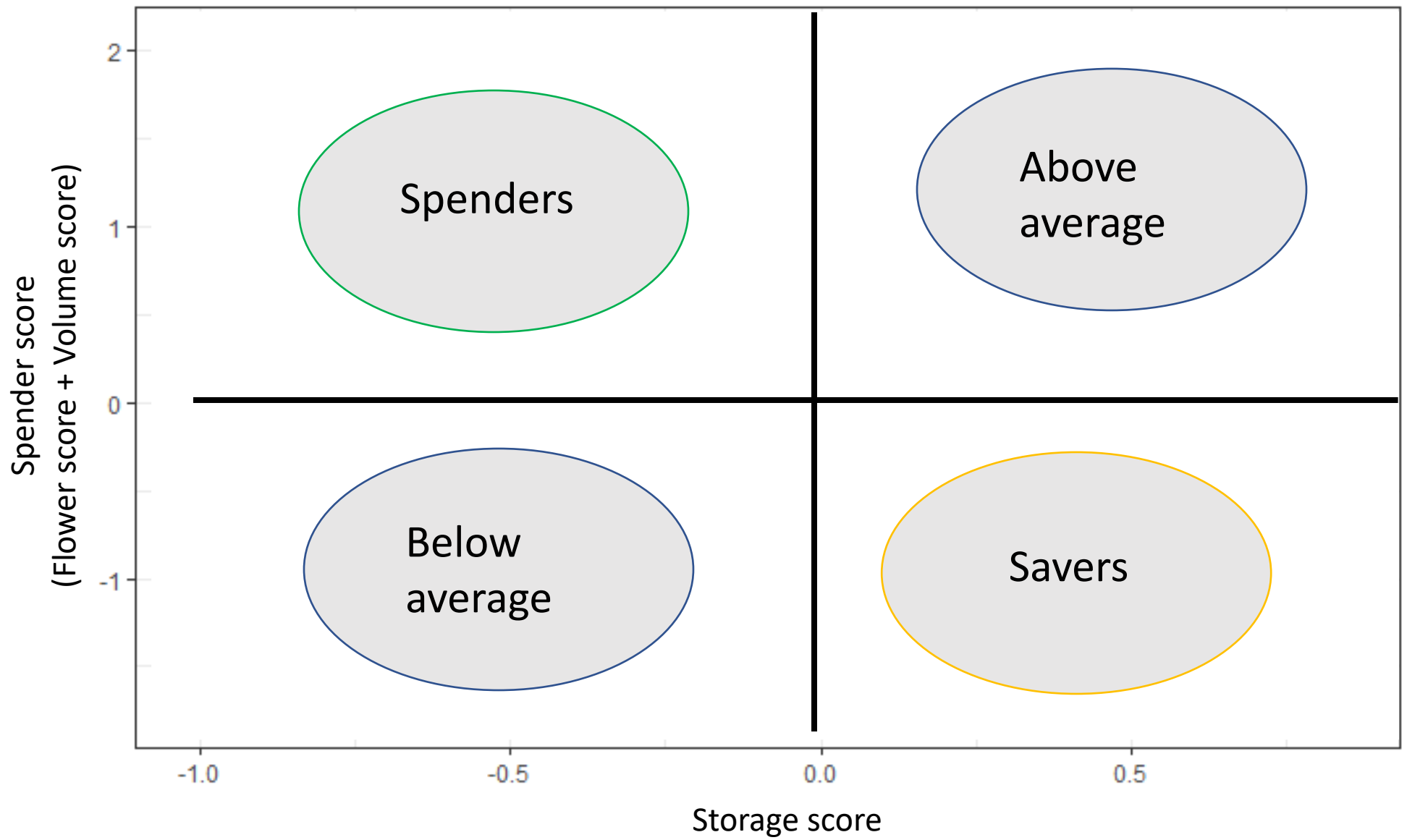
$F_{(1,7)} = 10.75$, $p = 0.014$, $R^2 = 0.61$

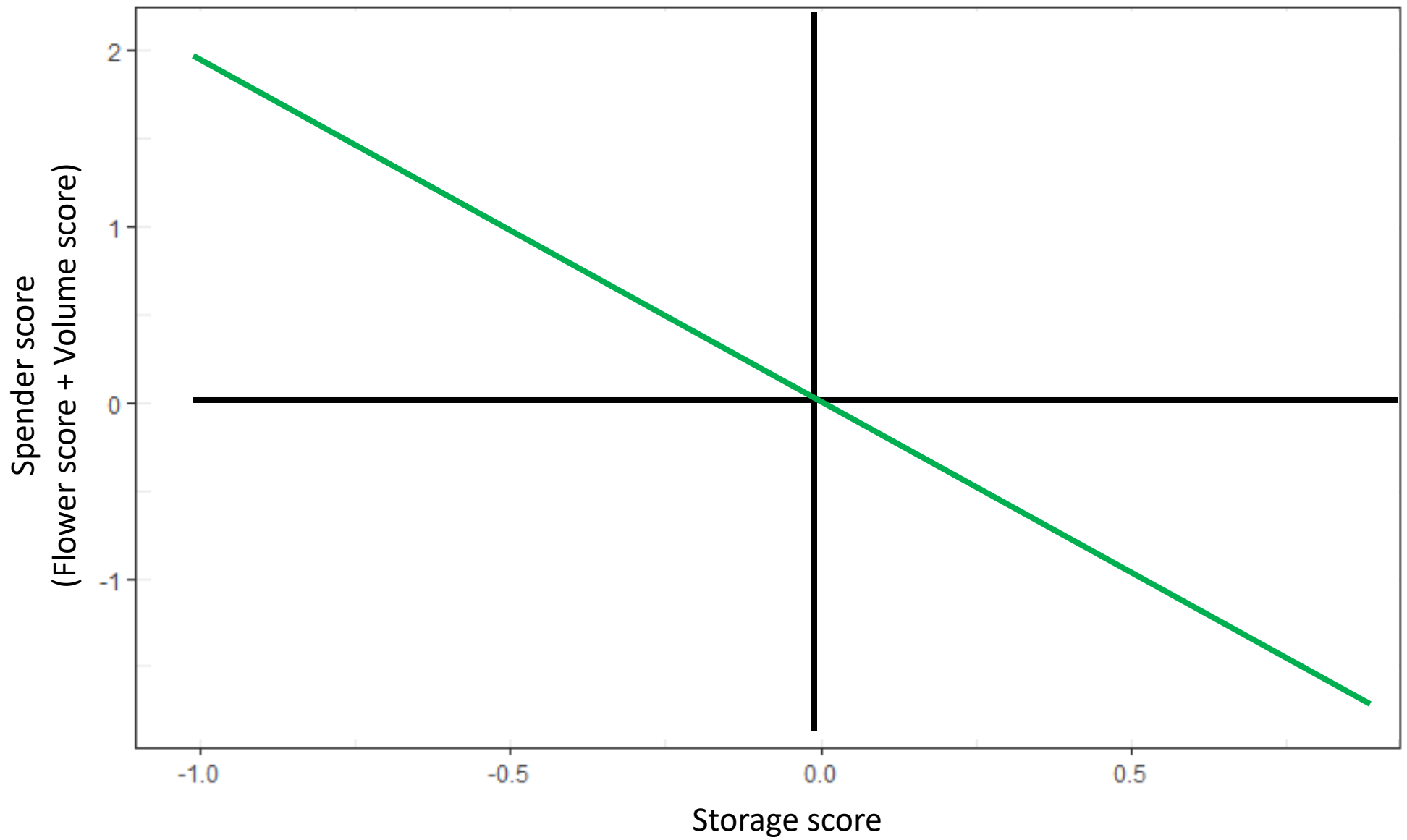

Log(Number of Catkins)
6
5
4
3
2
0.00
0.25
0.50
0.75
1.00
Relative risk of late freeze events

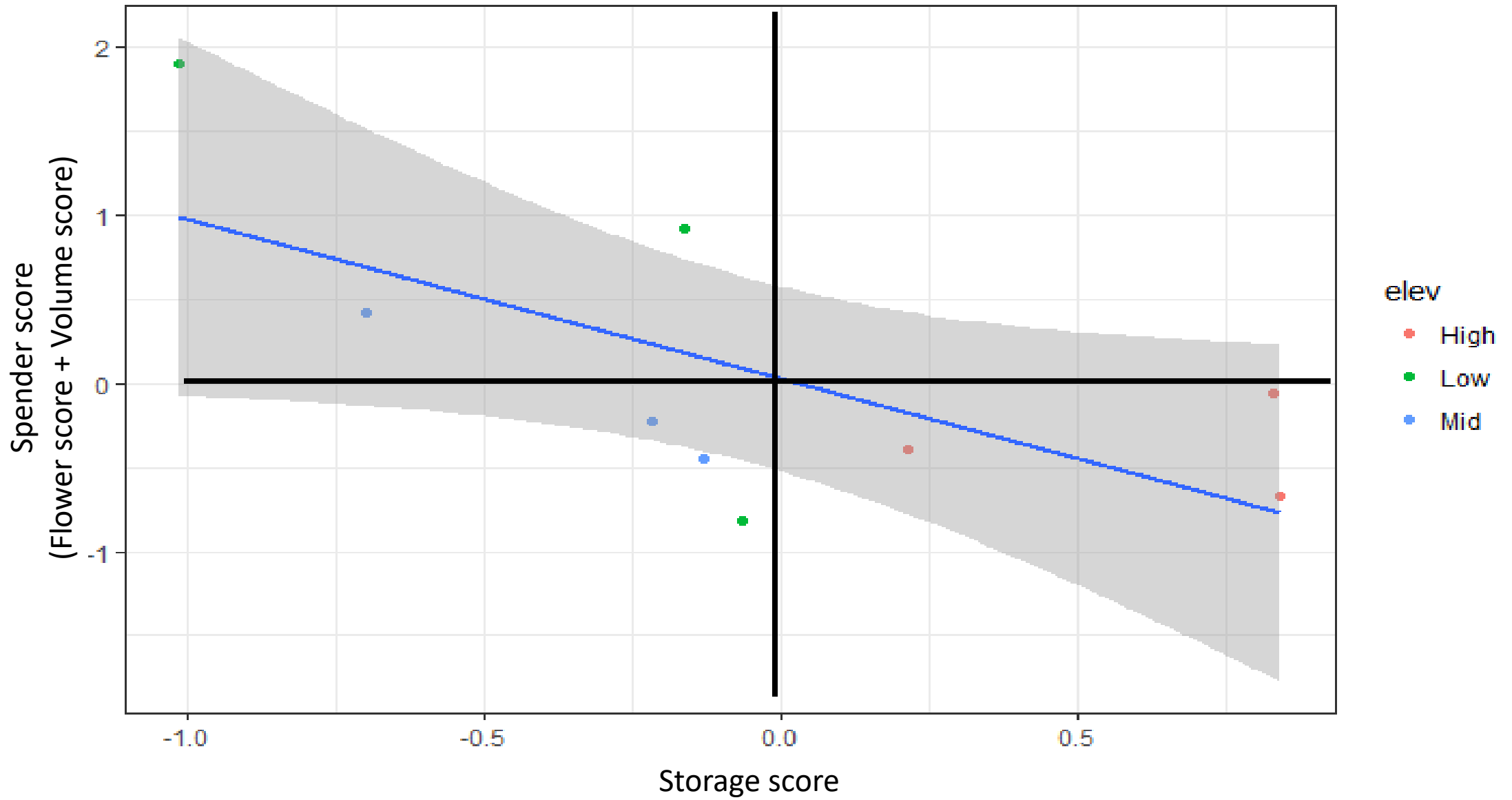

Canopy Volume(m^3)
70
60
50
40
30
20
0.00
0.25
0.50
0.75
1.00
Relative risk of late freeze events


mg TNC/g stem tissue
140
130
120
110
100
90
0.00
Log(Number of Catkins)
6
5
4
3
2
0.00
Canopy Volume(m3)
70
60
50
40
30
20
0.00

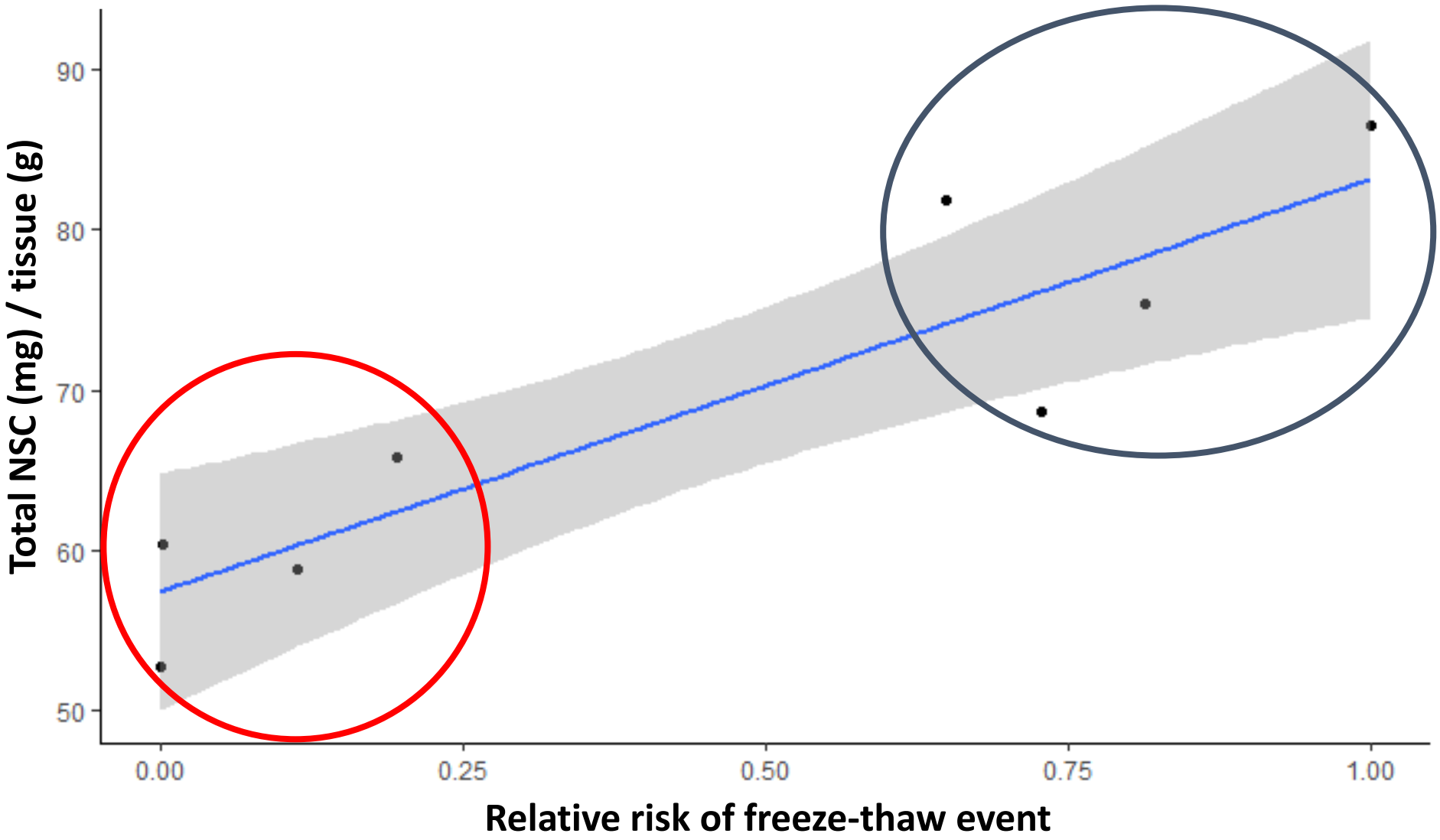

Spender score
(Flower score + Volume score)
2
1
0
-1
68% of data
95% of data
99.7% of data
−3
−2
−1
0
1
2
3
-1.0
-0.5
0.0
0.5
Storage score


Spenders
Above average
Below average
Savers
2
1
0
-1
-1.0
-0.5
0.0
0.5
Spender score
(Flower score + Volume score)
Storage score

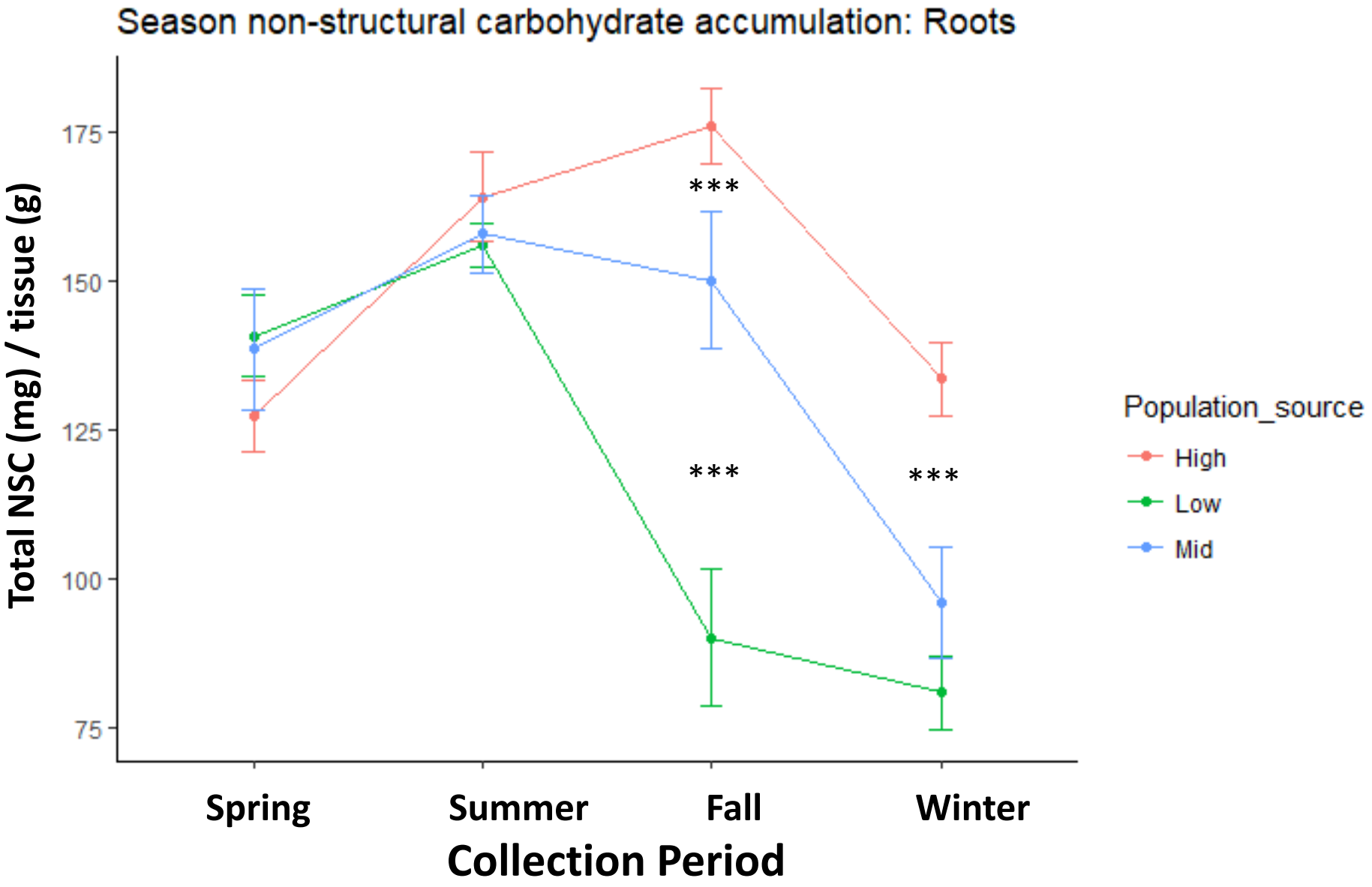

Spender score
(Flower score + Volume score)
2
1
0
-1
-1.0
-0.5
0.0
0.5
Storage score


Spender score
(Flower score + Volume score)
2
1
0
-1
-1.0
-0.5
0.0
0.5
Storage score
elev
High
Low
Mid

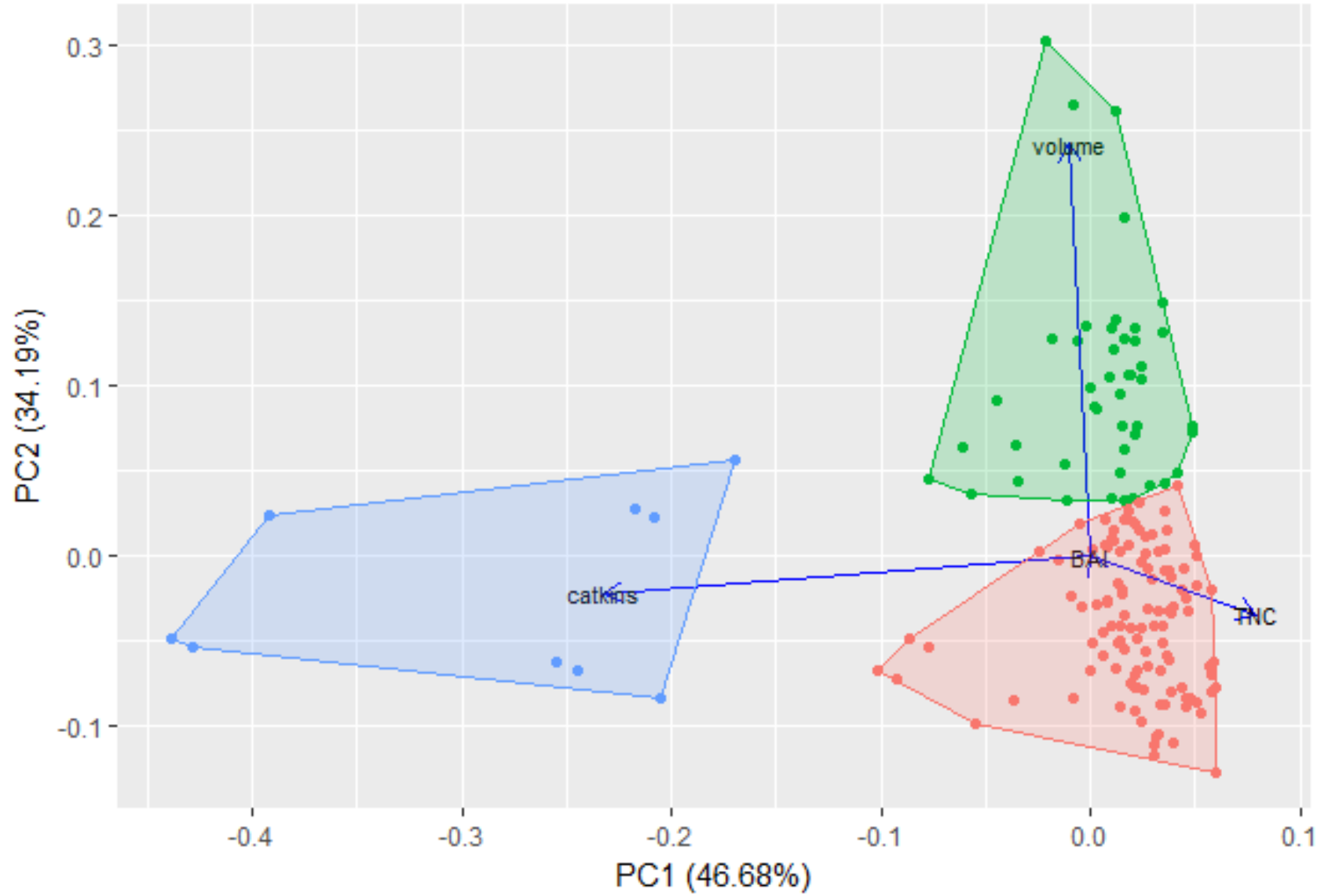
Thanks!



$F_{(1,6)} = 24.28$, $p = .003$, $R^2 = 0.80$



Population*Date: $F_{(6,99)} = 5.093$, P = 0.00014


0.3
0.2
0.1
0.0
-0.1
PC2 (34.19%)
volume
BAI
catkins
INC
-0.4
-0.3
-0.2
-0.1
0.0
0.1
PC1 (46.68%)