Major Revision 2
Texas Precipitation Gradient (2017)

Major Revision 2 requested by PeerJ

By Sean Kinard

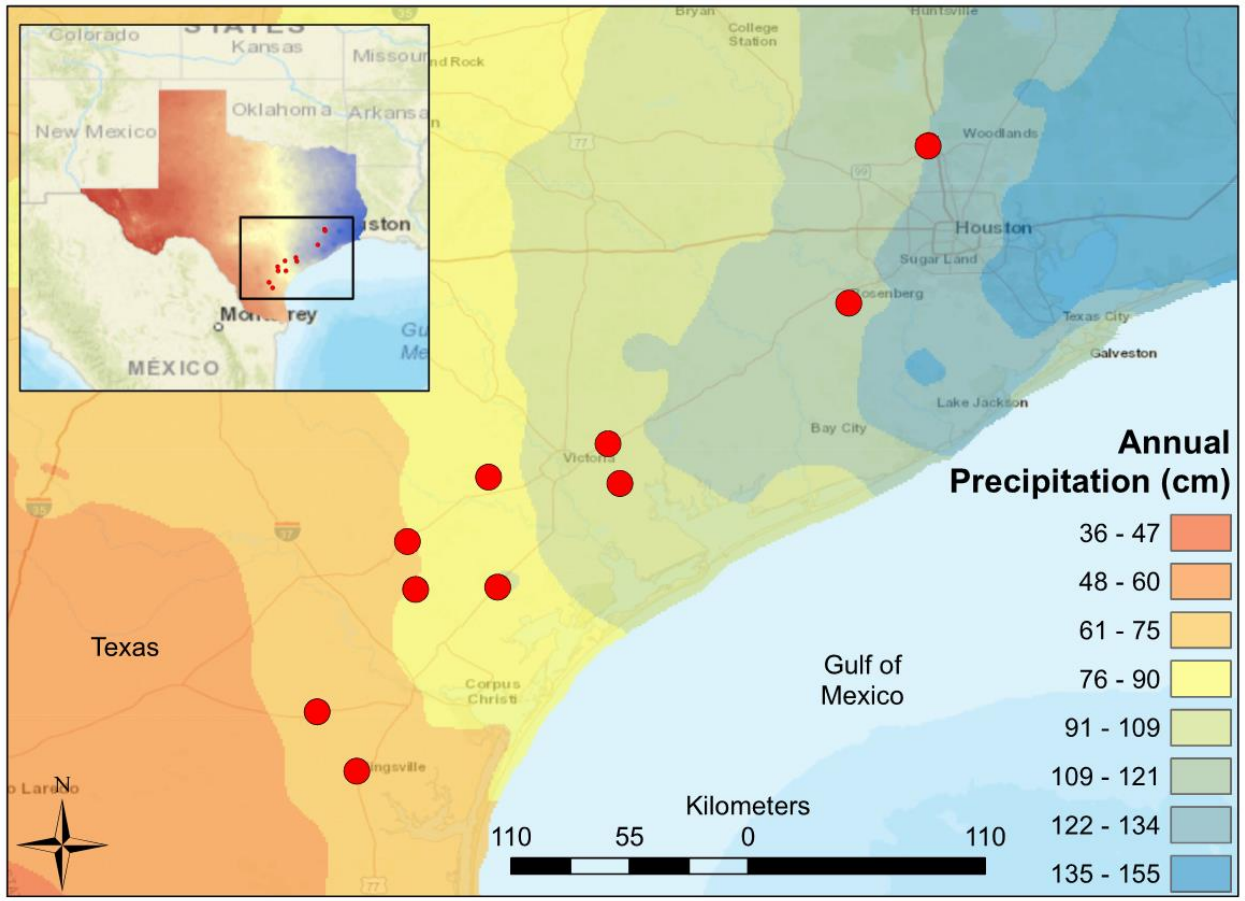

Figure 1: Map of South-Central Texas, where 10 USGS gaged Streams were sampled in the Spring of 2017. An annual precipitation overlay indicates that the sample sites span a gradient from 61 cm/yr in the Southwest to 134 cm/yr in the Northeast.

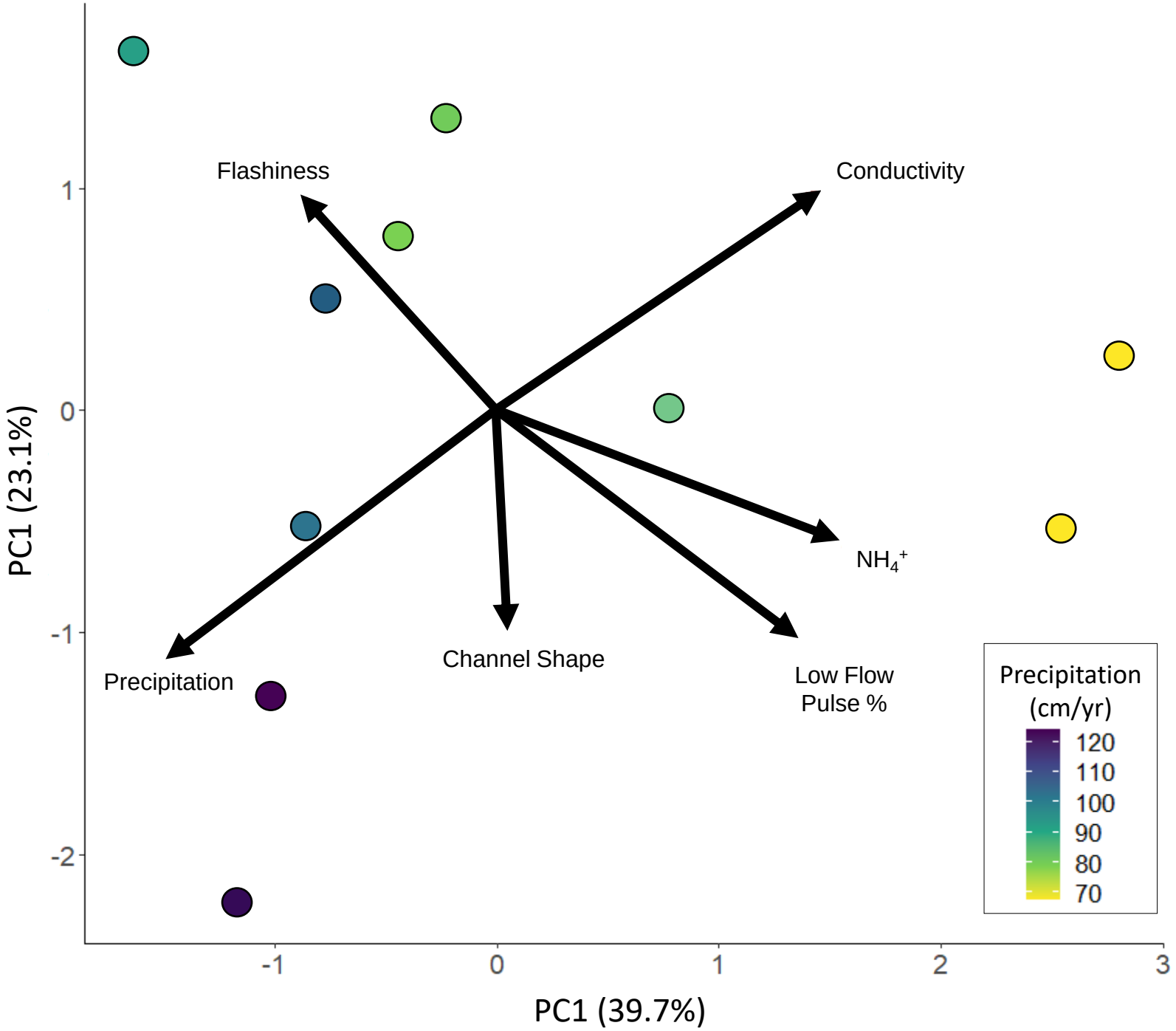

Figure 2: Principal Component Analysis of environmental predictors at 10 sites spanning a precipitation gradient along the Texas Coastal Prairie. Circles representing sample sites are colored based on their annual precipitation. Axes labels include the percentage of variance explained by PC1 (horizontal axis) and PC2 (vertical axis).

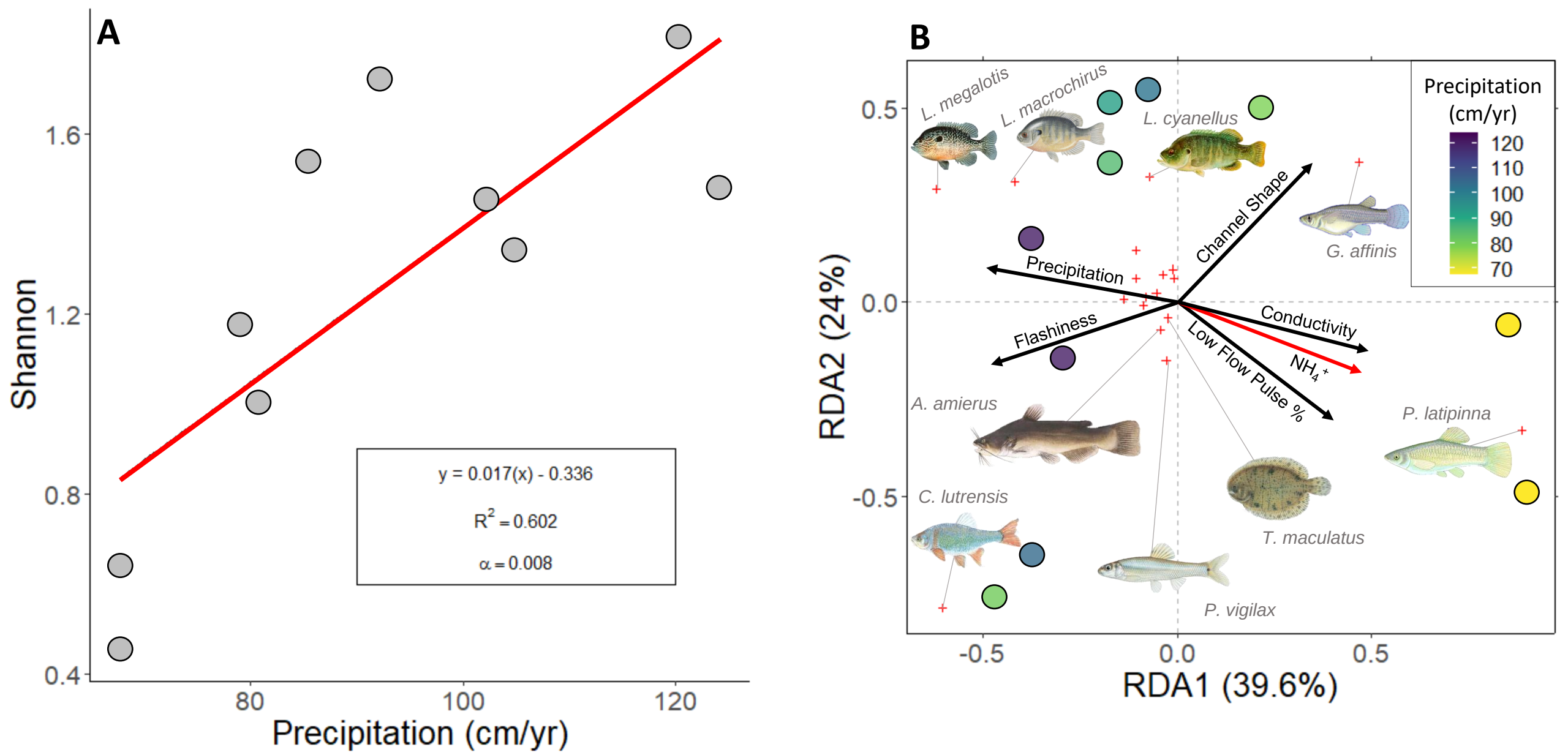

Figure 3. (**A**) Fish diversity plotted against annual precipitation (cm/yr) (**B**) Fish community ordination using Hellinger transformation and redundancy analysis. Axes labels display the proportion of the variance explained as a percentage. Sites are represented by circles colored by annual precipitation indicated in the legend. Species are represented by red crosses; species labels and reference images were added to outer members. Environmental variables were shown in arrows and the significant ones were presented in red.

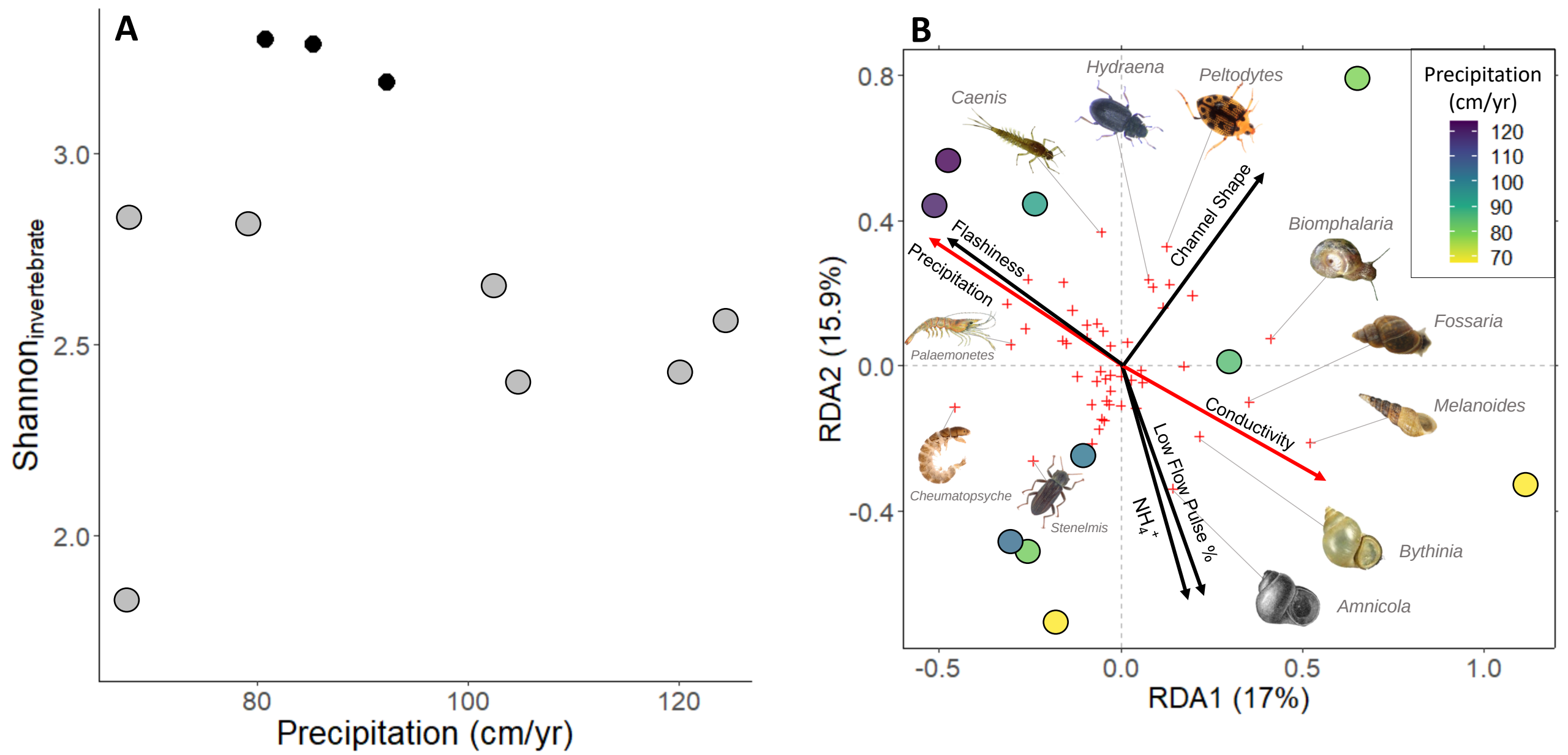

Figure 3. (**A**) Invertebrate diversity plotted against annual precipitation (cm/yr) (**B**) Invertebrate community ordination using Hellinger transformation and redundancy analysis. Axes labels display the proportion of the variance explained as a percentage. Sites are represented by circles colored by annual precipitation indicated in the legend. Species are represented by red crosses; species labels and reference images were added to outer members. Environmental variables were shown in arrows and the significant ones were presented in red.

Environmental Feature	Mean	Interquartile Range
Precipitaiton (cm/yr)	92.5	24.6
Mean Air Temperature (°C)	21.1	0.3
Minimum Air Temperature (°C)	15.1	0.4
Maximum Air Temperature (°C)	27.5	0.8
Elevation (m)	29.9	32.0
Average Basin Slope (%)	0.7	0.8
Human Development (%)	13.3	5.8
Planted Cropland (%)	41.8	23.9
Average Clay Content (%)	30.5	4.6
Average Silt Content (%)	31.0	2.1
Average Sand Content (%)	38.5	3.9

Table 1: Mean and interquartile range values for environmental gradient features of 10 samples sites spanning the Texas Coastal Prairie. The source data was collected from US Geologic Surveyors Geospatial Attributes of Gages for Evaluating Streamflow, version II dataset (Falcone 2011).

Site Name	USGS Station ID	Precipitation (cm/yr)	Flash Index	Low Flow Pulse %	Rosgen Index	NH_4^+ (mg/L)	Conductivity ln(µS/cm)
Aransas	8189700	80.770	1.053	7.664	11.781	0.105	6.835
Bear Branch	8068390	124.190	0.777	13.146	12.011	0.133	5.426
Big Creek	8115000	120.310	0.961	15.631	23.150	0.118	5.390
Garcitas	8164600	102.410	0.806	4.867	18.161	0.098	6.249
Medio	8189300	79.130	0.993	0.000	18.405	0.113	6.748
Mission	8189500	85.360	0.580	3.357	14.701	0.170	7.163
Perdido	8177300	92.370	1.339	0.000	15.152	0.075	6.602
Placedo	8164800	104.650	0.921	5.482	13.380	0.088	7.035
San Fernando	8211900	67.750	0.907	20.306	15.762	0.298	6.887
Tranquitas	8212300	67.750	0.781	24.060	17.988	0.153	9.096

Table 2: Environmental Predictors for the 10 sample sites. Annual precipitation, Flash Index, and Low Flow Pulse % were calculated using 30-year records provided by USGS stream gauges. Rosgen Index (stream width / stream depth), Canopy %, NH4+, and Conductivity were measured in-situ in during Spring 2017 sampling.

Response	Input	Sign	Slope	R^2	F-stat	df	p-value	Multiple Regression
$Shannon_{Fish}$	Conductivity	-	0.274	0.406	5.464	1	0.048 *	-
$Shannon_{Fish}$	Flash Index	+	0.339	0.024	0.193	1	0.672	+
$Shannon_{Fish}$	Low Flow Pulse %	-	0.031	0.339	4.102	1	0.077	- *
$Shannon_{Fish}$	NH_4^+	-	4.647	0.446	6.431	1	0.035 *	-
$Shannon_{Fish}$	Precipitation	+	0.017	0.602	12.101	1	0.008 *	+ *
$Shannon_{Fish}$	Channel Shape	+	0.021	0.027	0.224	1	0.649	+
$Shannon_{Invert}$	Conductivity	-	0.134	0.802	0.091	2	0.397	-
$Shannon_{Invert}$	Flash Index	+	0.623	0.65	0.075	2	0.443	+
$Shannon_{Invert}$	Low Flow Pulse %	-	0.035	5.591	0.411	2	0.046 *	- *
$Shannon_{Invert}$	NH_4^+	-	0.065	0.001	0	2	0.980	+
$Shannon_{Invert}$	Precipitation	-	0.003	0.141	0.017	2	0.717	-
$Shannon_{Invert}$	Channel Shape	-	0.054	1.612	0.168	2	0.240	-

Table 3: Univariate regression summary statistics and multiple regression relationships predicting fish and invertebrate Shannon Index values using environmental predictors. * denotes a *p*-value < 0.05 or an Δ AICc < 2.