

ESTADÍSTICA PARA CIENCIAS DEL MAR

PROGRAMA
Entidades/Variables/Poblaciones/Muestras/Matriz de datos
Media y Mediana
Primer cuartil (Q1), Tercer cuartil (Q3) y Rango intercuartílico
Mínimo, Máximo y Rango
Box-Plot
Desviación estándar
Curva de Lorenz/Índice de Gini
Proporción, Frecuencia relativa y Frecuencia absoluta
Funciones de distribución
Correlación
Regresión lineal
ERROR ESTÁNDAR
Contrastes de hipótesis/p-valor
Intervalos de confianza
Ji-cuadrado
Odds ratio (OR)
Regresión logística
Regresión de Poisson
Curvas de supervivencia
Regresión de Cox
Componentes principales
Comparación de medias, medianas y proporciones
Comparación de una población
Comparación de dos poblaciones
d de Cohen
Comparación de más de dos poblaciones

Entidades

Unidades de cualquier naturaleza que nos interesa aislar de un entorno.

Variables

Características evaluadas a las entidades.

Población

Agrupación de entidades aisladas respecto a otras agrupaciones.

Muestra

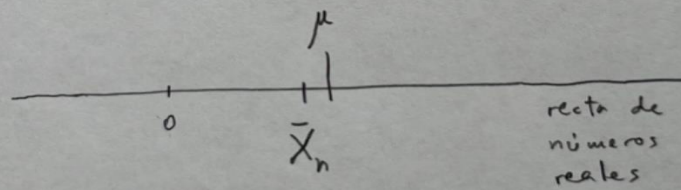
Una parte de una población, seleccionada mediante un método que tenga como objetivo la representatividad del todo a partir de esa parte.

Matriz de datos

Zona	Biomasa Fitoplancton	Biomasa Zooplancton	Fósforo	Nitrógeno	Diversidad	Presencia especie A
1	34	32,2	36,7	33,7	1,8	1
1	34,4	34,1	46,4	37,3	1,9	1
1	35,2	34,5	46,5	36,6	2,7	1
1	44,6	43,6	45,1	47,4	2,3	1
1	45,6	44,6	48,2	44,9	2,3	0
1	46,1	44,1	65,7	46,4	2,7	0
1	46,6	46,3	57,9	53,9	2,6	0
1	38,8	37,7	52,3	40,1	2,2	1
1	40,3	38,6	48	47,7	2	0
1	41,3	38,8	60,3	45,2	2,1	1
1	42,2	40,8	58,3	47,2	2,3	1
1	42,8	40,8	53,5	41,5	2,4	1
1	43,3	40,9	43,4	47,7	2,6	0
1	43,7	41,2	45,5	43,2	2,6	0
1	43,8	43,4	44,2	48	2,7	1
1	44,6	41,9	47,8	44,4	2,5	1
1	45,6	42,8	53,9	52,2	2,4	1
1	46,1	43,6	46,3	45,8	3,3	1
1	46,6	43,6	54,7	53	3	1
1	47,1	44,4	53,5	44,9	2,8	1
2	47,9	46,5	50,7	54,1	3,3	1
2	47,9	45,4	51,7	49,2	3,2	0
2	48,4	46,7	64,3	54,5	2,8	0
2	52,5	49,9	69,9	56,7	3,6	0
2	53	50,7	57,2	57,2	3,4	0
2	53	52,5	65,3	61,7	3,6	1
2	53,5	51,8	66,7	52,8	3,5	1
2	53,9	51,1	61,3	60,4	3,5	1
2	54,7	52,9	56,3	59	2,8	1
2	51,5	50,2	58	55	3,5	1
2	52,3	51,6	61,4	58,2	3,1	0
2	52,5	52	72	57,2	2,7	0
2	53	52,3	69,8	61,2	3,4	0
2	53	51,1	53,1	59,2	2,7	1
2	55,6	53,1	61,7	60,1	3,4	1
2	53,9	51,5	54	56,6	2,8	1
2	54,7	53	67,8	58,5	3,1	1
2	55,1	52,9	75,2	62,4	3,4	1
2	55,6	54,2	59,2	61,9	3,5	0
2	56	54,2	60,1	61,7	2,8	0

Media

Media $\begin{cases} \text{poblacional} & \mu \\ \text{muestral} & \bar{X}_n \end{cases}$



μ es fijo pero desconocido

$\bar{X}_n$ es conocido pero variable

Muestra: $(X_1, X_2, \dots, X_n)$

$$\bar{X}_n = \frac{X_1 + X_2 + \dots + X_n}{n}$$

Población: $(X_1, X_2, \dots, X_N)$

$$\mu = \frac{X_1 + X_2 + \dots + X_N}{N}$$

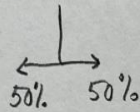
Mediana

Es el valor que separa la muestra, previamente ordenada, en dos mitades.

Ejemplo (si n es impar):

(3, 5, 1, 7, 6) Muestra

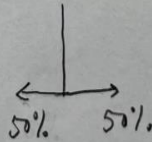
(1, 3, 5, 6, 7) Muestra ordenada de menor a mayor



Ejemplo (si n es par):

(3, 5, 1, 7, 6, 10) Muestra

(1, 3, 5, 6, 7, 10) Muestra ordenada



Se hace el promedio de los dos valores:

$$\frac{5+6}{2} = 5,5$$

Comparación Media / Mediana :

(1, 3, 5, 7, 9)

$$\text{Media} = \frac{1+3+5+7+9}{5} = 5$$

$$\text{Mediana} = 5$$

(1, 3, 5, 7, 34)

$$\text{Media} = \frac{1+3+5+7+34}{5} = 10$$

$$\text{Mediana} = 5$$

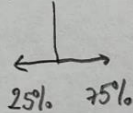
Primer cuartil

Cálculo equivalente al de la Mediana pero separando los fragmentos: uno del 25% de valores y otro del 75%.

Ejemplos:

(3, 1, 5, 9) Muestra

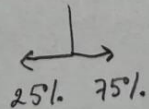
(1, 3, 5, 9) Muestra ordenada



$$\text{Primer cuartil} = \frac{1+3}{2} = 2$$

(3, 1, 5, 9, 7) Muestra

(1, 3, 5, 7, 9) Muestra ordenada



$$\text{Primer cuartil} = 3$$

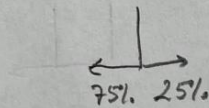
Tercer cuartil

Como el primer cuartil pero dejando a la izquierda el 75% de valores y a la derecha el 25% de valores.

Ejemplos:

(3, 1, 5, 9) Muestra

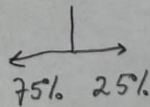
(1, 3, 5, 9) Muestra ordenada



$$\text{Tercer cuartil} = \frac{5+9}{2} = 7$$

(3, 1, 5, 9, 7) Muestra

(1, 3, 5, 7, 9) Muestra ordenada



$$\text{Tercer cuartil} = 7$$

Rango intercuartílico

Valor del Tercer cuartil menos el valor del primer cuartil.

Ejemplo:

(3, 1, 5, 9) Muestra

(1, 3, 5, 9) Muestra ordenada

↓ ↓

Primer cuartil = 2 Tercer cuartil = 7

Q1

Q3

$$IQR = Q3 - Q1 = 7 - 2 = 5$$

Mínimo, Máximo y Rango

El mínimo de una muestra es el valor más pequeño de esa muestra y el máximo es el valor mayor.

El rango:

Valor más grande de la muestra menos el valor más pequeño.

Ejemplo:

(3, 1, 5, 9)

$$\text{Rango} = 9 - 1 = 8$$

(1, 0, 7, 15, 6, 2)

$$\text{Rango} = 15 - 0 = 15$$

Box-Plot

Box-Plot : Gráfico que resume muchos de los números vistos hasta ahora:

Ejemplo :

(1, 3, 5, 11)

Mínimo = 1

Máximo = 11

Rango = 10

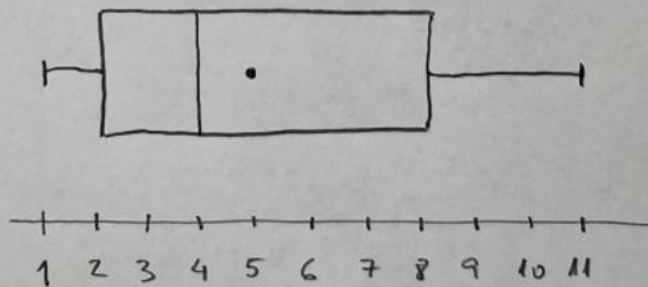
Media = 5

Mediana = 4

Primer cuartil = 2

Tercer cuartil = 8

Rango intercuartílico (IQR) = 6



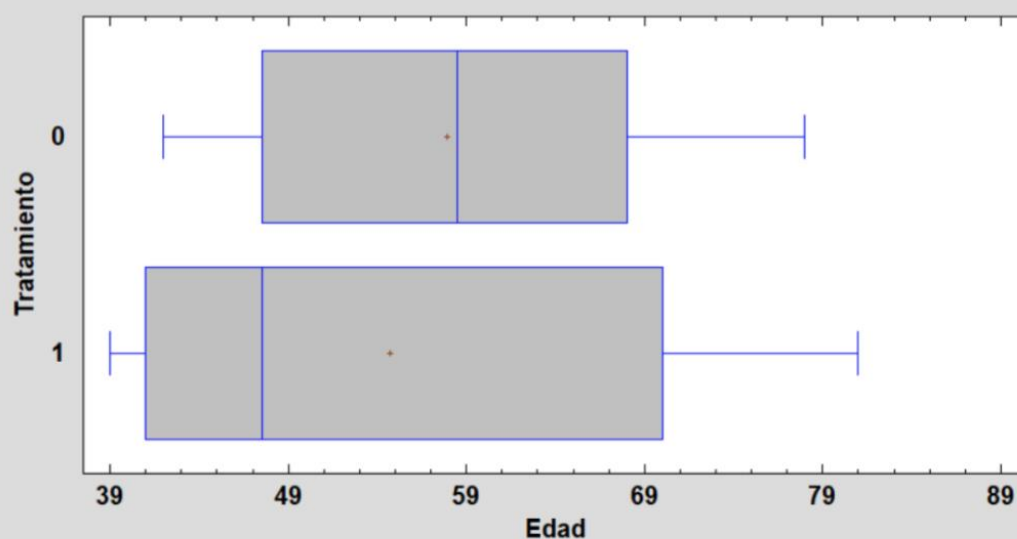
Estadísticas de Resumen

Datos/Variable: Edad

				Desviación			
Tratamiento	Recuento	Promedio	Mediana	Estándar	Mínimo	Máximo	Rango
0	20	57,9	58,5	11,8628	42,0	78,0	36,0
1	20	54,75	47,5	15,3584	39,0	81,0	42,0
Total	40	56,325	54,0	13,6389	39,0	81,0	42,0

	Cuartil	Cuartil
Tratamiento	Inferior	Superior
0	47,5	68,0
1	41,0	70,0
Total	44,0	69,0

Gráfica de Caja y Bigotes



Desviación estándar

Desviación estándar = Desviación típica

Error estándar

DE : Una medida de la dispersión de una variable.

(4, 4.5, 5, 5.5, 6) DE ↓

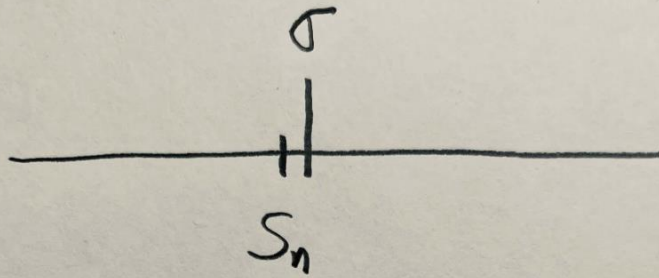
(3, 4, 5, 6, 7) DE ↑

(1, 3, 5, 7, 9) DE ↑↑

(5, 5, 5, 5, 5) DE = 0

S_n : Símbolo típico de la DE

Cálculo Desviación estándar			
Muestra	Resta de la media	Cuadrado	
0	-5	25	
5	0	0	
5	0	0	
10	5	25	
Media	Media	Media	Raíz cuadrada
5	0	12,5	3,54
Muestra	Resta de la media	Cuadrado	
3	-2	4	
5	0	0	
5	0	0	
7	2	4	
Media	Media	Media	Raíz cuadrada
5	0	2	1,41



S_n : Desviación estándar muestral

σ : Desviación estándar poblacional

$$\bar{X}_n \pm S_n$$

El gran problema de la Desviación estándar es su interpretación.

Pe :

Edad :

$$60 \pm 10$$

$$60 \pm 1$$

$$60 \pm 80$$

Tabla 1. Lista de especies y familias de la Clase Gastropoda con potencial económico asociada al sustrato intermareal rocoso en la región marina prioritaria 32, Guerrero, México. Tallas en largo y ancho / List of species and families of the Class Gastropoda with economic potential associated with intertidal rocky substrate in the marine region priority 32, Guerrero Mexico. Sizes in length and width

	N	Largo (mm)			
		Min.	Máx.	Avg	Ds
FISSURELLIDAE Fleming, 1822					
<i>Diodora inaequalis</i> (Sowerby, 1835)	33	5,10	25,56	16,78	4,96
LOTTIIDAE Gray, 1840					
<i>Lottia pediculus</i> (Philippi, 1846)	19,9	1,59	27,22	8,29	6,87
<i>Lottia mesoleuca</i> (Menke, 1851)	158	1,56	30,51	15,74	5,57
<i>Tectura fascicularis</i> (Menke, 1851)	584	0,84	30,04	12,68	7,51
TROCHIDAE Rafinesque, 1815					
<i>Tegula (Agathistoma) globulus</i> (Carpenter, 1857)*	1128	3,15	9,72	5,75	2,03
NERITIDAE Rafinesque, 1815					
<i>Nerita (Cymostyla) scabricosta</i> Lamarck, 1822*	26	6,90	17,64	9,86	3,17
<i>Nerita (Theliostyla) funiculata</i> Menke, 1851*	98	3,03	12,35	7,34	2,11
LITTORINIDAE Children, 1834					
<i>Nodilittorina (Nodilittorina) aspera</i> (Philippi, 1846)*	205	1,90	35,10	5,88	3,77
<i>Nodilittorina (Fossarilittorina) modesta</i> (Philippi, 1846)*	109	1,50	15,40	7,31	3,84
RISSOIDAE Gray, 1847					
<i>Rissoina (Rissoina) stricta</i> Menke, 1850*	66	4,63	9,05	6,64	0,72
PLANAXIDAE Lamarck, 1822					
<i>Planaxis obsoletus</i> Menke, 1851*	154	3,68	16,37	10,00	3,04
HIPPONICIDAE Troschel, 1861					
<i>Hipponix delicatus</i> Dall, 1908*	19	2,36	14,09	9,39	3,42
CALYPTRAEIDAE Lamarck, 1809					
<i>Crepidula aculeata</i> (Gmelin, 1791)*	96	2,57	27,32	18,04	5,30
<i>Crepidula incurva</i> (Broderip, 1834)*	50	3,18	16,43	7,31	3,02
<i>Crucibulum (Crucibulum) umbrela</i> (Deshayes, 1830)	230	8,39	57,30	35,51	12,36
<i>Crucibulum (Crucibulum) scutellatum</i> (Wood, 1928)	32	4,30	43,06	16,95	11,37
CYPRAEIDAE Rafinesque, 1815					
<i>Macrocypaea cervinetta</i> (Kiener, 1843)	20	4,51	84,48	35,76	24,61
<i>Mauritia arabicula</i> Lamarck, 1810	44	10,87	31,27	23,04	4,41
OVULIDAE Fleming, 1822					
<i>Jenneria pustulata</i> [Lightfoot, 1786]	24	10,10	18,91	14,48	2,66
MURICIDAE Follows Vokes, 1996					
<i>Mancinella speciosa</i> (Valenciennes, 1832)	228	3,50	28,88	16,37	5,16
<i>Mancinella triangularis</i> (Blainville, 1832)	1117	3,19	18,96	9,90	2,46
<i>Muricopsis (Muricopsis) zeteki</i> Hertlein & Strong 1951*	70	7,73	26,64	16,32	3,43
<i>Plicopurpura pansa</i> (Gould, 1853)	293	3,67	34,53	18,51	4,30
<i>Stramonita biserialis</i> (Blainville, 1832)	749	3,88	50,56	12,45	5,85
<i>Trachypollia lugubris</i> (C.B. Adams, 1852)*	385	2,73	25,88	14,19	4,39
BUCCINIDAE Rafinesque, 1815					
<i>Cantharus (Polia) sanguinolentus</i> (Duclos, 1833)*	72	10,17	27,58	19,94	3,52
<i>Engina tabogaensis</i> Bartsch, 1931*	131	4,43	14,71	10,35	2,15
COLUMBELLIDAE Swainson, 1840					
<i>Columbella fuscata</i> Sowerby, 1832*	679	4,89	22,84	14,82	4,03
<i>Columbella major</i> Sowerby, 1832*	72	7,65	30,30	21,07	4,20
<i>Columbella sonsonatensis</i> (Mörch, 1860)*	27	3,73	26,14	13,17	7,04
<i>Cosmioconcha palmeri</i> (Dall, 1913)*	32	6,71	10,99	8,75	1,11
<i>Costoanachis nigrofusca</i> (Carpenter, 1857)*	643	2,68	23,53	7,08	1,59
<i>Mitrella ocellata</i> (Gmelin, 1791)*	732	3,32	22	10,61	1,43
<i>Mitrella xenia</i> (Dall, 1919)*	190	1,69	25,49	8,35	1,98
FASCIOLARIIDAE Gray, 1853					
<i>Leucozonia cerata</i> (Wood, 1828)	98	5,42	69,13	24,07	11,32
<i>Opeastoma pseudodon</i> (Burrow, 1815)	65	12,33	45,57	24,12	6,25
MITRIDAE Swainson, 1829					
<i>Mitra (Strigatella) tristis</i> Broderip, 1836*	53	3,51	16,2	9,7	2,94
CONIDAE Fleming, 1822					
<i>Conux nux</i> (Broderip, 1833)	39	9,51	24,03	16,56	4,17
SIPHONARIIDAE Gray, 1827					
<i>Siphonaria (Heterosiphonaria) maura</i> Sowerby, 1835*	791	1,33	19,52	8,13	3,25
<i>Siphonaria (Heterosiphonaria) palmata</i> Carpenter, 1857*	387	1,14	16,08	7,3	2,87

Table 1. Median and IQR of concentrations in nutrients, suspended sediments, and DOC in Manton Creek for each of the four seasons. All values are in mg L⁻¹.

	Total phosphorous	Nitrogen (NO _x -N)	Suspended sediments	DOC
	(IQR) [n]	(IQR) [n]	(IQR) [n]	(IQR) [n]
Early storms	0.01 (0.01–0.02) [43]	0.004 (0.002–0.006) [120]	4.5 (2–21) [36]	5.16 (3.55–6.29) [7]
Wet season	0.005 (0.002–0.01) [127]	0.004 (0.002–0.006) [341]	4 (3–5) [110]	2.94 (2.24–5.14) [24]
Recession	0.005 (0.003–0.007) [26]	0.006 (0.003–0.092) [72]	3 (2–4) [22]	1.60 (1.23–2.23) [9]
Dry season	0.01 (0.007–0.02) [13]	0.002 (0.002–0.006) [38]	3.5 (2.25–4) [10]	2.52 (2.04–4.01) [16]

Fig. 10 Box plots representing ranges of mean density ($N/10^4 m^3$), species richness (number of species/taxa), and diversity (Shannon–Wiener Index H') of stations separated into day and night stations. The central box indicates the interquartile range. Significance levels according to Tukey's HSD post-hoc test (** $p < 0.05$ mean density, *** $p < 0.001$ species richness)

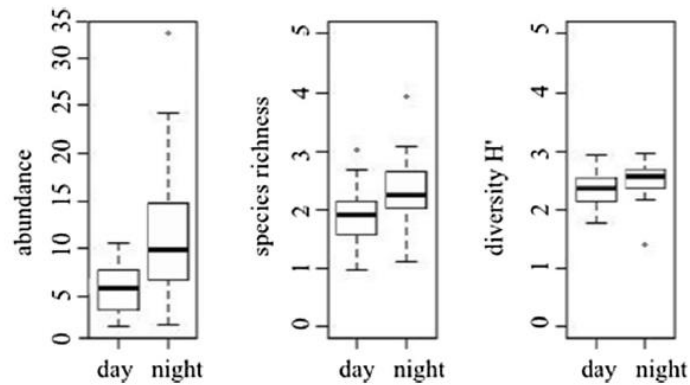


Tabla 1. Estadística descriptiva de los parámetros biológicos, índice de condición corporal (Kn) y de la concentración de los metales pesados analizados. Se indica el número de individuos analizados (n), media, mediana, rango y desviación estándar (DE).

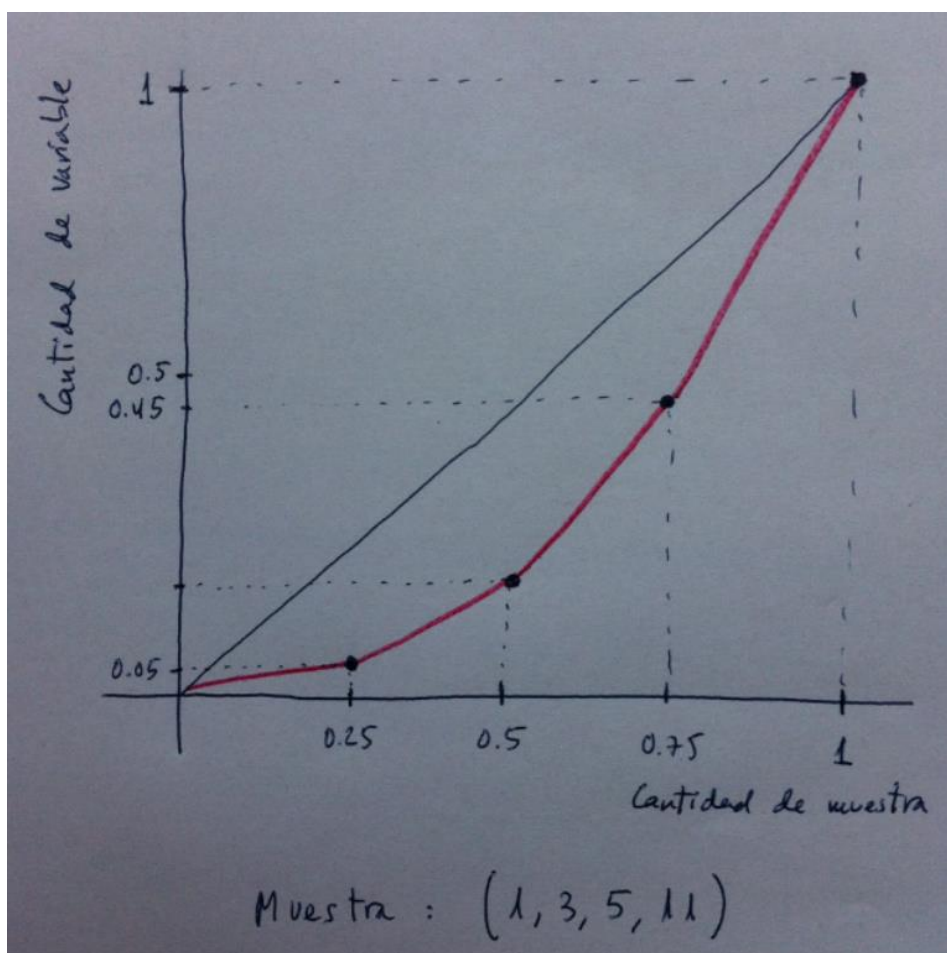
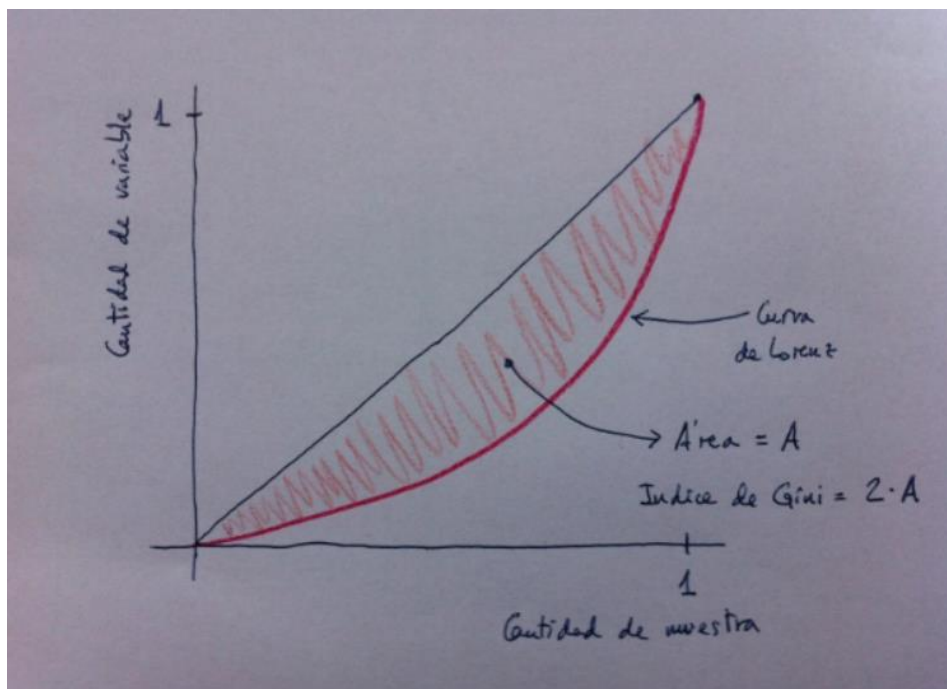
Table 1. Descriptive statistic of biological parameters, body condition index (Kn) and heavy metals concentration. It is shown the sampler number (n), mean, median and standard deviation (DE).

	n	Media	Mediana	Rango	DE
Edad (años)	35	2,91	2,00	0,00 - 13,00	2,69
Talla (cm)	38	115,97	114,20	78,70 - 160,50	19,29
Peso (kg)	38	20,90	19,80	5,80 - 52,00	8,67
Kn	38	0,89	0,88	0,52 - 1,30	0,17
Cd ($\mu g g^{-1}$)	37	5,72	2,99	0,20 - 29,85	7,56
Cu ($\mu g g^{-1}$)	33	4,52	3,31	1,08 - 15,22	3,62
Zn ($\mu g g^{-1}$)	36	22,50	20,90	12,17 - 34,92	4,78

Table 1
Summary statistics for the geochemical dataset under study.

	Average	Min	Max	St dev	Skewness
Al ($mg kg^{-1}$)	47 664	12 605	75 768	17 971	-0.4
Ba ($mg kg^{-1}$)	164	60	307	53	-0.2
Ca ($mg kg^{-1}$)	37 653	16 254	122 007	15 966	3.8
Fe ($mg kg^{-1}$)	33 867	14 787	48 678	9141	-0.5
K ($mg kg^{-1}$)	11 385	3866	17 520	3671	-0.4
Li ($mg kg^{-1}$)	51	13	81	19	-0.5
Mg ($mg kg^{-1}$)	9940	4132	15 166	3088	-0.3
Mn ($mg kg^{-1}$)	474	255	1178	202	1.3
Na ($mg kg^{-1}$)	12 879	2703	36 326	5451	1.5
Ti ($mg kg^{-1}$)	913	703	1072	83	-0.5
Co ($mg kg^{-1}$)	12	4.5	16	2.9	-1.0
Cr ($mg kg^{-1}$)	71	27	124	22	-0.2
Cu ($mg kg^{-1}$)	41	7.1	128	24	1.2
La ($mg kg^{-1}$)	30	18	39	5.5	-0.7
Ni ($mg kg^{-1}$)	34	15	47	8.7	-0.7
P ($mg kg^{-1}$)	1550	525	3706	645	0.7
Pb ($mg kg^{-1}$)	67	15	188	42	1.6
V ($mg kg^{-1}$)	95	36	140	28	-0.4
Zn ($mg kg^{-1}$)	163	41	497	85	1.4
pH	7.3	6.9	7.8	0.2	0.3
<63 μm (%)	29	7.1	48	11.0	-0.2
Sulphate ($mg l^{-1}$)	4551	1473	7298	1436	-0.6
OC (%)	8.4	3.1	13	2.8	-0.4
Carb (%)	4.1	2.2	12	1.5	3.3
Cl ($mg l^{-1}$)	12 411	3681	17 571	3497	-1.0
CEC ($ccmol kg^{-1}$)	68 681	21 037	115 874	23 636	-0.3
CRS ($\mu mol g^{-1}$)	71	12	212	36	1.3

Curva de Lorenz/Índice de Gini



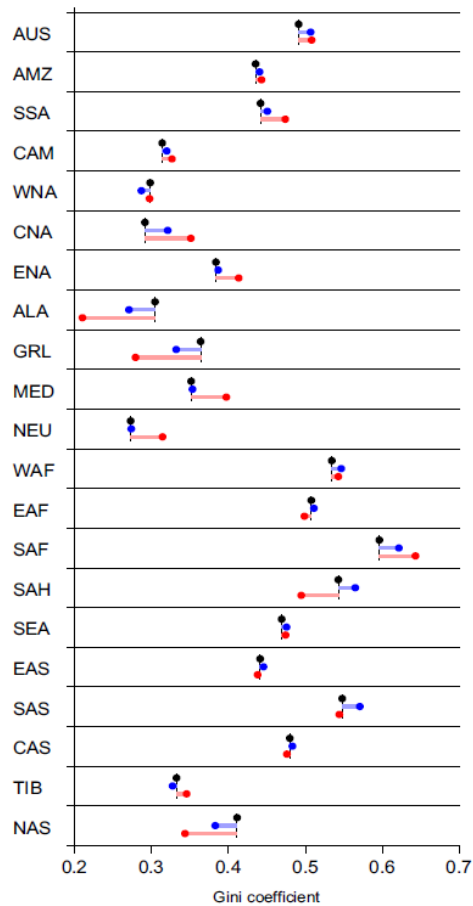
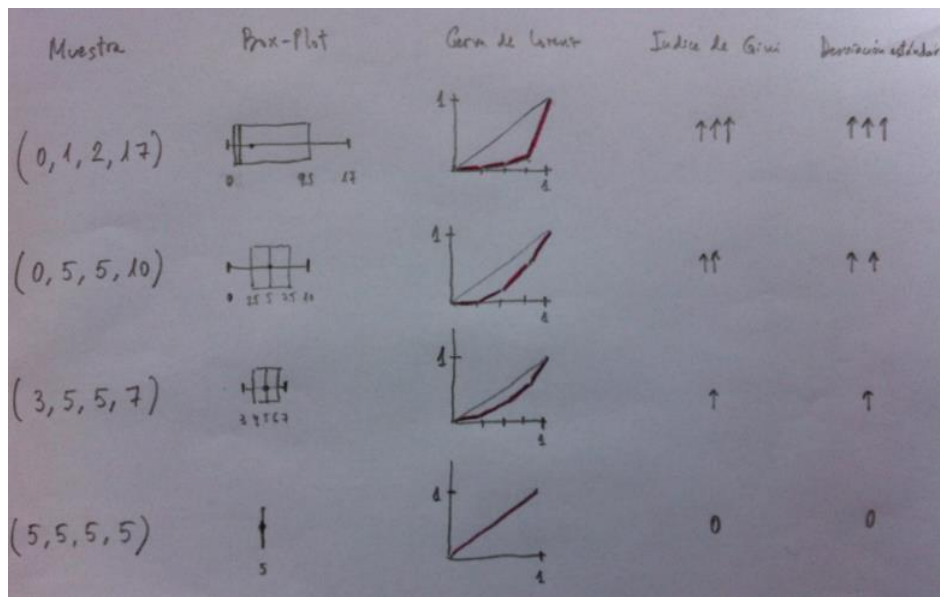


Figure 6. Mean Gini coefficients of major river channel cells in each Giorgi region. Black, blue, and red circles indicate the values for historical data (1960–1989), projected data under RCP 2.6 (2070–2099), and projected data under RCP 8.5 (2070–2099), respectively. Changes with respect to the historical values are indicated by horizontal bars.

Proporción, Frecuencia relativa y Frecuencia absoluta

Es la aplicación de la media a una variable que
tiene sólo dos valores: 0 y 1.

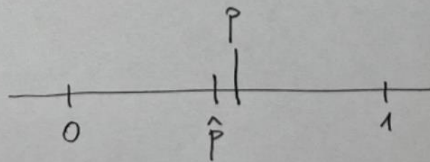
$$(X_1, X_2, \dots, X_n)$$

$$(0, 1, 1, 0, 0, 0, 1)$$

$$\hat{p} = \frac{0+1+1+0+0+0+1}{7} = \frac{3}{7} = 0.428$$

$$\mu \longleftrightarrow \bar{X}_n$$

$$p \longleftrightarrow \hat{p}$$



Veamos un ejemplo con una variable cualitativa con cuatro valores posibles:

Variable cualitativa (= nominal = categórica)

Valores: a, b, c, d

Valores	Frecuencia absoluta	Frecuencia relativa	Frecuencia absoluta acumulada	Frecuencia relativa acumulada
a	5	10%	5	10%
b	10	20%	15	30%
c	5	10%	20	40%
d	30	60%	50	100%

Funciones de distribución

Distribución: Forma de la variabilidad de una variable.

Dos formas de trabajar con distribuciones:

- 1) Distribuciones prefabricadas.
- 2) Distribuciones construidas "ad hoc".

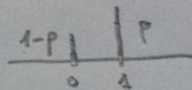
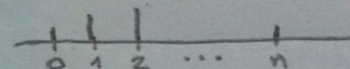
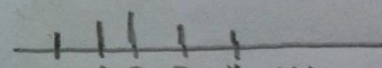
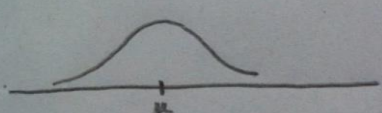
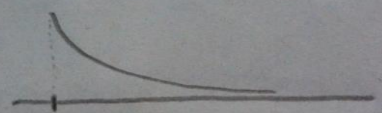
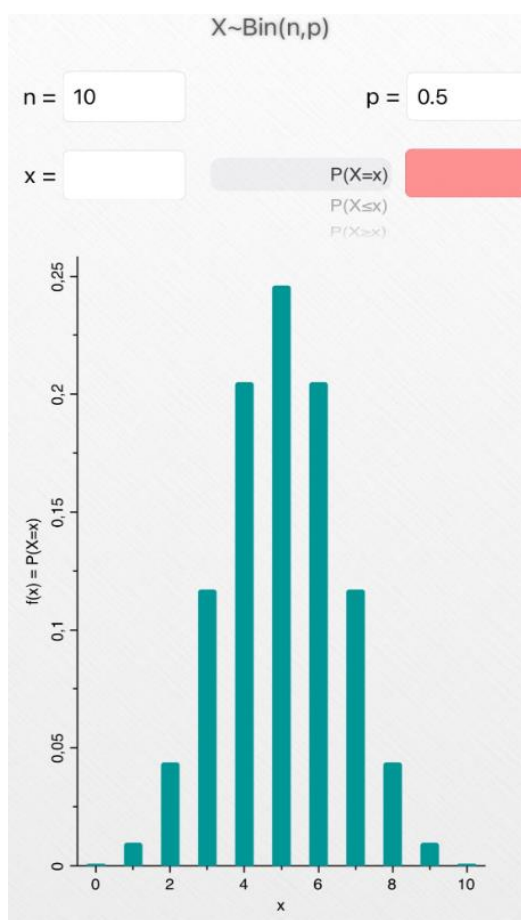
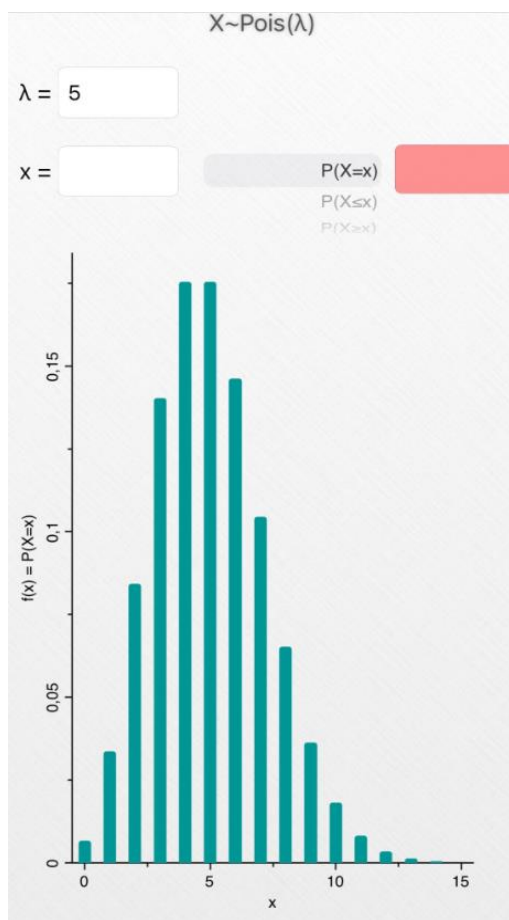
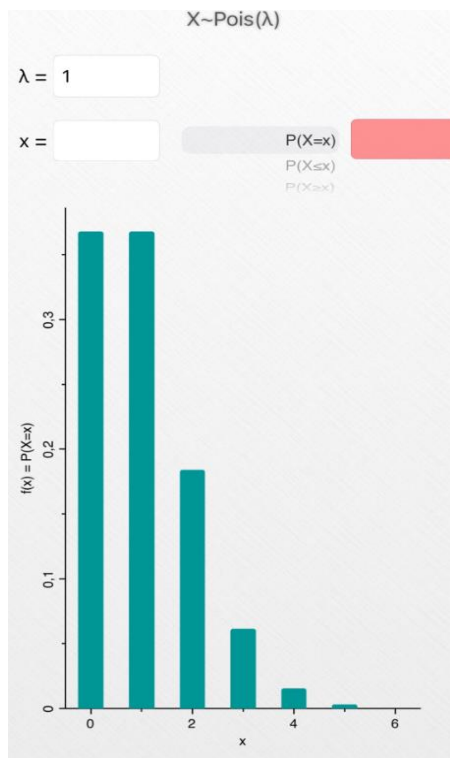
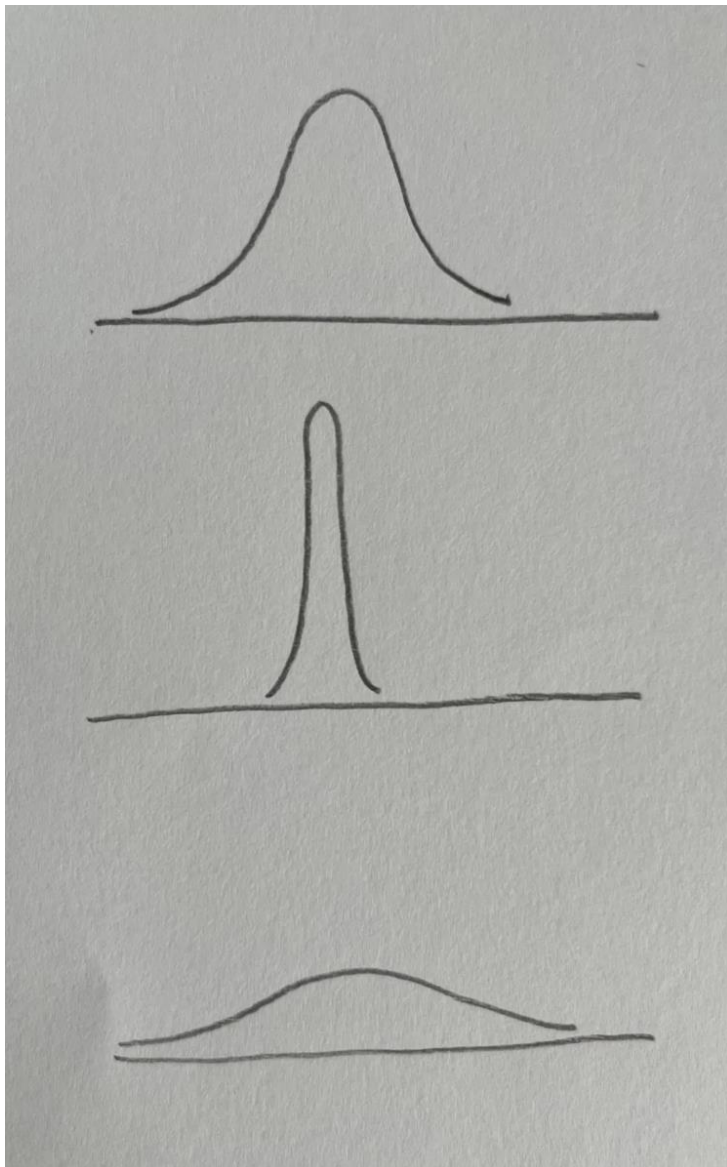
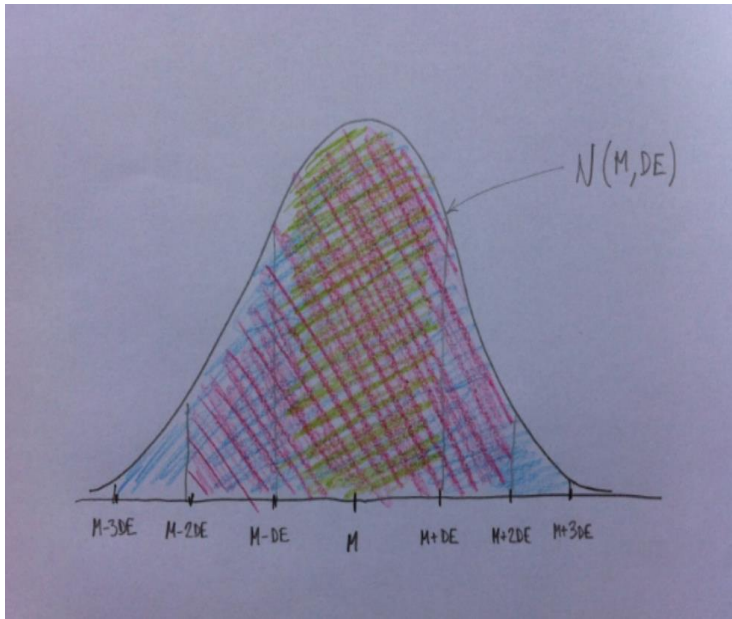
<u>Distribución</u>	<u>Nomenclatura</u>	<u>Forma</u>
BERNOULLI	$B(p)$	
BINOMIAL	$B(n, p)$	
POISSON	$P(\lambda)$	
NORMAL	$N(\mu, \sigma)$	
EXPONENCIAL	$E(\alpha)$	

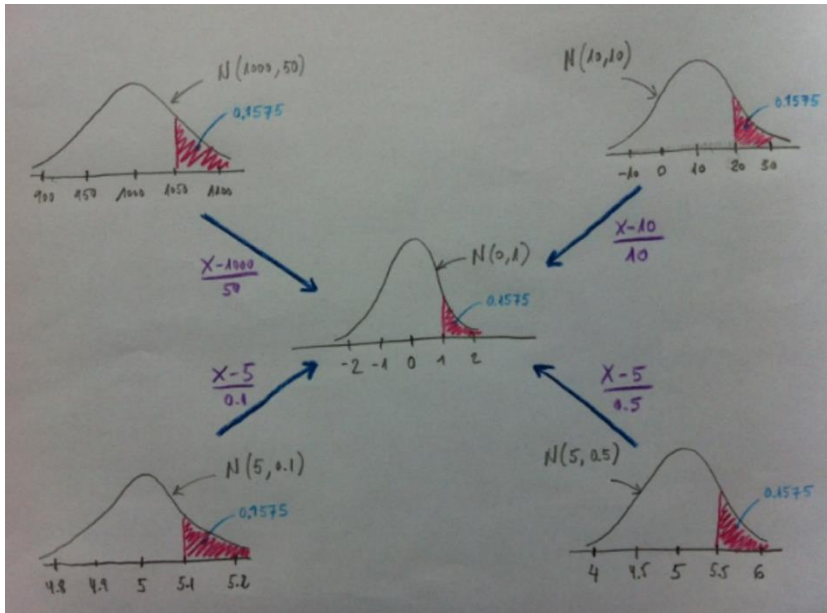
Tabla 7: Función de distribución de la variable Poisson(λ)

	λ									
x	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
0	0.9048	0.8187	0.7408	0.6703	0.6065	0.5488	0.4966	0.4493	0.4066	0.3679
1	0.9953	0.9825	0.9631	0.9384	0.9098	0.8781	0.8442	0.8088	0.7725	0.7358
2	0.9998	0.9989	0.9964	0.9921	0.9856	0.9769	0.9659	0.9526	0.9371	0.9197
3	1.0000	0.9999	0.9997	0.9992	0.9982	0.9966	0.9942	0.9909	0.9865	0.9810
4	1.0000	1.0000	1.0000	0.9999	0.9998	0.9996	0.9992	0.9986	0.9977	0.9963
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9998	0.9997	0.9994
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
x	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00
0	0.3329	0.3012	0.2725	0.2466	0.2231	0.2019	0.1827	0.1653	0.1496	0.1353
1	0.6990	0.6626	0.6268	0.5918	0.5578	0.5249	0.4932	0.4628	0.4337	0.4060
2	0.9004	0.8795	0.8571	0.8335	0.8088	0.7834	0.7572	0.7306	0.7037	0.6767
3	0.9743	0.9662	0.9569	0.9463	0.9344	0.9212	0.9068	0.8913	0.8747	0.8571
4	0.9946	0.9923	0.9893	0.9857	0.9814	0.9763	0.9704	0.9636	0.9559	0.9473
5	0.9990	0.9985	0.9978	0.9968	0.9955	0.9940	0.9920	0.9896	0.9868	0.9834
6	0.9999	0.9997	0.9996	0.9994	0.9991	0.9987	0.9981	0.9974	0.9966	0.9955
7	1.0000	1.0000	0.9999	0.9999	0.9998	0.9997	0.9996	0.9994	0.9992	0.9989
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9998	0.9998
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
x	2.10	2.20	2.30	2.40	2.50	2.60	2.70	2.80	2.90	3.00
0	0.1225	0.1108	0.1003	0.0907	0.0821	0.0743	0.0672	0.0608	0.0550	0.0498
1	0.3796	0.3546	0.3309	0.3084	0.2873	0.2674	0.2487	0.2311	0.2146	0.1991
2	0.6496	0.6227	0.5960	0.5697	0.5438	0.5184	0.4936	0.4695	0.4460	0.4232
3	0.8386	0.8194	0.7993	0.7787	0.7576	0.7360	0.7141	0.6919	0.6696	0.6472
4	0.9379	0.9275	0.9162	0.9041	0.8912	0.8774	0.8629	0.8477	0.8318	0.8153
5	0.9796	0.9751	0.9700	0.9643	0.9580	0.9510	0.9433	0.9349	0.9258	0.9161
6	0.9941	0.9925	0.9906	0.9884	0.9858	0.9828	0.9794	0.9756	0.9713	0.9665
7	0.9985	0.9980	0.9974	0.9967	0.9958	0.9947	0.9934	0.9919	0.9901	0.9881
8	0.9997	0.9995	0.9994	0.9991	0.9989	0.9985	0.9981	0.9976	0.9969	0.9962
9	0.9999	0.9999	0.9999	0.9998	0.9997	0.9996	0.9995	0.9993	0.9991	0.9989
10	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999	0.9998	0.9998	0.9997
11	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000





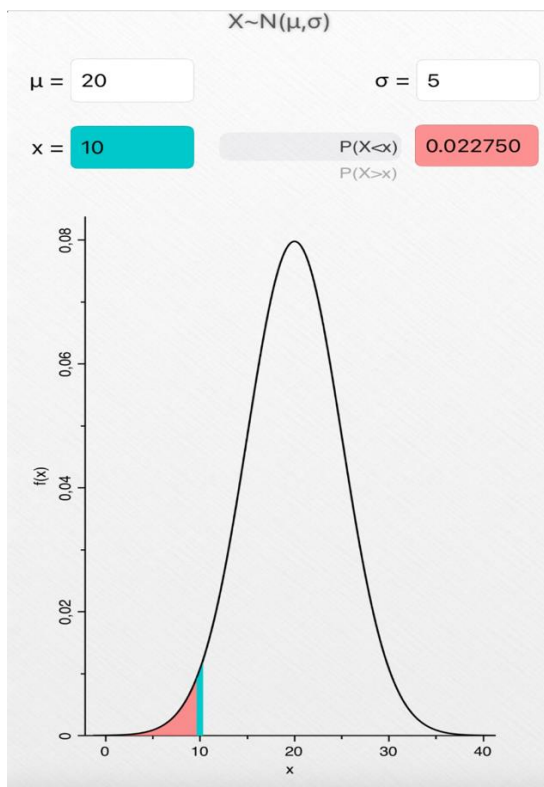
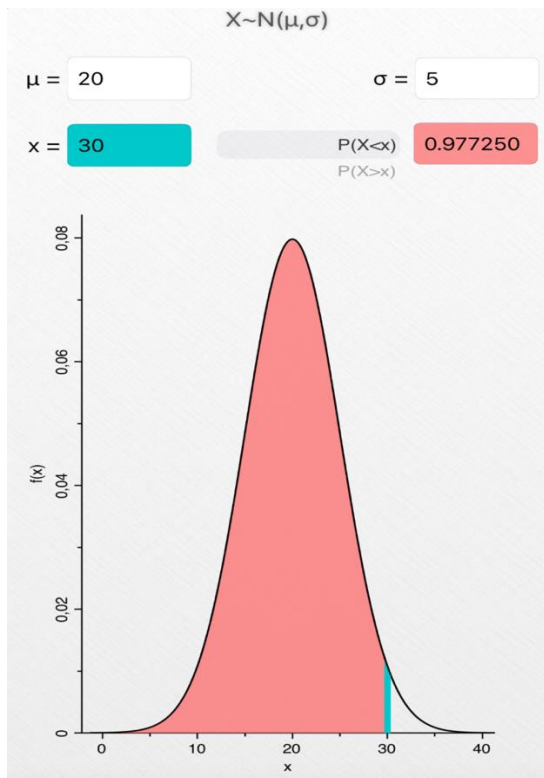




μ = Media
 σ = Desviación típica
 Tipificación: $z_0 = \frac{x - \mu}{\sigma}$

$$P(z \leq z_0) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z_0} e^{-\frac{z^2}{2}} dz$$

z_0	0,00	0,01	0,02	0,03	0,04	0,05	0,06	0,07	0,08	0,09	z_0
0,0	0,5000	0,5040	0,5080	0,5120	0,5160	0,5199	0,5239	0,5279	0,5319	0,5359	0,0
0,1	0,5398	0,5438	0,5478	0,5517	0,5557	0,5596	0,5636	0,5675	0,5714	0,5753	0,1
0,2	0,5793	0,5832	0,5871	0,5910	0,5948	0,5987	0,6026	0,6064	0,6103	0,6141	0,2
0,3	0,6179	0,6217	0,6255	0,6293	0,6331	0,6368	0,6406	0,6443	0,6480	0,6517	0,3
0,4	0,6554	0,6591	0,6628	0,6664	0,6700	0,6736	0,6772	0,6808	0,6844	0,6879	0,4
0,5	0,6915	0,6950	0,6985	0,7019	0,7054	0,7088	0,7123	0,7157	0,7190	0,7224	0,5
0,6	0,7257	0,7291	0,7324	0,7357	0,7389	0,7422	0,7454	0,7486	0,7517	0,7549	0,6
0,7	0,7580	0,7611	0,7642	0,7673	0,7704	0,7734	0,7764	0,7794	0,7823	0,7852	0,7
0,8	0,7881	0,7910	0,7939	0,7967	0,7995	0,8023	0,8051	0,8078	0,8106	0,8133	0,8
0,9	0,8159	0,8186	0,8212	0,8238	0,8264	0,8289	0,8315	0,8340	0,8365	0,8389	0,9
1,0	0,8413	0,8438	0,8461	0,8485	0,8508	0,8531	0,8554	0,8577	0,8599	0,8621	1,0
1,1	0,8643	0,8665	0,8686	0,8708	0,8729	0,8749	0,8770	0,8790	0,8810	0,8830	1,1
1,2	0,8849	0,8869	0,8888	0,8907	0,8925	0,8944	0,8962	0,8980	0,8997	0,9015	1,2
1,3	0,9032	0,9049	0,9066	0,9082	0,9099	0,9115	0,9131	0,9147	0,9162	0,9177	1,3
1,4	0,9192	0,9207	0,9222	0,9236	0,9251	0,9265	0,9279	0,9292	0,9306	0,9319	1,4
1,5	0,9332	0,9345	0,9357	0,9370	0,9382	0,9394	0,9406	0,9418	0,9429	0,9441	1,5
1,6	0,9452	0,9463	0,9474	0,9484	0,9495	0,9505	0,9515	0,9525	0,9535	0,9545	1,6
1,7	0,9554	0,9564	0,9573	0,9582	0,9591	0,9599	0,9608	0,9616	0,9625	0,9633	1,7
1,8	0,9641	0,9649	0,9656	0,9664	0,9671	0,9678	0,9686	0,9693	0,9699	0,9706	1,8
1,9	0,9713	0,9719	0,9726	0,9732	0,9738	0,9744	0,9750	0,9756	0,9761	0,9767	1,9
2,0	0,9772	0,9778	0,9783	0,9788	0,9793	0,9798	0,9803	0,9808	0,9812	0,9817	2,0
2,1	0,9821	0,9826	0,9830	0,9834	0,9838	0,9842	0,9846	0,9850	0,9854	0,9857	2,1
2,2	0,9861	0,9864	0,9868	0,9871	0,9875	0,9878	0,9881	0,9884	0,9887	0,9890	2,2
2,3	0,9893	0,9896	0,9898	0,9901	0,9904	0,9906	0,9909	0,9911	0,9913	0,9916	2,3
2,4	0,9918	0,9920	0,9922	0,9925	0,9927	0,9929	0,9931	0,9932	0,9934	0,9936	2,4
2,5	0,9938	0,9940	0,9941	0,9943	0,9945	0,9946	0,9948	0,9949	0,9951	0,9952	2,5
2,6	0,9953	0,9955	0,9956	0,9957	0,9959	0,9960	0,9961	0,9962	0,9963	0,9964	2,6
2,7	0,9965	0,9966	0,9967	0,9968	0,9969	0,9970	0,9971	0,9972	0,9973	0,9974	2,7
2,8	0,9974	0,9975	0,9976	0,9977	0,9977	0,9978	0,9979	0,9979	0,9980	0,9981	2,8
2,9	0,9981	0,9982	0,9982	0,9983	0,9984	0,9984	0,9985	0,9985	0,9986	0,9986	2,9
3,0	0,99865	0,99869	0,99874	0,99878	0,99882	0,99886	0,99889	0,99893	0,99896	0,99900	3,0
3,1	0,99903	0,99906	0,99910	0,99913	0,99916	0,99918	0,99921	0,99924	0,99926	0,99929	3,1
3,2	0,99931	0,99934	0,99936	0,99938	0,99940	0,99942	0,99944	0,99946	0,99948	0,99950	3,2
3,3	0,99952	0,99953	0,99955	0,99957	0,99958	0,99960	0,99961	0,99962	0,99964	0,99965	3,3
3,4	0,99966	0,99968	0,99969	0,99970	0,99971	0,99972	0,99973	0,99974	0,99975	0,99976	3,4
3,5	0,99977	0,99978	0,99978	0,99979	0,99980	0,99981	0,99981	0,99982	0,99983	0,99983	3,5
3,6	0,99984	0,99985	0,99985	0,99986	0,99986	0,99987	0,99987	0,99988	0,99988	0,99989	3,6
3,7	0,99989	0,99990	0,99990	0,99990	0,99991	0,99991	0,99992	0,99992	0,99992	0,99992	3,7
3,8	0,99993	0,99993	0,99993	0,99994	0,99994	0,99994	0,99994	0,99995	0,99995	0,99995	3,8
3,9	0,99995	0,99995	0,99996	0,99996	0,99996	0,99996	0,99996	0,99996	0,99997	0,99997	3,9



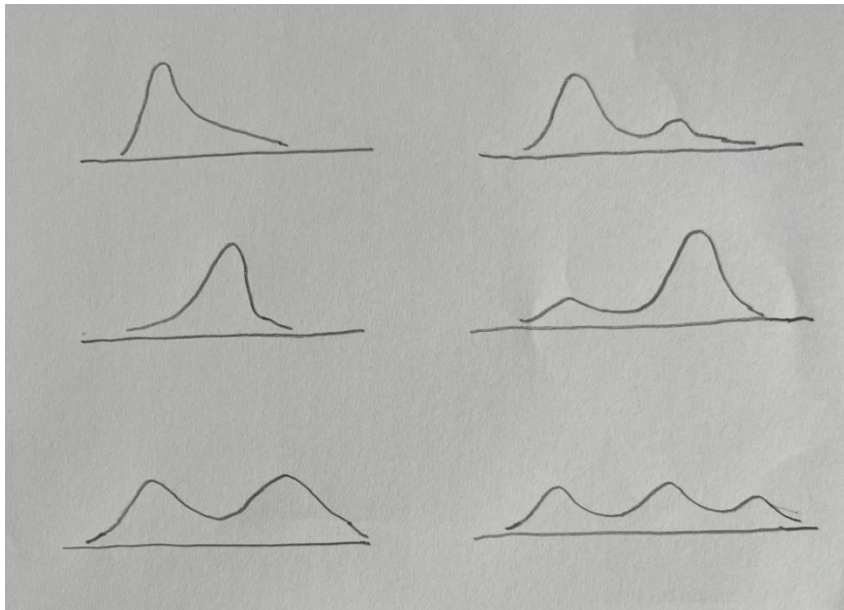


Table 1. Clinical Characteristics of 214 Women With Anorexia Nervosa*

Characteristic	Values
Age, y	25.0 ± 6.4 (17-45)
Percentage of IBW	77 ± 6 (60-85)
Duration of AN, mo	65.9 ± 70.4 (1-336)
Age at onset of AN, y	19.5 ± 5.6 (9-40)
Women who purge, %	24.1
No. of purges/wk†	1.6 ± 15.9 (1-70)
BMI	16.8 ± 1.4 (13.2-20.8)
LBM, kg	34.3 ± 3.9 (24.5-45.5)
Fat mass, kg	8.0 ± 3.3 (2.6-20.3)
Percentage of body fat	17.7 ± 5.9 (6.3-32.4)
LMP, mo	27.1 ± 38.9 (3-300)
Amenorrhea, mo	54.6 ± 61.2 (4-324)
Age at menarche, y	13.6 ± 0.48
Women with primary amenorrhea, %	14.8
Women engaging in vigorous exercise, %	74.6
No. of hours of vigorous exercise/wk †	5.9 ± 4.8 (0.67-23.5)
Women consuming alcohol, %	41.6
No. of drinks/wk‡	2.6 ± 4.1 (0-28.0)
Women who smoke, %	16.4
No. of cigarettes/d†	11.6 ± 9.0 (0.3-40)
Women who incurred fractures, %	30.1

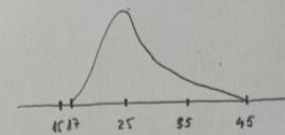
Abbreviations: AN, anorexia nervosa; BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters); IBW, ideal body weight; LBM, lean body mass; LMP, length of time since last menstrual period.

*Values are given as mean ± SD (range) unless otherwise indicated.

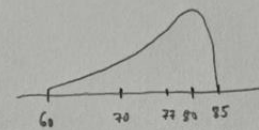
†The frequency reported is the mean for all patients who engaged in the activity.

‡Social drinkers who did not specify a number of drinks were assigned zero drinks per week.

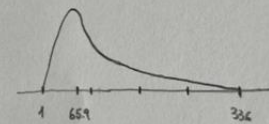
Age



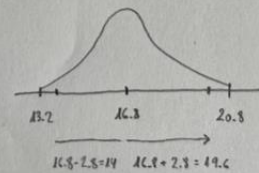
Percentage of IBW



Duration of AN



Bmi



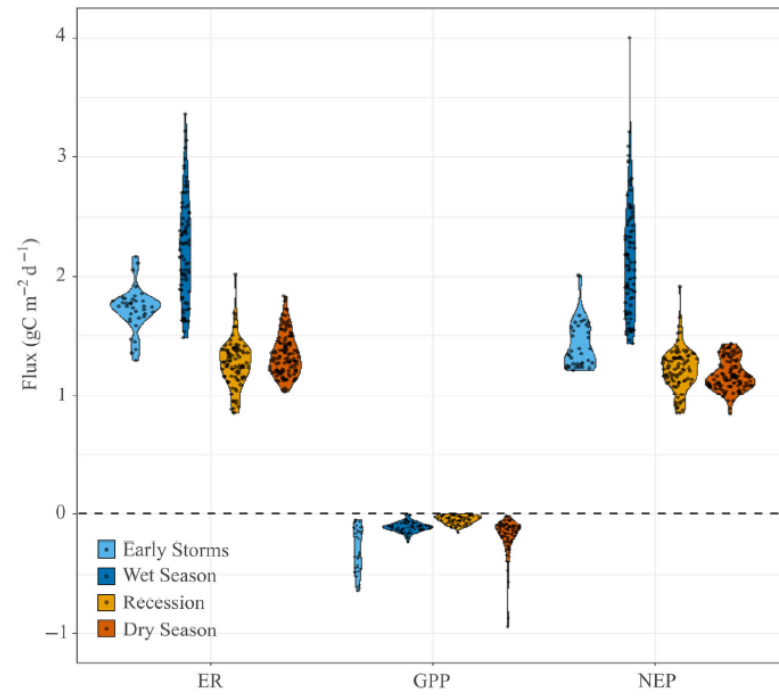
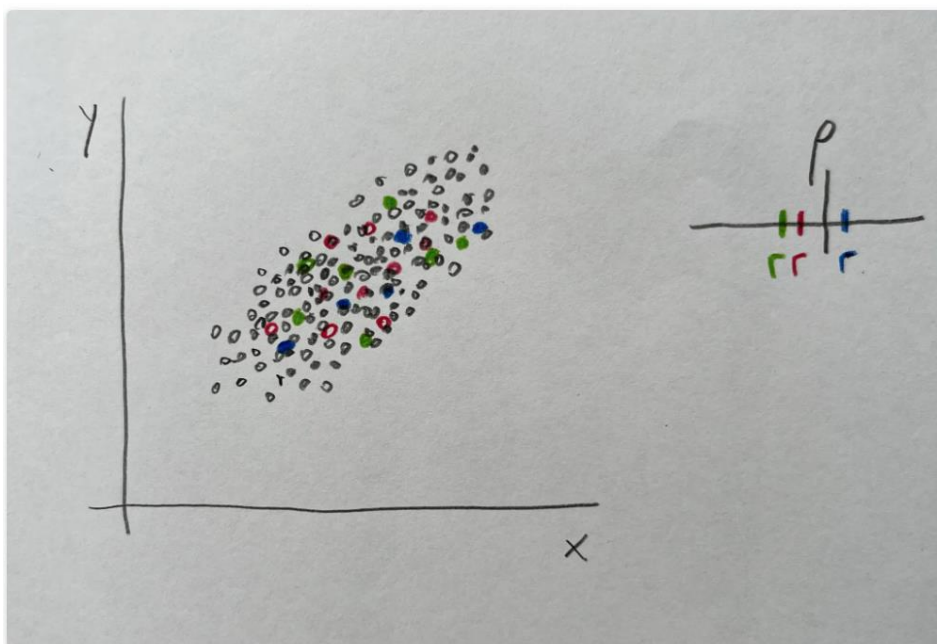
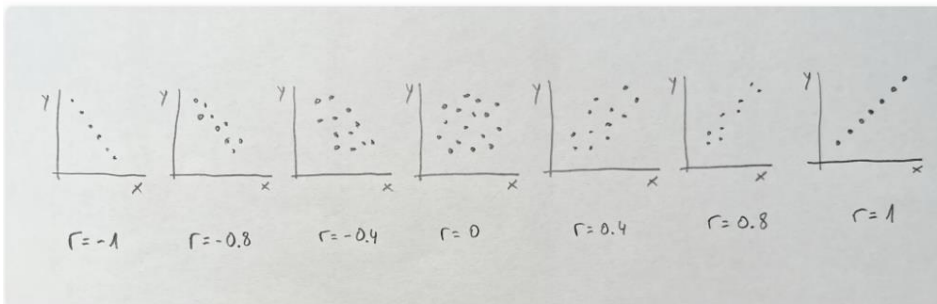
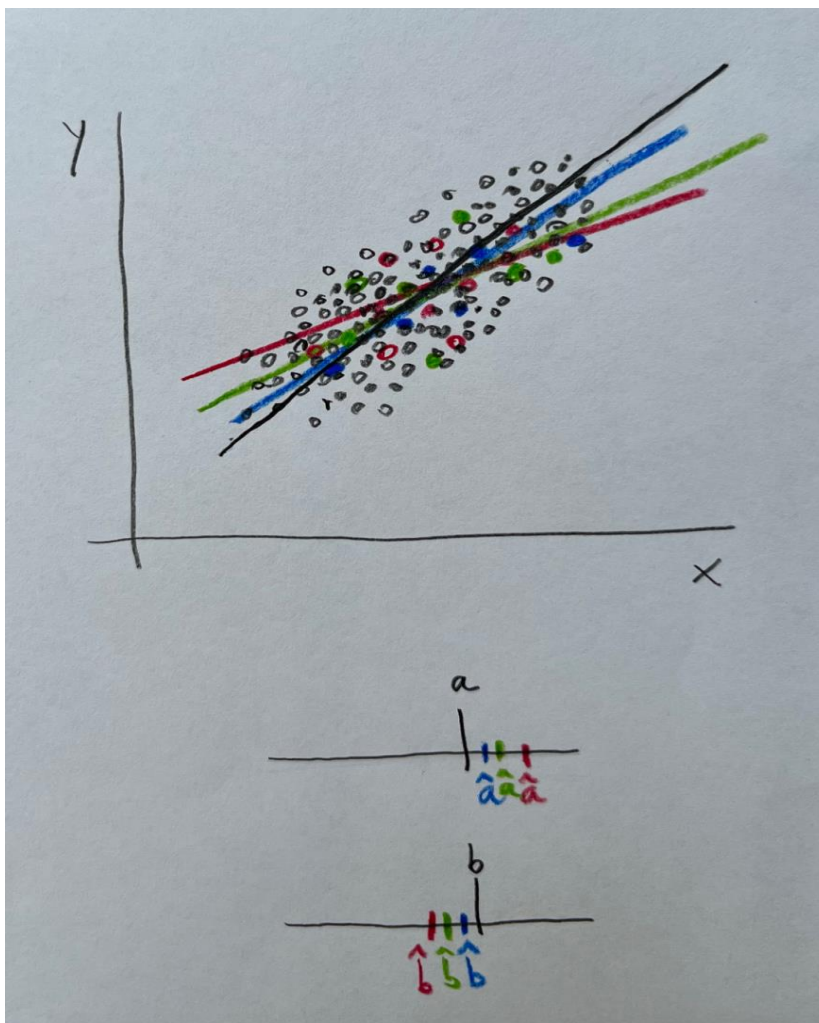
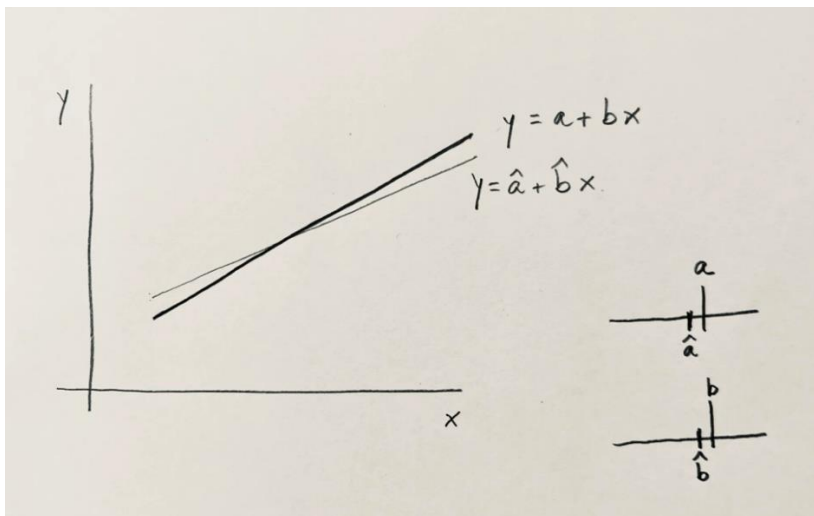


Fig. 2. Distribution of daily ER, GPP and NEP rates estimated for 322 d at Manton Creek.

Correlación



Regresión lineal



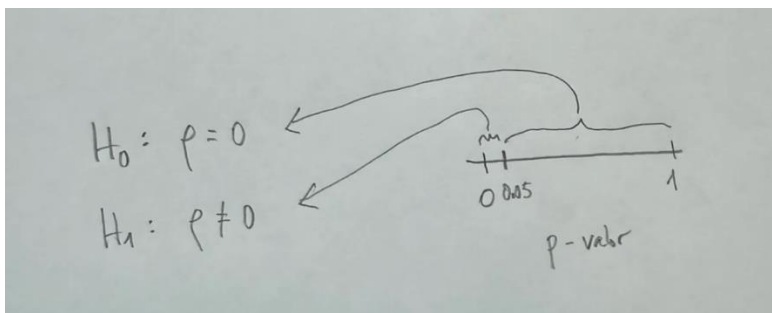
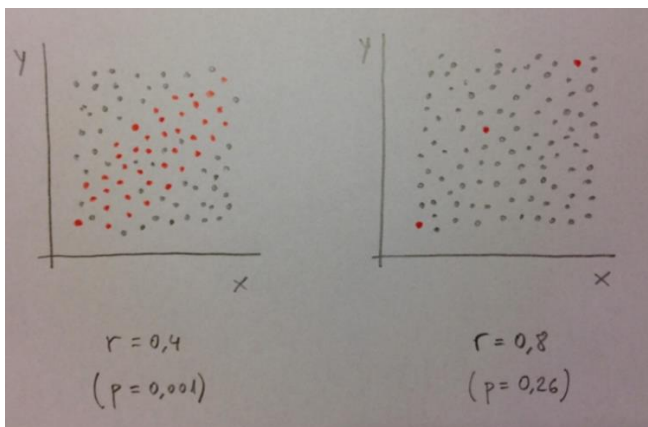
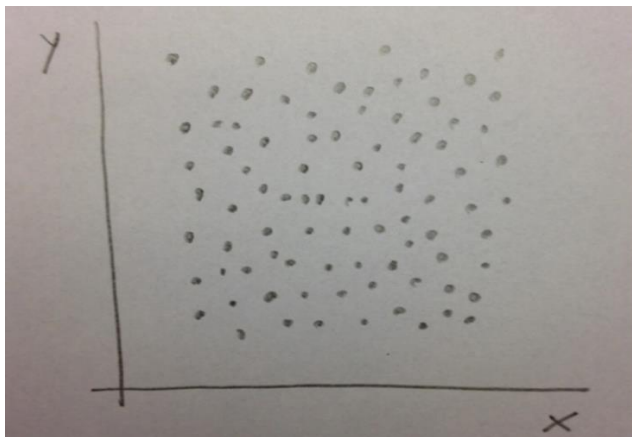
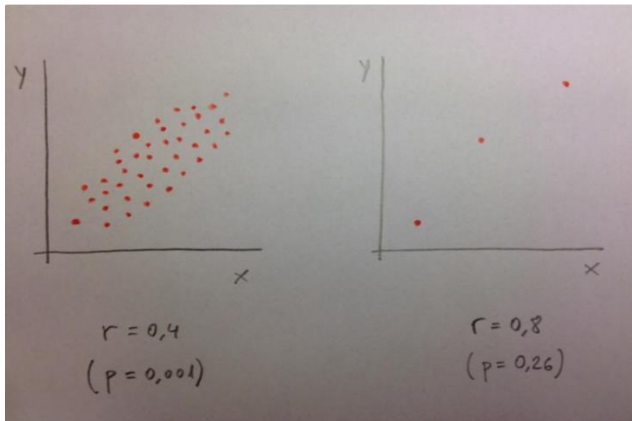


Table 2. Coefficients (r) obtained by Pearson correlation analysis between abiotic factors (salinity, organic matter and fine sediments) and the most abundant species in the estuary of the Cachoeira River, Ilhéus, Bahia, Brazil / Coeficientes (r), obtenidos por análisis de correlación de Pearson entre factores abióticos (salinidad, materia orgánica y sedimentos finos) y las especies más abundantes en el estuario del río Cachoeira Brasil, Ilhéus, Bahia, Brasil

Factors and species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Salinity																	
2 Organic matter	-0,62																
3 Silt-clays	-0,43	0,76															
4 NE	-0,59	-0,09	0,06														
5 Cc	-0,90	0,62	0,60	0,69													
6 Hf	-0,59	0,04	0,26	0,92	0,78												
7 HC	0,35	-0,50	-0,83	-0,44	-0,69	-0,62											
8 On	0,43	0,21	0,57	-0,49	-0,21	-0,26	-0,44										
9 Dr	0,37	0,02	0,54	-0,16	-0,07	0,08	-0,65	0,91									
10 Nv	0,38	-0,23	-0,34	0,12	-0,26	-0,20	0,16	-0,23	-0,29								
11 Lz	0,51	-0,28	-0,28	0,04	-0,35	-0,25	0,11	-0,06	-0,12	0,98							
12 Ao	0,57	-0,31	-0,37	-0,01	-0,42	-0,30	0,17	-0,06	-0,12	0,96	0,99						
13 Mc	0,07	-0,40	-0,30	-0,20	-0,35	-0,30	0,61	-0,27	-0,32	-0,15	-0,18	-0,21					
14 Te	-0,93	0,54	0,58	0,58	0,91	0,67	-0,50	-0,26	-0,14	-0,42	-0,56	-0,61	0,04				
15 Tp	-0,60	0,05	0,23	0,92	0,79	1,00	-0,63	-0,27	0,07	-0,19	-0,24	-0,29	-0,31	0,68			
16 Ib	-0,51	-0,16	0,14	0,91	0,65	0,95	-0,46	-0,33	0,04	-0,23	-0,28	-0,34	-0,02	0,65	0,95		
17 Om	0,75	-0,18	0,03	-0,26	-0,43	-0,37	-0,14	0,54	0,46	0,67	0,79	0,79	-0,30	-0,65	-0,37	-0,42	
18 Ta	0,44	-0,31	-0,43	0,09	-0,33	-0,22	0,23	-0,25	-0,30	0,99	0,97	0,98	-0,15	-0,50	-0,22	-0,25	0,66

Abbreviations of species /abreviaciones de las especies: Ab = *Anomalocardia brasiliensis*, Ao = *Anachis obesa*, Cc = *Capitella* cf. *capitata*, Dr = *Drilonereis* sp., Hc = *Hemipodia californiensis*, Hf = *Heteromastus filiformis*, Lz = *Littorina ziczac*, Mc = *Macra constricta*, Ne = *Nemertea* n. id., Nv = *Neritina virginea*, Om = *Olivella minuta*, On = *Onuphis* sp., Ta = *Tricolia affinis*, Te = *Tellina* sp., Tp = *Tagelus plebeius*

Table 2
Pearson product moment and Spearman rank (in italics) correlations between each pair of variables. The correlation coefficient (r) and statistical significance (p) are shown. A total of 26 pairs of data were used.

Diam	r	0.6600															
	p	0.0002*															
GI1	r	0.0914	0.1267														
	p	0.6571	0.5372														
GI2	r	0.1235	0.2375	0.808													
	p	0.5477	0.2428	0.0000*													
GI3	r	0.0794	0.1948	0.7567	0.9867												
	p	0.6913	0.3301	0.0002*	0.0000*												
GI4	r	-0.0687	-0.0639	0.7778	0.9145	0.9018											
	p	0.7311	0.7492	0.0001*	0.0000*	0.0000*											
G Hum	r	0.0215	-0.1332	-0.0157	-0.5726	-0.5104	-0.4449										
	i	0.9171	0.5166	0.9392	0.0022	0.0107*	0.0261*										
G Vol	r	0.1813	0.3737	0.6986	0.5535	0.3978	0.4944	-0.0282									
	p	0.3755	0.0600	0.0001*	0.0034*	0.0467*	0.0102*	0.8912									
Spaw (%)	r	-0.1548	-0.2103	-0.3116	-0.6485	-0.6495	-0.6221	0.6382	0.0104								
	p	0.4390	0.2930	0.1193	0.0012*	0.0012*	0.0019*	0.0014*	0.9585								
Temp	r	0.0859	0.1249	-0.7671	-0.4231	-0.4341	-0.526	-0.1166	-0.4538	0.0852							
	p	0.6677	0.5325	0.0001*	0.0344*	0.0300*	0.0085*	0.5598	0.0233*	0.6701							
		Alt	Diam	GI1	GI2	GI3	GI4	G Hum	G Vol	Spaw (%)							

* Significant correlations (95%).

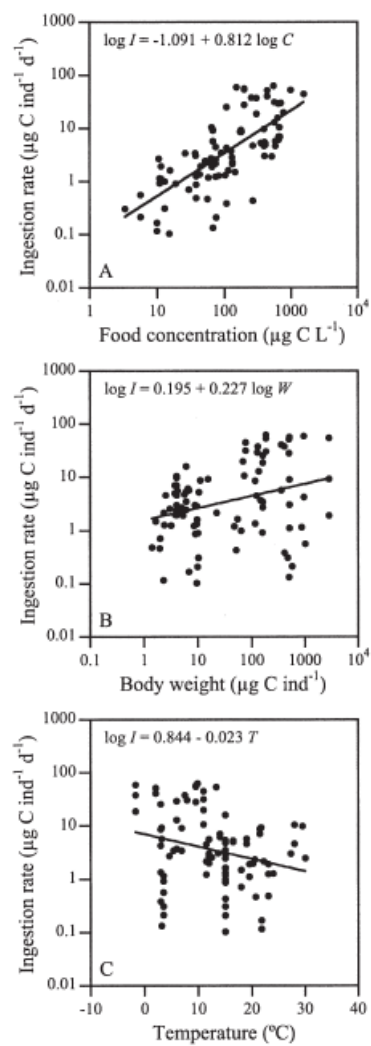


Fig. 1. Bivariate plots of ingestion rates of calanoid copepodites (including adults) as a function of, respectively, (A) food concentration, (B) body weight, and (C) temperature. Linear regression equations fitted to the logarithmically transformed data are given and drawn in each panel. See Table 2 for further details.

Table 2. Regression analysis of calanoid copepod ingestion rates (I , $\mu\text{g C ind}^{-1} \text{ d}^{-1}$) from field studies. Summary of fit, F -test of ANOVA of the model, and parameter estimates are provided. C , food concentration, $\mu\text{g C L}^{-1}$; T , temperature, $^{\circ}\text{C}$; W , body mass, $\mu\text{g C ind}^{-1}$; W_{res} , residuals of the log W - T relationship; RMSE, root mean square error; MR, mean of response; 95% CI, 95% confidence interval. Standardized regression coefficients in multiple regression analyses are indicated as a' , b' , c' , and d' , respectively.

a) $\log(I)=a+b \log(C)$	
$R^2=0.52$, RMSE=0.487, MR=0.544, $F_{1,88}=93.62$, $p<0.001$	
$a=-1.091$ (95% CI, -1.442 to -0.740), $t=-6.18$, $\text{df}=88$, $p<0.001$	
$b=0.812$ (95% CI, 0.645 to 0.978), $t=9.68$, $\text{df}=88$, $p<0.001$	
b) $\log(I)=a+b \log(W)$	
$R^2=0.09$, RMSE=0.666, MR=0.544, $F_{1,88}=9.02$, $p<0.004$	
$a=0.195$ (95% CI, -0.075 to 0.465), $t=1.44$, $\text{df}=88$, $p>0.1$	
$b=0.227$ (95% CI, 0.077 to 0.377), $t=3.00$, $\text{df}=88$, $p<0.004$	
c) $\log(I)=a+b T$	
$R^2=0.06$, RMSE=0.677, MR=0.544, $F_{1,88}=6.11$, $p<0.016$	
$a=0.844$ (95% CI, 0.564 to 1.123), $t=6.00$, $\text{df}=88$, $p<0.001$	
$b=-0.023$ (95% CI, -0.042 to -0.005), $t=-2.47$, $\text{df}=88$, $p<0.016$	
d) $\log(I)=a+b \log(W)+c \log(C)$	
$R^2_{\text{adj}}=0.81$, * RMSE=0.296, MR=0.582, $F_{2,84}=182.02$, $p<0.001$	
$a=-1.751$ (95% CI, -2.003 to -1.500), $t=-13.86$, $\text{df}=84$, $p<0.001$, $a'=0$	
$b=0.355$ (95% CI, 0.287 to 0.423), $t=10.31$, $\text{df}=84$, $p<0.001$, $b'=0.492$	
$c=0.893$ (95% CI, 0.790 to 0.996), $t=17.31$, $\text{df}=84$, $p<0.001$, $c'=0.826$	
e) $\log(I)=a+b W_{\text{res}}+c \log(C)+dT$	
$R^2_{\text{adj}}=0.81$, † RMSE=0.297, MR=0.582, $F_{3,83}=120.80$, $p<0.001$	
$a=-0.820$ (95% CI, -1.061 to -0.578), $t=-6.76$, $\text{df}=83$, $p<0.001$, $a'=0$	
$b=0.382$ (95% CI, 0.280 to 0.485), $t=7.40$, $\text{df}=83$, $p<0.001$, $b'=0.356$	
$c=0.897$ (95% CI, 0.794 to 1.001), $t=17.23$, $\text{df}=83$, $p<0.001$, $c'=0.830$	
$d=-0.031$ (95% CI, -0.039 to -0.022), $t=-7.27$, $\text{df}=83$, $p<0.001$, $d'=-0.345$	

* Three outlier data points were not used in this analysis. The inclusion of these values did not modify significantly the regression coefficient estimates, but R^2_{adj} decreased to 0.67 and RMSE increased to 0.397.

† Three outlier data points, which extended away >1.5 times the interquartile range for W_{res} , were not used in this analysis. The inclusion of these values did not significantly modify the regression coefficient estimates, but R^2_{adj} decreased to 0.67 and RMSE increased to 0.398.

Table 1. Egg production rate of *Acartia grani* (EPR, eggs ind. d^{-1}) as a function of either RNA content ($\mu\text{g RNA ind.}^{-1}$) or RNA : DNA ratio at each experimental temperature. Values for the parameters ($\pm\text{SE}$) of simple linear regression fits ($\text{EPR} = a + bX$) are shown (*, $P < 0.001$).

	17.8 $^{\circ}\text{C}$	23.3 $^{\circ}\text{C}$
a. RNA content as regressor		
a	-11.8 ± 3.66	-40.8 ± 6.95
b	38.7 ± 4.50	126.0 ± 10.65
r^2	0.88*	0.93*
b. RNA : DNA as regressor		
a	-19.4 ± 3.52	-29.6 ± 4.69
b	1.76 ± 0.159	3.41 ± 0.223
r^2	0.92*	0.96*

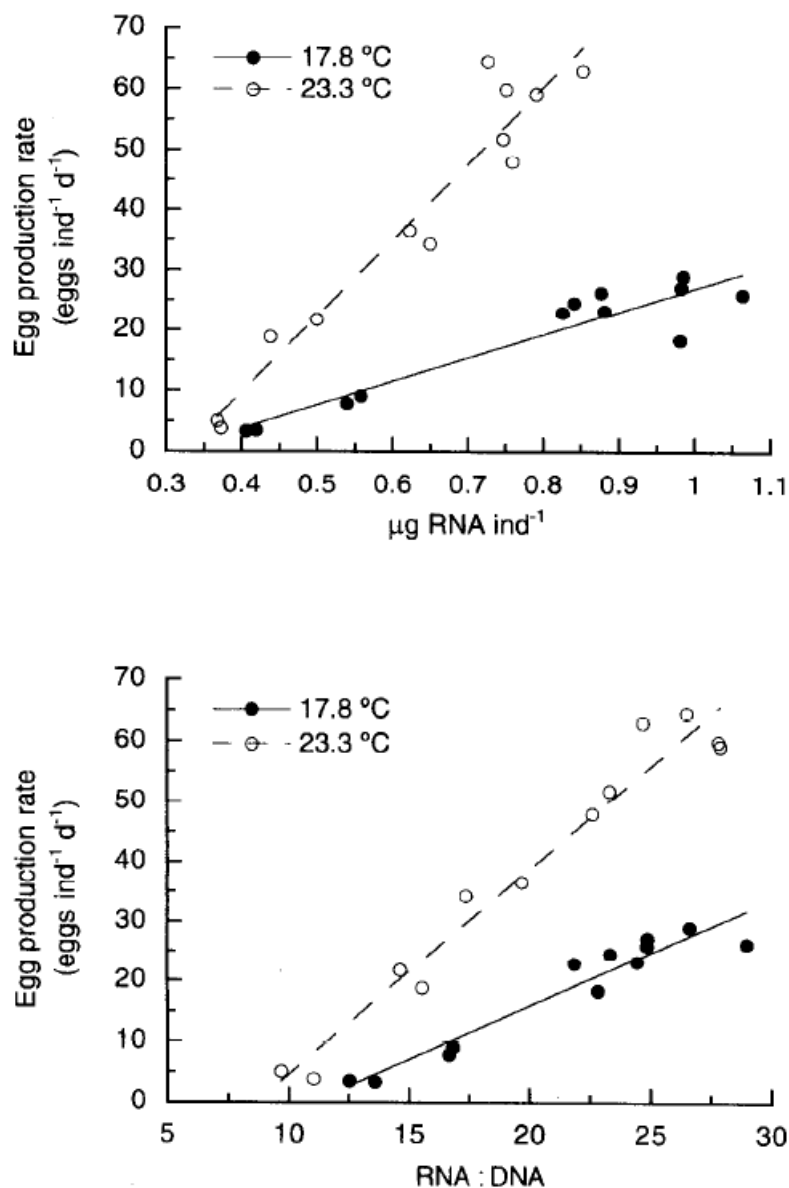


Fig. 3. Linear relationship between egg production rate and RNA content per copepod (top panel, $\mu\text{g RNA ind.}^{-1}$) and RNA:DNA ratio (bottom panel) at both experimental temperatures.

ERROR ESTÁNDAR

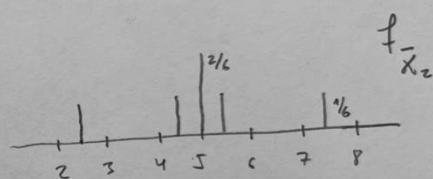
2	3	7	8
---	---	---	---

2	2	3	3	7	7	8	8
---	---	---	---	---	---	---	---

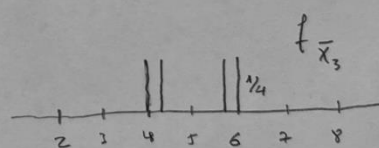
4	5	5	6
---	---	---	---

2	3	7	8
---	---	---	---

	$\bar{X}_2$
(2, 3)	2.5
(2, 7)	4.5
(2, 8)	5
(3, 7)	5
(3, 8)	5.5
(7, 8)	7.5



	$\bar{X}_3$
(2, 3, 7)	4
(2, 3, 8)	4.3
(2, 7, 8)	5.6
(3, 7, 8)	6



2	2	3	3	7	7	8	8
---	---	---	---	---	---	---	---

$\bar{X}_2$

(2, 2) 2

(2, 3) 2.5

(2, 3) 2.5

(2, 7) 4.5

(2, 7) 4.5

(2, 8) 5

(2, 8) 5

(2, 3) 2.5

(2, 3) 2.5

(2, 7) 4.5

(2, 7) 4.5

(2, 8) 5

(2, 8) 5

(3, 3) 3

(3, 7) 5

(3, 7) 5

(3, 8) 5.5

(3, 8) 5.5

(3, 7) 5

(3, 7) 5

(3, 8) 5.5

(3, 8) 5.5

$\bar{X}_2$

(7, 7) 7

(7, 8) 7.5

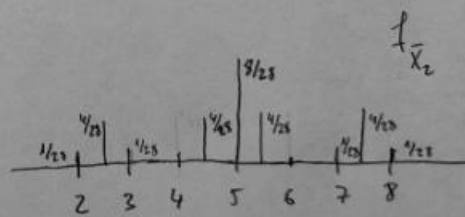
(7, 8) 7.5

(7, 8) 7.5

(7, 8) 7.5

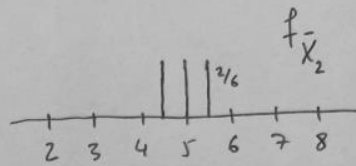
(7, 8) 7.5

(8, 8) 8



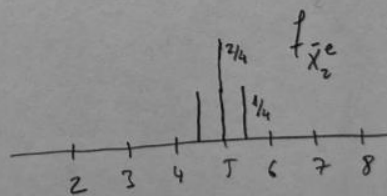
4	5	5	6
---	---	---	---

	$\bar{X}_2$
(4,5)	4.5
(4,5)	4.5
(4,6)	5
(5,5)	5
(5,6)	5.5
(5,6)	5.5



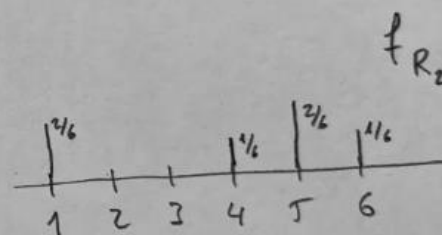
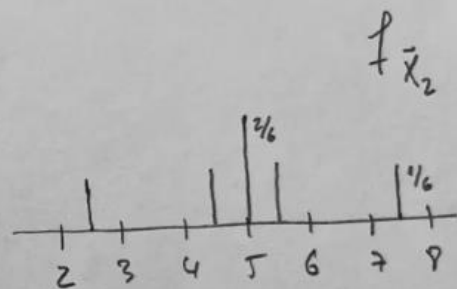
2	3	7	8
---	---	---	---

	$\bar{X}_2^e$
(2,7)	4.5
(2,8)	5
(3,7)	5
(3,8)	5.5



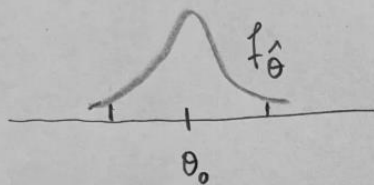
2	3	7	8
---	---	---	---

	$\bar{X}_2$	R_2
(2,3)	2.5	1
(2,7)	4.5	5
(2,8)	5	6
(3,7)	5	4
(3,8)	5.5	5
(7,8)	7.5	1



CONTRASTE DE HIPÓTESIS

$$\begin{array}{l}
 H_0: \theta = \theta_0 \\
 H_1: \theta \neq \theta_0
 \end{array}
 \quad
 \left(
 \begin{array}{c|c|c|c|c|c|c|c}
 \mu = 170 & p = 0.5 & \mu_1 - \mu_2 = 0 & p_1 - p_2 = 0 & p = 0 & \chi^2 = 0 & b = 0 & \alpha = 1 \\
 \mu \neq 170 & p \neq 0.5 & \mu_1 - \mu_2 \neq 0 & p_1 - p_2 \neq 0 & p \neq 0 & \chi^2 > 0 & b \neq 0 & \alpha \neq 1
 \end{array}
 \right)$$



$\uparrow$ Si $\hat{\theta}$ cae aquí $p < 0.05$
 $\uparrow$ Si $\hat{\theta}$ cae aquí dentro $p > 0.05$
 $\uparrow$ Si $\hat{\theta}$ cae aquí $p < 0.05$

$p \geq 0.05 \longrightarrow$ Mantenemos H_0

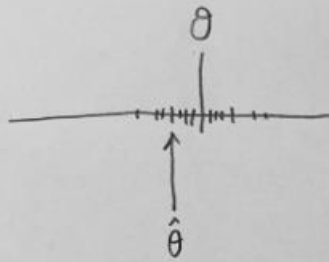
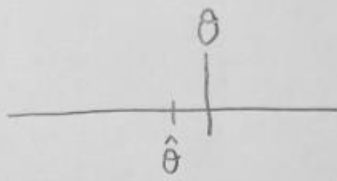
$p < 0.05 \longrightarrow$ Rechazamos H_0 y aceptamos H_1

Aceptamos H_0 como cierta:

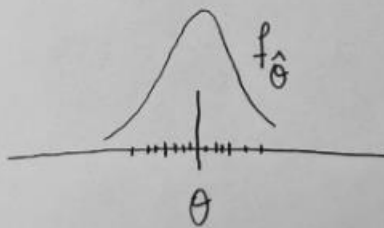
$$E(\hat{\theta}) = \theta_0$$

$EE(\hat{\theta})$ conocida

Distribución $f_{\hat{\theta}}$ localizada

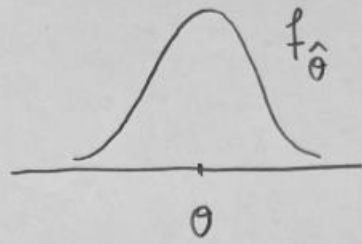


El que tengo
los demás: los que hubiera
podido tener



$f_{\hat{\theta}}$: Distribución de $\hat{\theta}$ como variable

$EE(\hat{\theta})$: Desviación estándar de $\hat{\theta}$
como variable



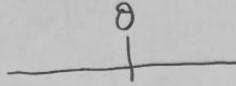
$f_{\hat{\theta}}$ depende de:

- 1) N
- 2) n
- 3) Tipo de muestreo
- 4) Variabilidad de X
- 5) Estructura de $\hat{\theta}$

$$E(\hat{\theta}) = \theta$$

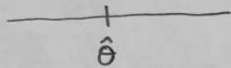
$$\sqrt{\text{var}(\hat{\theta})} = \text{Error estándar}$$

INTERVALO DE CONFIANZA



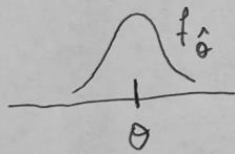
Valor poblacional

Fijo pero desconocido



Valor muestral

Conocido pero variable

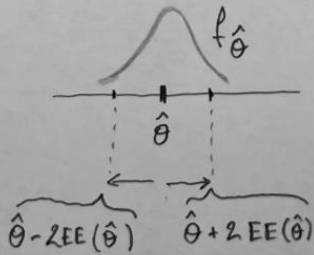


Distribución de $\hat{\theta}$

$$E(\hat{\theta}) = \theta$$

$EE(\hat{\theta})$ conocido

localización desconocida



Desplazamos sobre $\hat{\theta}$, que es un valor conocido, la distribución de $\hat{\theta}$ de localización desconocida pero de distribución conocida.

Le sumamos y le restamos $2 EE(\hat{\theta})$ para delimitar un IC 95%.

Ji-cuadrado

	Enfermo	No enfermo
Hombre	60	40
Mujer	20	80

	Enfermo	No enfermo
Hombre	62	38
Mujer	59	41

	Enfermo	No enfermo		Enfermo	No enfermo
Hombre	60	40	Hombre	6	4
Mujer	20	80	Mujer	2	8

OBSERVADO

		Patología	
		Si	No
Sexo	H	60	40
	M	20	80

ESPERADO

		Patología	
		Si	No
Sexo	H	40	60
	M	40	60

OBSERVADO

Patología

Si

No

Sexo

H

6

4

M

2

8

ESPERADO

Patología

Si

No

Sexo

H

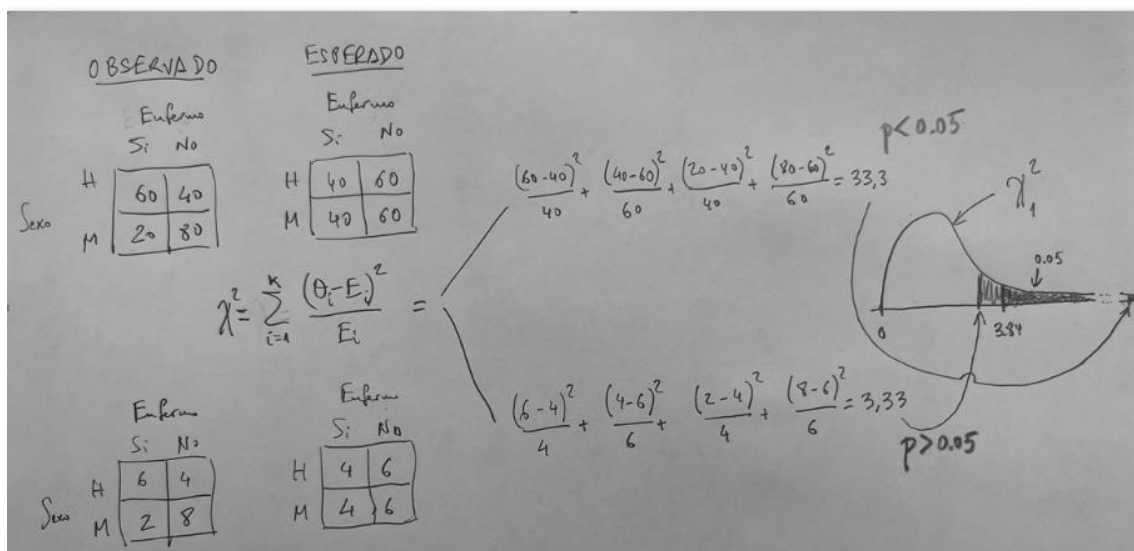
4

6

M

4

6



Grupos sanguíneos	Valores teóricos (%)	Observado	Esperado
A	32	377	320
B	25	264	250
AB	9	101	90
O	34	258	340
Total	100	1000	1000
		ji-cuadrado=	32,06

Table 9. Critical Values For The Chi-Square Distribution (Continued)

ν	α							
	.10	.05	.025	.01	.005	.001	.0005	.0001
1	2.7055	3.8415	5.0239	6.6349	7.8794	10.8276	12.1157	15.1367
2	4.6052	5.9915	7.3778	9.2103	10.5966	13.8155	15.2018	18.4207
3	6.2514	7.8147	9.3484	11.3449	12.8382	16.2662	17.7300	21.1075
4	7.7794	9.4877	11.1433	13.2767	14.8603	18.4668	19.9974	23.5127
5	9.2364	11.0705	12.8325	15.0863	16.7496	20.5150	22.1053	25.7448
6	10.6446	12.5916	14.4494	16.8119	18.5476	22.4577	24.1028	27.8563
7	12.0170	14.0671	16.0128	18.4753	20.2777	24.3219	26.0178	29.8775
8	13.3616	15.5073	17.5345	20.0902	21.9550	26.1245	27.8680	31.8276
9	14.6837	16.9190	19.0228	21.6660	23.5894	27.8772	29.6658	33.7199
10	15.9872	18.3070	20.4832	23.2093	25.1882	29.5883	31.4198	35.5640
11	17.2750	19.6751	21.9200	24.7250	26.7568	31.2641	33.1366	37.3670
12	18.5493	21.0261	23.3367	26.2170	28.2995	32.9095	34.8213	39.1344
13	19.8119	22.3620	24.7356	27.6882	29.8195	34.5282	36.4778	40.8707
14	21.0641	23.6848	26.1189	29.1412	31.3193	36.1233	38.1094	42.5793
15	22.3071	24.9958	27.4884	30.5779	32.8013	37.6973	39.7188	44.2632
16	23.5418	26.2962	28.8454	31.9999	34.2672	39.2524	41.3081	45.9249
17	24.7690	27.5871	30.1910	33.4087	35.7185	40.7902	42.8792	47.5664
18	25.9894	28.8693	31.5264	34.8053	37.1565	42.3124	44.4338	49.1894
19	27.2036	30.1435	32.8523	36.1909	38.5823	43.8202	45.9731	50.7955
20	28.4120	31.4104	34.1696	37.5662	39.9968	45.3147	47.4985	52.3860
21	29.6151	32.6706	35.4789	38.9322	41.4011	46.7970	49.0108	53.9620
22	30.8133	33.9244	36.7807	40.2894	42.7957	48.2679	50.5111	55.5246
23	32.0069	35.1725	38.0756	41.6384	44.1813	49.7282	52.0002	57.0746
24	33.1962	36.4150	39.3641	42.9798	45.5585	51.1786	53.4788	58.6130
25	34.3816	37.6525	40.6465	44.3141	46.9279	52.6197	54.9475	60.1403
26	35.5632	38.8851	41.9232	45.6417	48.2899	54.0520	56.4069	61.6573
27	36.7412	40.1133	43.1945	46.9629	49.6449	55.4760	57.8576	63.1645
28	37.9159	41.3371	44.4608	48.2782	50.9934	56.8923	59.3000	64.6624
29	39.0875	42.5570	45.7223	49.5879	52.3356	58.3012	60.7346	66.1517
30	40.2560	43.7730	46.9792	50.8922	53.6720	59.7031	62.1619	67.6326
31	41.4217	44.9853	48.2319	52.1914	55.0027	61.0983	63.5820	69.1057
32	42.5847	46.1943	49.4804	53.4858	56.3281	62.4872	64.9955	70.5712
33	43.7452	47.3999	50.7251	54.7755	57.6484	63.8701	66.4025	72.0296
34	44.9032	48.6024	51.9660	56.0609	58.9639	65.2472	67.8035	73.4812
35	46.0588	49.8018	53.2033	57.3421	60.2748	66.6188	69.1986	74.9262
36	47.2122	50.9985	54.4373	58.6192	61.5812	67.9852	70.5881	76.3650
37	48.3634	52.1923	55.6680	59.8925	62.8833	69.3465	71.9722	77.7977
38	49.5126	53.3835	56.8955	61.1621	64.1814	70.7029	73.3512	79.2247
39	50.6598	54.5722	58.1201	62.4281	65.4756	72.0547	74.7253	80.6462
40	51.8051	55.7585	59.3417	63.6907	66.7660	73.4020	76.0946	82.0623
50	63.1671	67.5048	71.4202	76.1539	79.4900	86.6608	89.5605	95.9687
60	74.3970	79.0819	83.2977	88.3794	91.9517	99.6072	102.6948	109.5029
70	85.5270	90.5312	95.0232	100.4252	104.2149	112.3169	115.5776	122.7547
80	96.5782	101.8795	106.6286	112.3288	116.3211	124.8392	128.2613	135.7825
90	107.5650	113.1453	118.1359	124.1163	128.2989	137.2084	140.7823	148.6273
100	118.4980	124.3421	129.5612	135.8067	140.1695	149.4493	153.1670	161.3187

Table 1. Summary statistics of delta-mean calculation of abundance (number 100 m⁻³) and chi-square frequency test for day and night samples

	Mean	s^2	m	n	Delta-mean	o	e	Chi-square
Day	5.79	3.90	317	1213	591 ± 222	317	378.39	9.96
Night	5.69	3.12	427	1172	507 ± 139	427	365.61	10.31
Totals			744	2385		744	744	20.27

The delta-means are accompanied by 95% confidence intervals. The chi-square test statistic = 20.27; degrees of freedom = 1; $\chi^2_{0.95} = 8.84$; mean is the mean of log-transformed non-zero data; s^2 = variance of log-transformed non-zero data; m = number of non-zero observations; n = total number of samples; o = observed frequency of occurrence; e = expected frequency of occurrence.

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Table 2. Seasonal delta-means and chi-square test

	Mean	s^2	m	n	Delta-mean	o	e	Chi-square
Spring	5.98	2.95	210	691	517 ± 192	210	215.56	0.14
Summer	6.26	3.61	151	471	987 ± 490	151	146.93	0.11
Autumn	5.69	3.40	250	819	486 ± 182	250	255.49	0.12
Winter	4.83	2.97	133	404	177 ± 80	133	126.03	0.39
Totals			744	2385		744	744	0.76

Winter was defined as January–March; spring, April–June; summer, July–September; autumn, October–December. The chi-square value of 0.76 is less than $\chi^2_{0.95} = 7.82$. Degrees of freedom = 3.

Table 3. Delta-mean and chi-square tests by month

	Mean	s^2	m	n	Delta-mean	o	e	Chi-square
January	4.19	1.61	19	49	54 ± 39	19	15.29	0.90
February	4.56	3.66	18	53	160 ± 176	18	16.53	0.13
March	5.05	2.90	96	302	204 ± 106	96	94.21	0.03
April	5.49	3.32	78	284	333 ± 208	78	88.59	1.27
May	6.29	2.24	87	304	461 ± 214	87	94.83	0.64
June	6.22	3.17	45	103	988 ± 741	45	32.13	5.15
July	6.85	3.22	60	181	1469 ± 1000	60	56.46	0.22
August	5.73	3.67	76	245	559 ± 376	76	76.42	0.002
September	6.60	2.28	15	45	666 ± 633	15	14.04	0.07
October	5.99	4.36	127	414	1036 ± 633	127	129.15	0.04
November	5.51	1.91	67	210	199 ± 94	67	65.51	0.03
December	5.22	2.62	56	195	188 ± 118	56	60.83	0.38
Totals			744	2385		744	744	8.87

Chi-square = 8.87; $\chi^2_{0.95} = 19.68$.

Table 4. Delta-mean and chi-square statistics by year, 1977–1986

	Mean	s^2	m	n	Delta-mean	o	e	Chi-square
1977	5.72	3.45	87	271	633 ± 386	87	84.54	0.07
1978	6.66	2.85	42	189	669 ± 492	42	58.96	4.88
1979	5.75	2.44	73	263	285 ± 151	73	82.04	1.00
1980	5.41	2.50	93	325	217 ± 105	93	101.38	0.60
1981	5.73	2.11	100	346	250 ± 106	100	107.93	0.58
1982	5.82	3.14	102	295	541 ± 290	102	92.03	1.08
1983	5.14	5.02	36	98	625 ± 664	36	30.57	0.96
1984	5.96	4.48	119	345	1181 ± 755	119	107.62	1.20
1985	5.49	4.87	86	239	916 ± 707	86	74.56	1.76
1986	5.42	4.96	6	14	516 ± 802	6	4.37	0.61
Totals			744	2385		744	744	12.84

Chi-square statistic = 12.84; $\chi^2_{0.95} = 16.92$; degrees of freedom = 9.

Table 5. Delta-mean and chi-square test results by station depth (m)

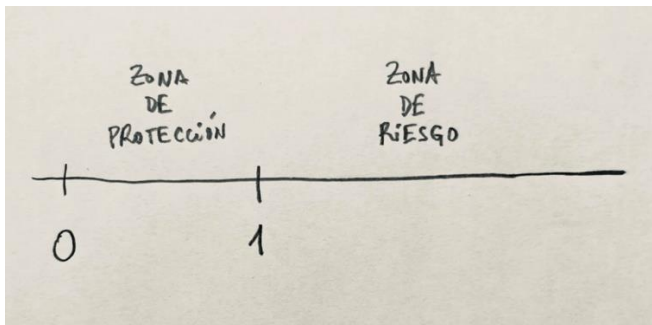
Depth	Mean	s^2	m	n	Delta-mean	o	e	Chi-square
≥ 29	6.93	5.40	54	76	9184 ± 8868	54	23.71	38.70
30–39	6.52	3.69	143	231	2563 ± 1304	143	72.68	69.84
40–49	6.55	2.69	143	233	1601 ± 650	143	72.68	68.02
50–59	5.53	1.83	92	222	256 ± 102	92	69.25	7.47
60–69	5.46	1.57	109	299	186 ± 63	109	93.27	2.65
70–79	5.26	1.72	72	252	127 ± 55	72	78.61	0.55
80–89	4.61	1.63	55	253	40 ± 24	55	78.92	7.25
90–99	3.44	2.72	24	195	20 ± 22	24	60.83	22.30
> 100	3.94	2.14	52	624	12 ± 8	52	194.65	104.55
Totals			744	2385		744	744	321.34

Chi-square = 321.34; $\chi^2_{0.95} = 15.51$; degrees of freedom = 8.

Odds ratio

	Casos	Controles
Expuestos	a	b
No expuestos	c	d

$$OR = \frac{\frac{a}{b}}{\frac{c}{d}}$$



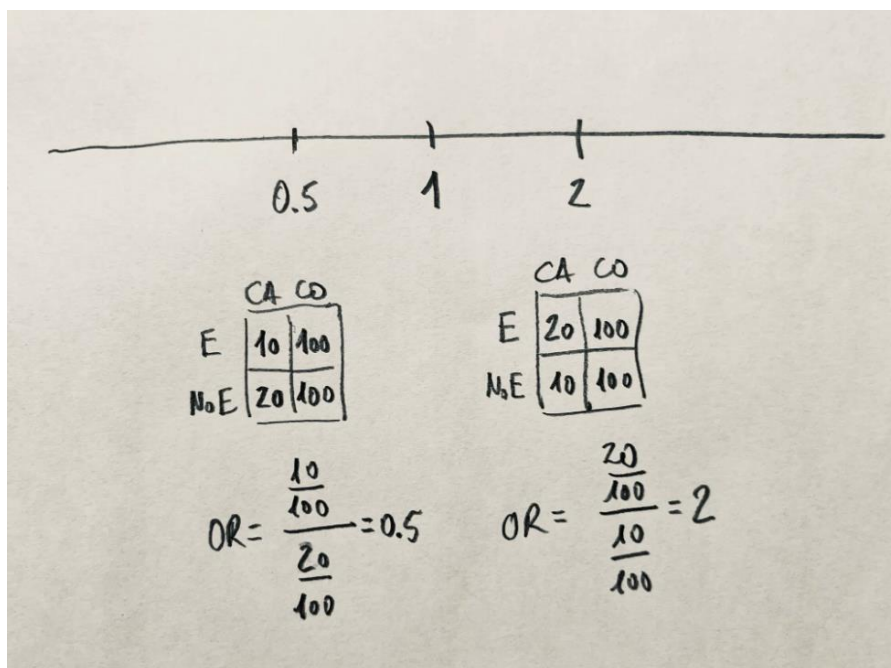


TABLE 2. Prospective Associations Between Total Amount of Exercise at Baseline and Later Depression or Anxiety

Total Amount of Exercise Per Week	Depression ^a		Anxiety ^b	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Model 1^c				
None	1.69	1.39-2.06	1.16	0.96-1.41
Up to 30 minutes	1.29	1.10-1.52	1.16	0.99-1.35
31-59 minutes	1.14	0.96-1.35	1.15	0.99-1.34
1-2 hours	1.00		1.00	
2-4 hours	1.08	0.86-1.35	1.20	0.98-1.45
More than 4 hours	1.03	0.81-1.29	1.21	0.99-1.48

<u>Actividad</u>	<u>Depresión</u>	<u>No depresión</u>
Ninguna	169	10000
Hasta 30 min	129	10000
31-59 min	114	10000
1-2 h	100	10000
2-4 h	108	10000
Más de 4 h	103	10000

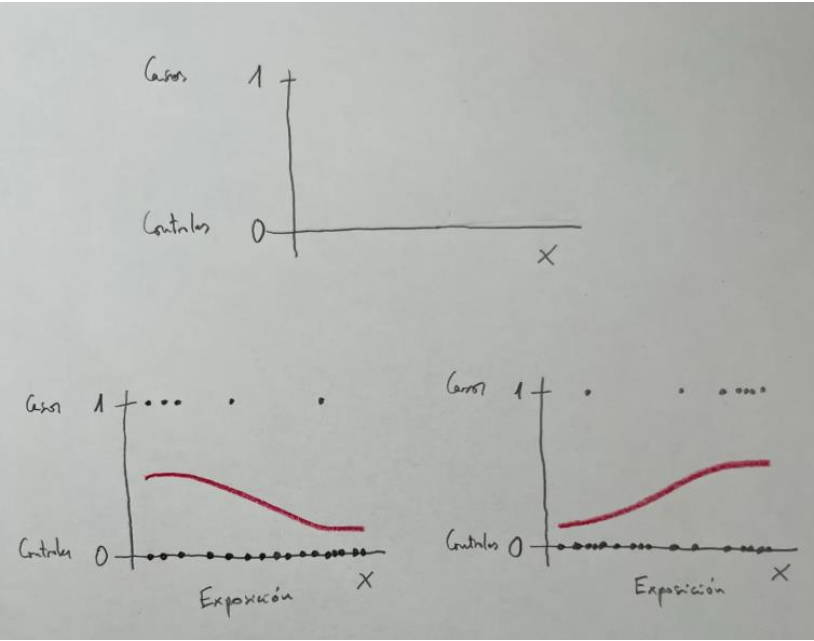
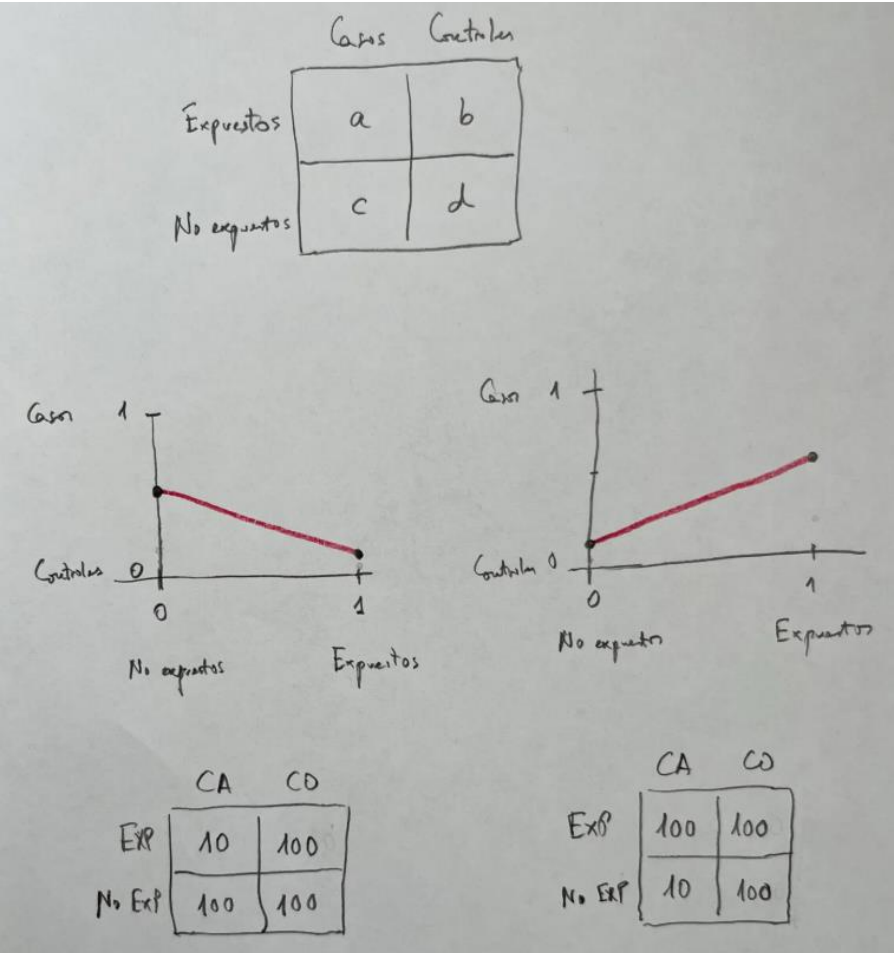
	Cases	Controls	
Exp	169	10000	Ninjala
No exp	100	10000	1-2 h.

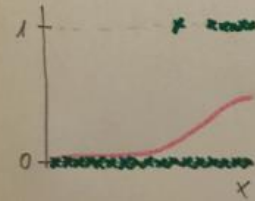
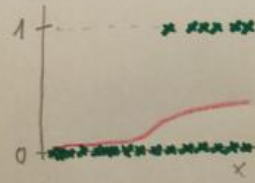
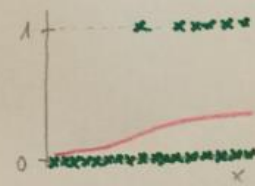
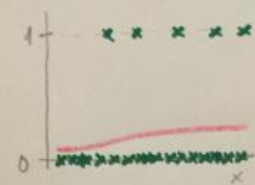
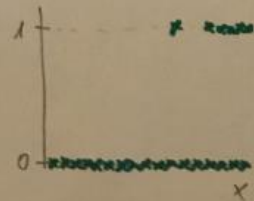
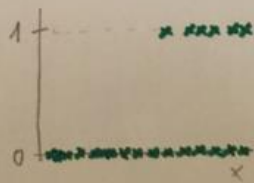
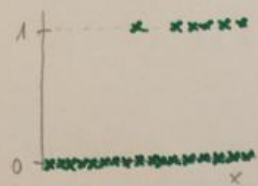
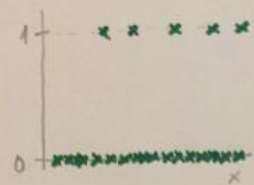
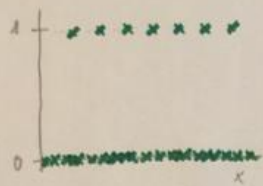
$$OR = 1.69$$

	Cases	Controls	
Exp	100	10000	1-2 h.
No exp	169	10000	Ninjala

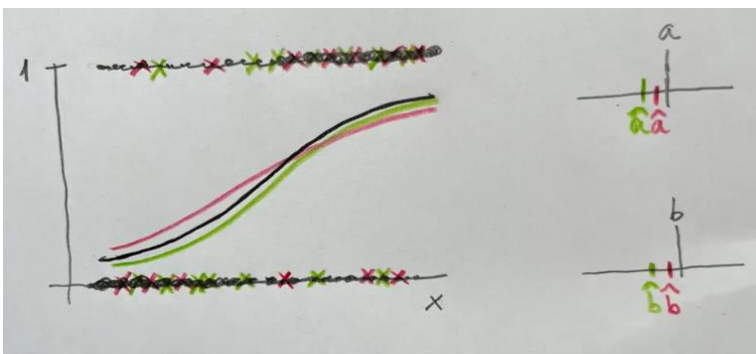
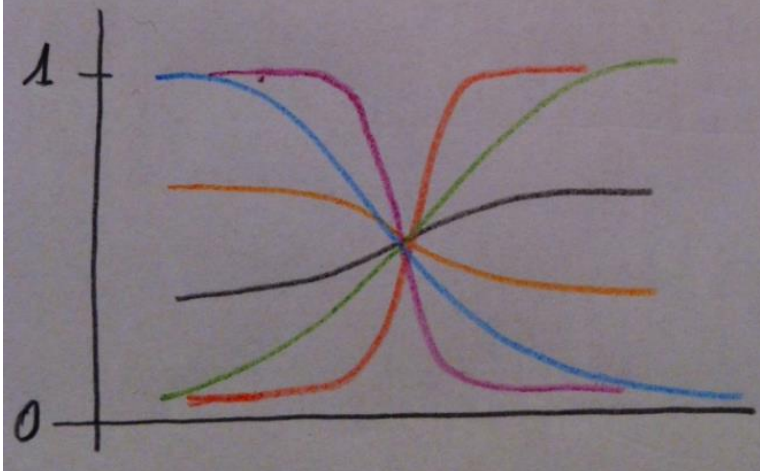
$$OR = 0.59$$

Regresión logística





$$y = \frac{e^{a+bx}}{1 + e^{a+bx}}$$



$$OR = e^b$$

TABLE 2. Logistic regression analysis of risk factors for leptospirosis in stranded California sea lions, California, 2004.

Risk factor ^a	Odds ratio	95% confidence interval	<i>p</i>
Season			
Winter	1.00	0.00	—
Spring	0.43	0.08–2.31	0.329
Summer	16.74	4.32–64.90	0.000
Autumn	11.61	2.95–45.71	0.000
Dog-park density per stranding site hydrologic unit	1.95	1.18–3.22	0.009
Distance to dog park (km)	0.75	0.60–0.93	0.009

^a Adjusted for age class and sex.

Table 5. Associations between phytoplankton cell counts and incident illness occurring during the 10- to 12-day period between the beach visit and the follow-up telephone interview among beachgoers who reported body immersion in water.

Phytoplankton group	Gastrointestinal illness (<i>n</i> = 11,832)		Respiratory illness (<i>n</i> = 11,160)		Eye irritation (<i>n</i> = 12,013)		Rash (<i>n</i> = 11,857)		Earache (<i>n</i> = 11,947)	
	Cases (%)	OR (95% CI)	Cases (%)	OR (95% CI)	Cases (%)	OR (95% CI)	Cases (%)	OR (95% CI)	Cases (%)	OR (95% CI)
All groups combined										
≤ Q1	174 (5.0)	1	227 (6.9)	1	114 (3.2)	1	156 (4.5)	1	57 (1.6)	1
> Q1 to < Q3	211 (4.5)	0.91 (0.74, 1.12)	315 (7.1)	1.03 (0.86, 1.23)	144 (3.0)	0.93 (0.72, 1.19)	199 (4.2)	0.95 (0.77, 1.18)	96 (2.0)	1.25 (0.90, 1.74)
≥ Q3	178 (4.9)	1.00 (0.80, 1.24)	244 (7.1)	1.02 (0.85, 1.24)	155 (4.2)	1.30 (1.01, 1.66)	206 (5.6)	1.27 (1.02, 1.57)	76 (2.1)	1.25 (0.88, 1.77)
Bacillariophyta										
≤ Q1	142 (4.4)	1	189 (6.1)	1	110 (3.3)	1	170 (5.2)	1	54 (1.6)	1
> Q1 to < Q3	281 (5.0)	1.13 (0.92, 1.39)	405 (7.7)	1.28 (1.07, 1.54)	223 (3.9)	1.18 (0.94, 1.49)	279 (5.0)	0.97 (0.80, 1.18)	118 (2.1)	1.29 (0.93, 1.79)
≥ Q3	140 (4.7)	1.06 (0.83, 1.35)	192 (6.8)	1.10 (0.89, 1.35)	80 (2.7)	0.78 (0.58, 1.05)	112 (3.8)	0.73 (0.57, 0.94)	57 (1.9)	1.15 (0.79, 1.68)
Cyanobacteria										
≤ Q1	173 (5.0)	1	187 (5.8)	1	114 (3.3)	1	144 (4.2)	1	55 (1.6)	1
> Q1 to < Q3	226 (4.4)	0.87 (0.71, 1.06)	354 (7.4)	1.30 (1.08, 1.56)	161 (3.1)	0.96 (0.75, 1.22)	236 (4.6)	1.12 (0.90, 1.39)	101 (2.0)	1.25 (0.89, 1.74)
≥ Q3	164 (5.0)	0.98 (0.79, 1.22)	245 (7.8)	1.37 (1.12, 1.67)	138 (4.1)	1.25 (0.97, 1.62)	181 (5.5)	1.32 (1.05, 1.66)	73 (2.2)	1.35 (0.95, 1.93)
Picocyanophytes										
None	397 (4.8)	1	527 (6.7)	1	281 (3.3)	1	407 (4.9)	1	155 (1.8)	1
Any	166 (4.7)	0.96 (0.80, 1.16)	259 (7.8)	1.13 (0.97, 1.32)	132 (3.7)	1.10 (0.89, 1.36)	154 (4.3)	0.90 (0.74, 1.09)	74 (2.1)	1.11 (0.83, 1.47)
Dinophyta										
≤ Q1	128 (4.5)	1	192 (7.2)	1	96 (3.3)	1	151 (5.3)	1	64 (2.2)	1
> Q1 to < Q3	275 (5.3)	1.22 (0.98, 1.51)	358 (7.2)	1.01 (0.84, 1.21)	185 (3.5)	1.04 (0.81, 1.33)	243 (4.6)	0.84 (0.68, 1.04)	87 (1.6)	0.72 (0.52, 1.01)
≥ Q3	160 (4.3)	0.97 (0.76, 1.23)	236 (6.7)	0.95 (0.78, 1.15)	132 (3.5)	1.05 (0.80, 1.37)	167 (4.4)	0.82 (0.65, 1.03)	78 (2.1)	0.93 (0.67, 1.30)

Abbreviations: CI, confidence interval; OR, adjusted odds ratio; Q1, 25th percentile; Q3, 75th percentile. Models adjusted for age (as a continuous variable) and sex. Denominator for the case percentage is the total number in the exposure group.

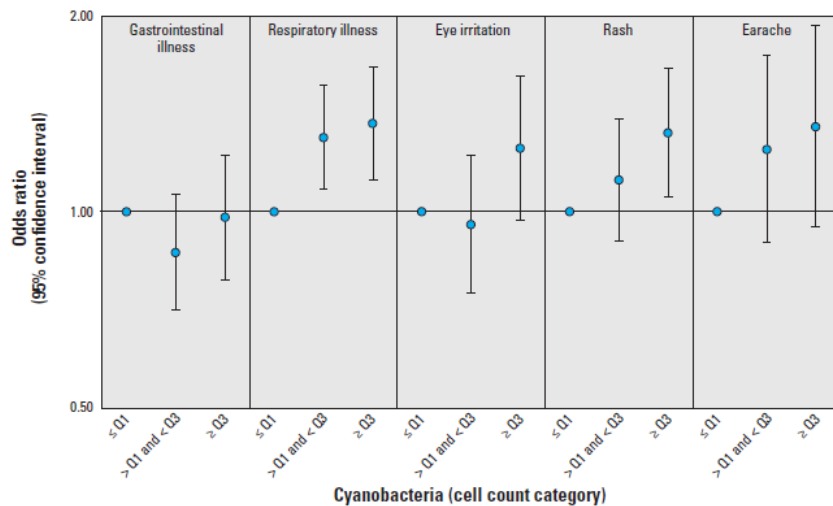
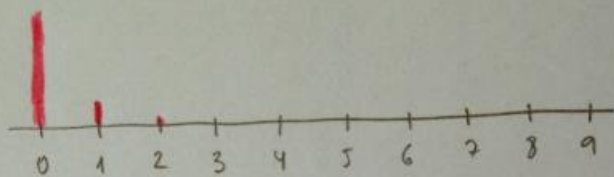
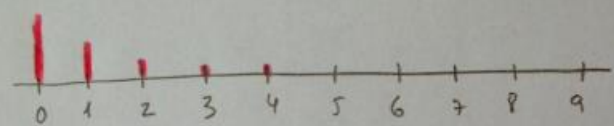


Figure 2. Associations between Cyanobacteria cell count and illness among beachgoers who reported body immersion in water. Models adjusted for age (as a continuous variable) and sex. Q1 = 25th percentile; Q3 = 75th percentile.

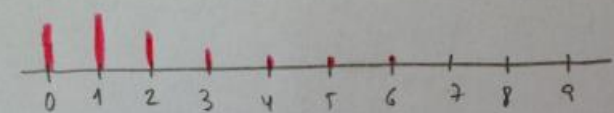
Regresión de Poisson



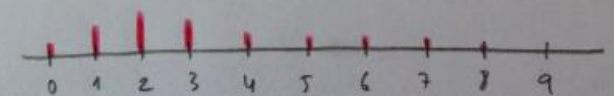
$$\lambda = 0.1$$



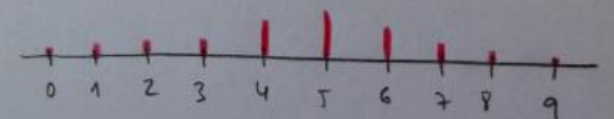
$$\lambda = 0.5$$



$$\lambda = 1$$



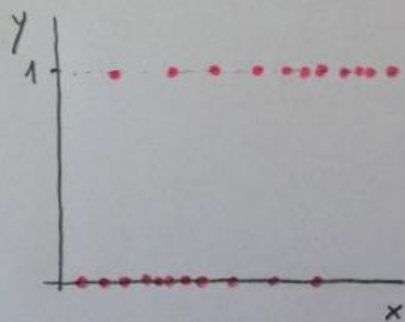
$$\lambda = 2$$



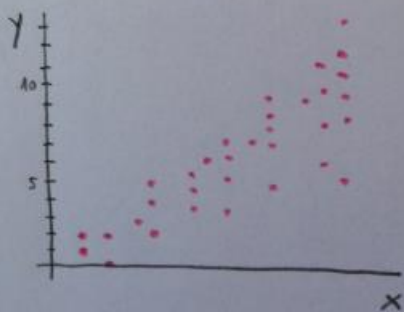
$$\lambda = 5$$



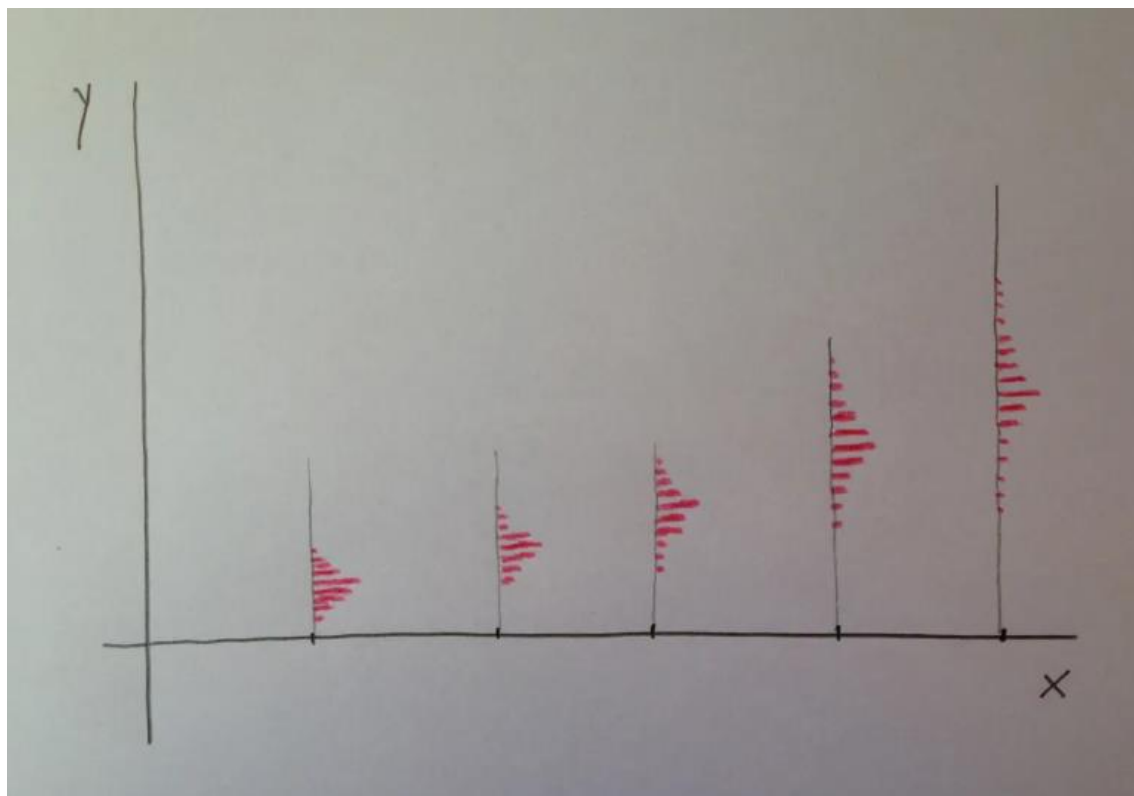
REGRESIÓN LINEAL



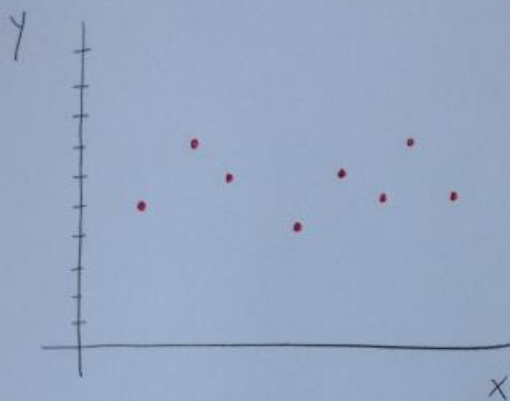
REGRESIÓN LOGÍSTICA



REGRESIÓN DE POISSON



$$y = e^{ax+b}$$



$$y = e^{ax+b}$$

$$a = 0,008$$

$$b = 1,7$$

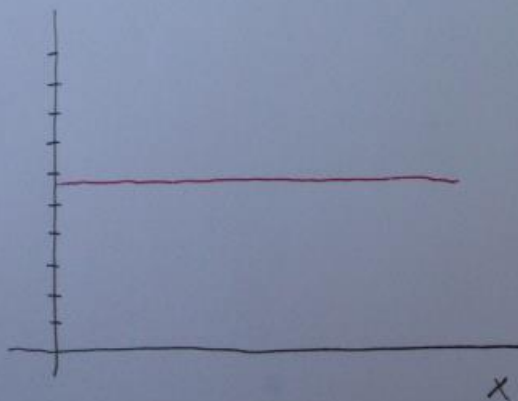
$$H_0: a = 0$$

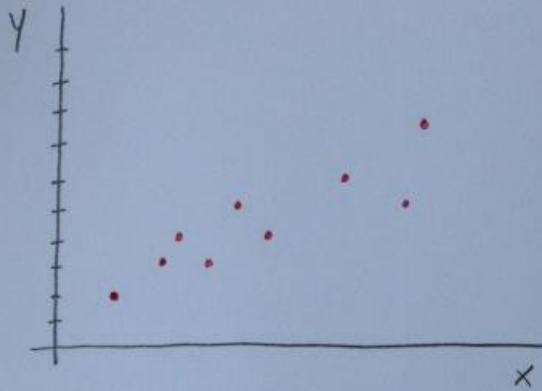
$$H_1: a \neq 0$$

$$p = 0,89$$

Modelo final:

$$y = e^{1,7} = 5,47$$





$$y = e^{ax+b}$$

$$a = 0,15$$

$$b = 0,53$$

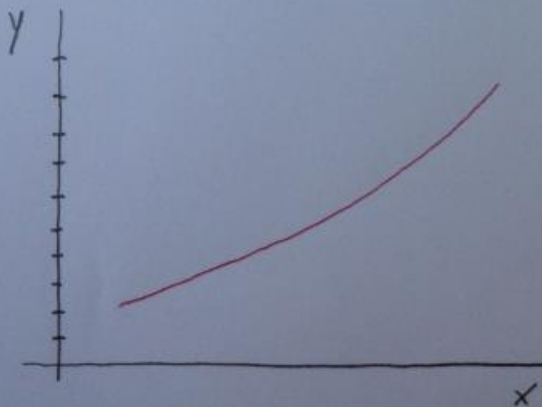
$$H_0: a=0$$

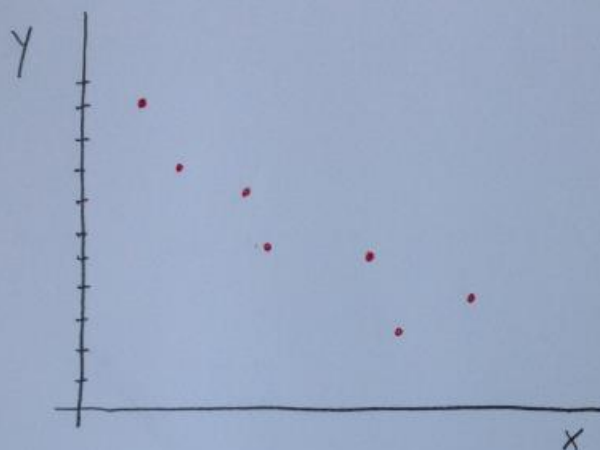
$$H_1: a \neq 0$$

$$p = 0,03$$

Modelo final:

$$y = e^{0,15x + 0,53}$$





$$y = e^{ax+b}$$

$$a = -0,15$$

$$b = 2,18$$

$$H_0: a = 0$$

$$H_1: a \neq 0$$

$$p = 0,02$$

Modelo final:

$$y = e^{-0,15x + 2,18}$$

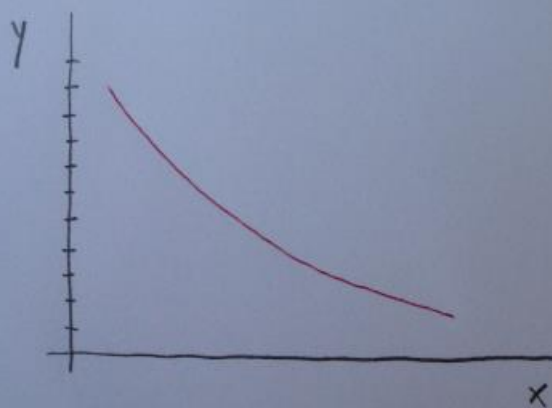


TABLE 3 | Parameters estimates for the final zero-inflated Poisson generalized linear model for the association between traits of reef fishes, location, and number of debris ingested as the response variable.

Variable	Estimate	SE	z-Value	p
Count process (Poisson distribution)				
Intercept	-5.555	2.315	-2.40	0.016
log body length	0.886	0.407	2.172	0.029
Food acquisition mode (scraper)	1.368	0.183	7.440	<0.001
Location (Arraial do Cabo)	1.189	0.188	6.316	<0.001
Location (Natal)	-0.453	0.310	-1.458	0.144
Binary process (Bernoulli distribution)				
Intercept	0.062	0.360	0.175	0.861
Location (Arraial do Cabo)	-2.427	0.651	-3.726	<0.001
Location (Natal)	-0.254	0.651	-0.390	0.696

Showing coefficient estimates of explanatory variables, standard error (SE), test statistic (z-value), and the p-value (p). Coefficient in bold indicates that p-value is significant at $p < 0.05$ level. Reference levels for this regression were set as "browser" for food acquisition mode and as "Abrolhos" for location.

TABLE 4 | Parameters estimates for the final zero-inflated Poisson generalized linear model for the association between different herbivorous reef fishes, location, and number of debris ingested as the response variable.

Variable	Estimate	SE	z-Value	p
Count process (Poisson distribution)				
Intercept	-1.923	2.172	-0.885	0.376
log body length	0.362	0.391	0.929	0.353
Species (<i>Kyphosus vaigiensis</i>)	-0.798	0.204	-3.903	<0.001
Species (<i>Sparisoma axillare</i>)	0.859	0.129	6.685	<0.001
Location (Arraial do Cabo)	1.364	0.187	7.301	<0.001
Location (Natal)	-0.642	0.309	-2.075	0.038
Binary process (Bernoulli distribution)				
Intercept	-0.191	0.411	-0.465	0.642
Location (Arraial do Cabo)	-2.258	0.727	-3.105	0.002
Location (Natal)	-0.930	1.093	-0.851	0.395

Showing coefficient estimates of explanatory variables, standard error (SE), test statistic (z-value), and the p-value (p). Coefficient in bold indicates that p-value is significant at $p < 0.05$ level. Reference levels for this regression were set as "*Acanthurus chirurgus*" for species and as "Abrolhos" for location.

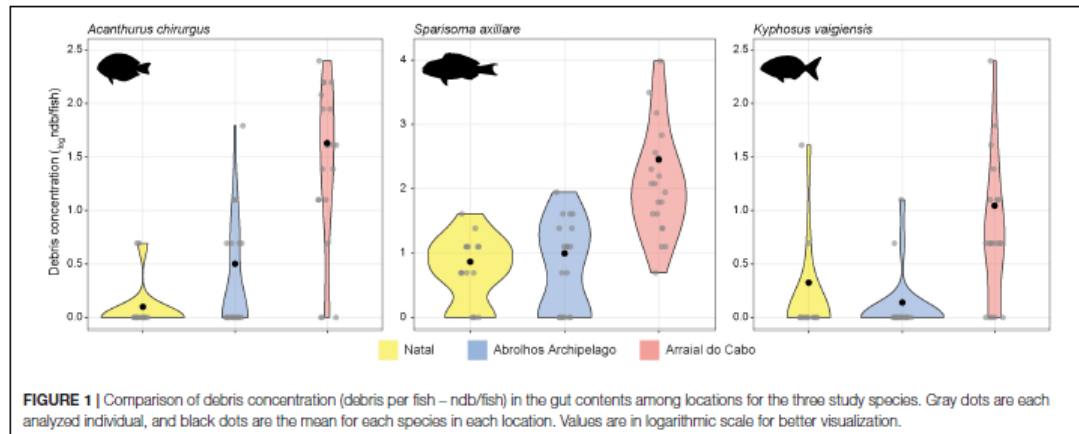


FIGURE 1 | Comparison of debris concentration (debris per fish - ndb/fish) in the gut contents among locations for the three study species. Gray dots are each analyzed individual, and black dots are the mean for each species in each location. Values are in logarithmic scale for better visualization.

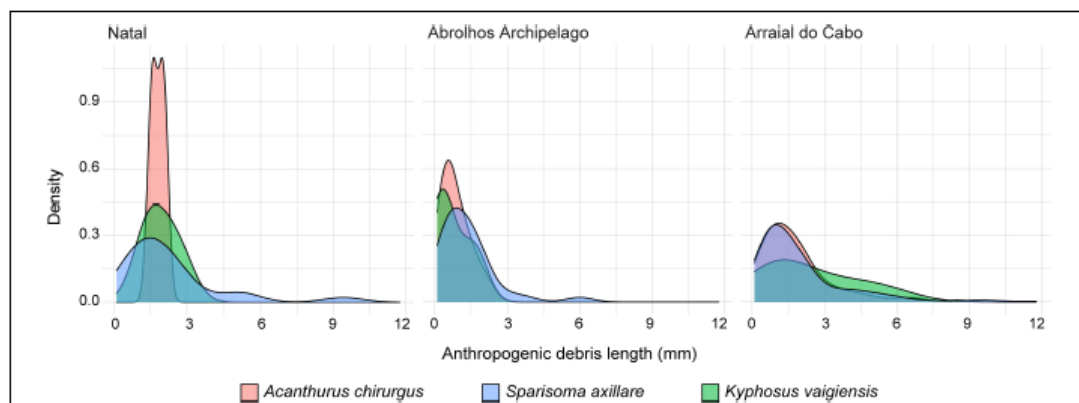
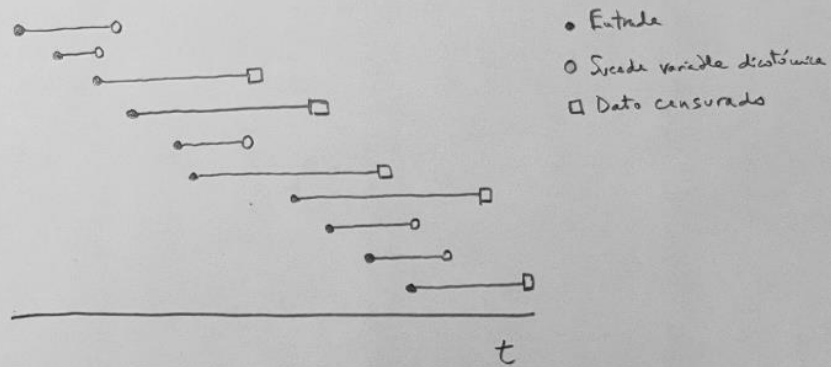


FIGURE 2 | Density plot of the length of the anthropogenic debris found in the species' gut contents sampled at each location.

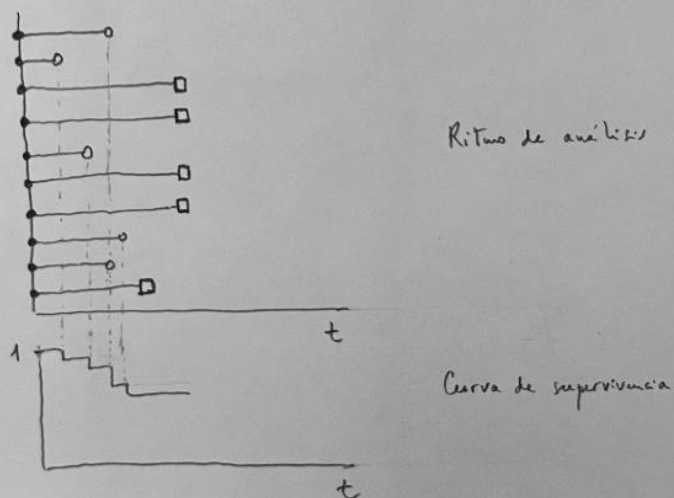
Curvas de supervivencia

Elementos fundamentales en una Curva de supervivencia:

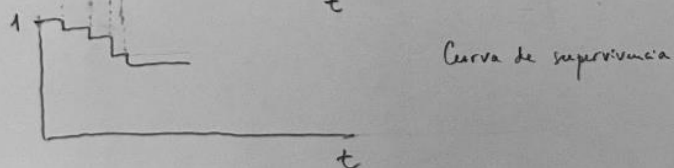
- 1) Variable dicotómica
- 2) Tiempo
- 3) Seguimiento (Monitorización)



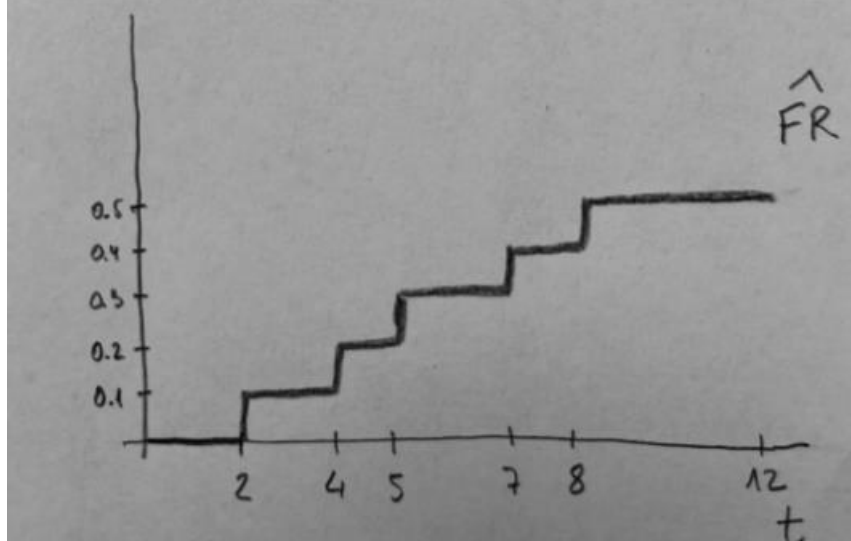
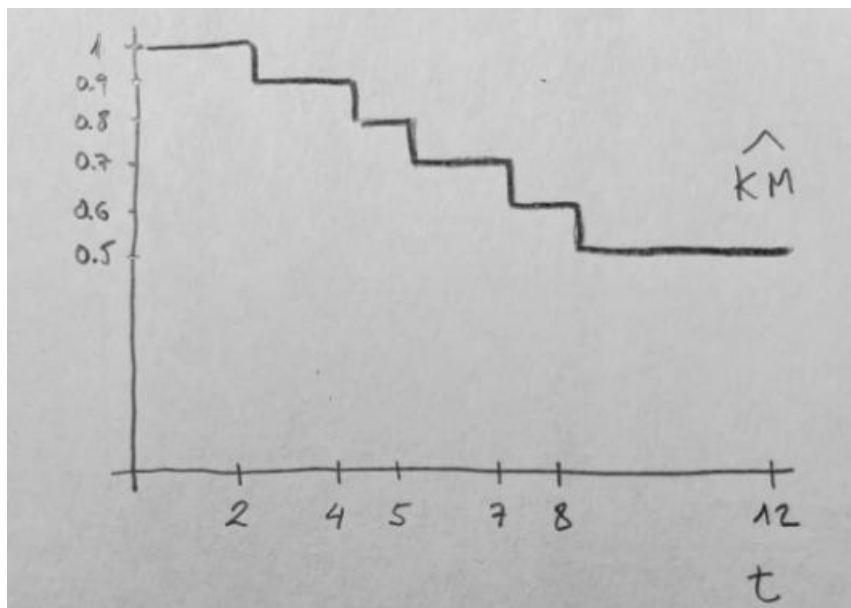
Ritmo real del estudio



Ritmo de análisis



Curva de supervivencia



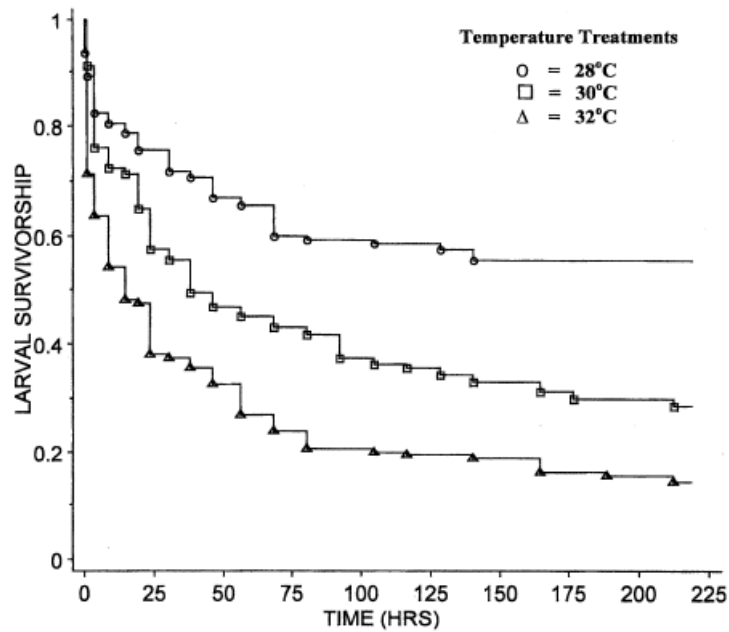


Fig. 3 *Diploria strigosa*. Survivorship in larvae under conditions of three experimental seawater temperatures (28°C, 30°C, and 32°C) through time. Step-wise curves calculated and generated using Kaplan-Meier product-limit analysis (see Parmer and Machin 1995; also see Fernandez-Pato et al. 1992 for explanation). Data pooled over ammonium-enriched treatments and shown as a function of time after exposure. Significant difference between temperature treatments (Breslow-Gahan-Wilcoxon rank test, $P < 0.001$)

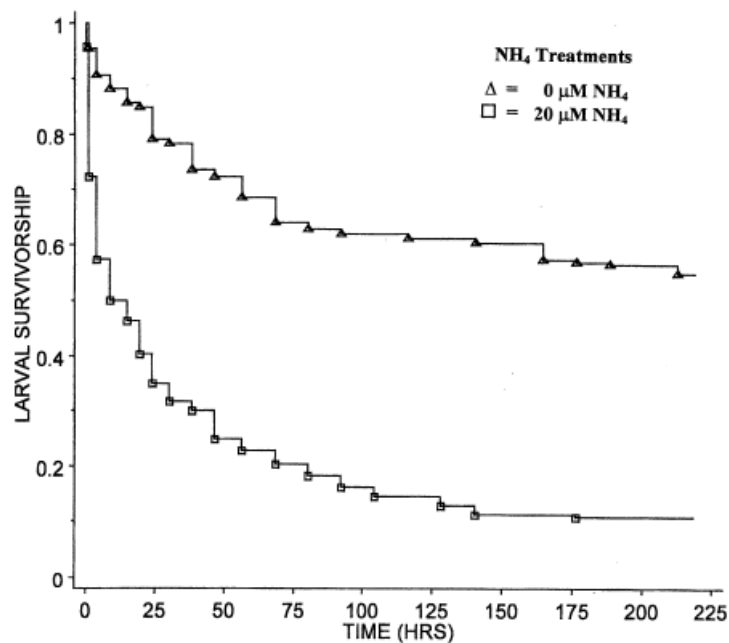
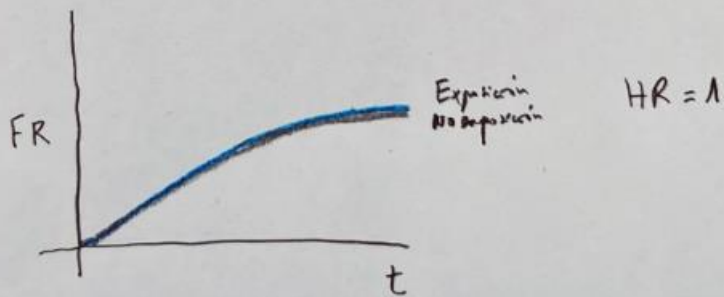
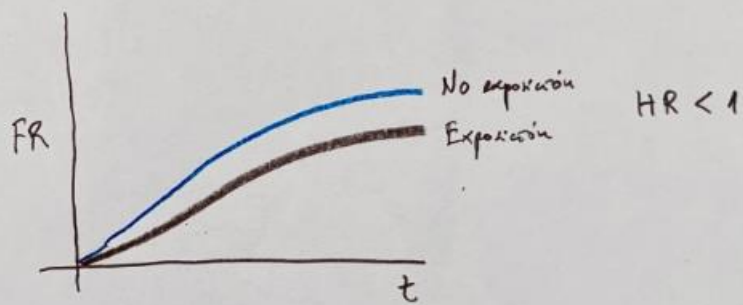
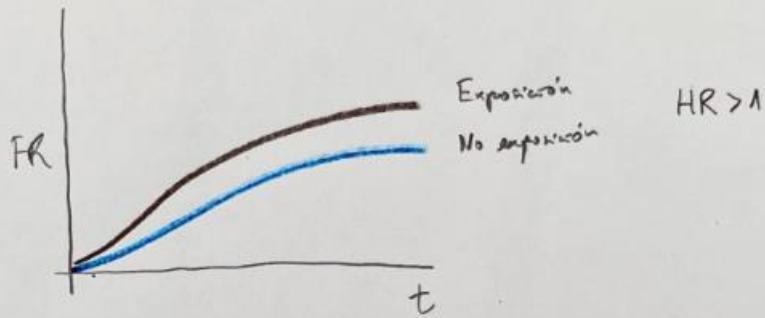


Fig. 4 *Diploria strigosa*. Survivorship in larvae under control and ammonium-enriched conditions. Curves calculated and generated using Kaplan-Meier product-limit analysis (see Parmer and Machin 1995; also see Fernandez-Pato et al. 1992 for explanation). Data pooled over temperatures and shown as a function of time after exposure. Significant difference between nutrient treatment and control (Breslow-Gahan-Wilcoxon rank test, $P < 0.001$)

Regresión de Cox



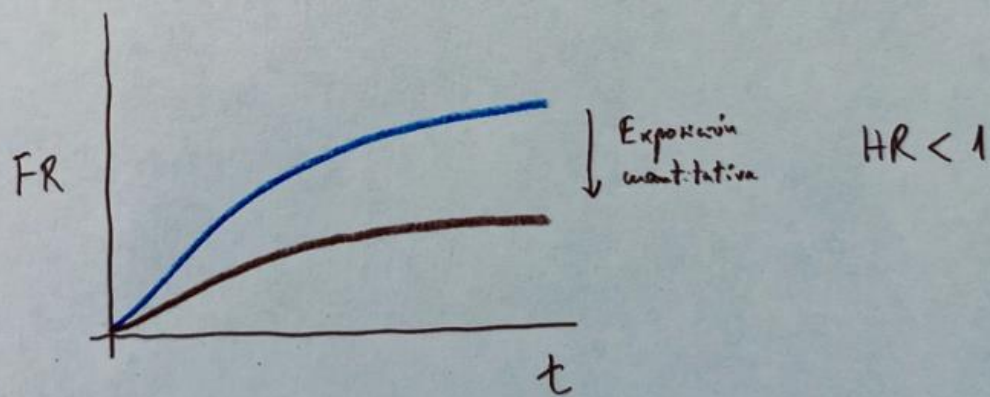
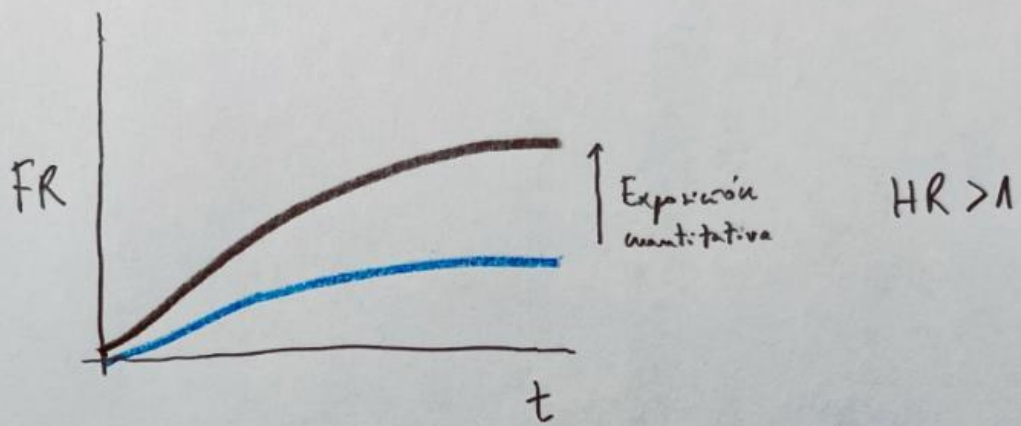


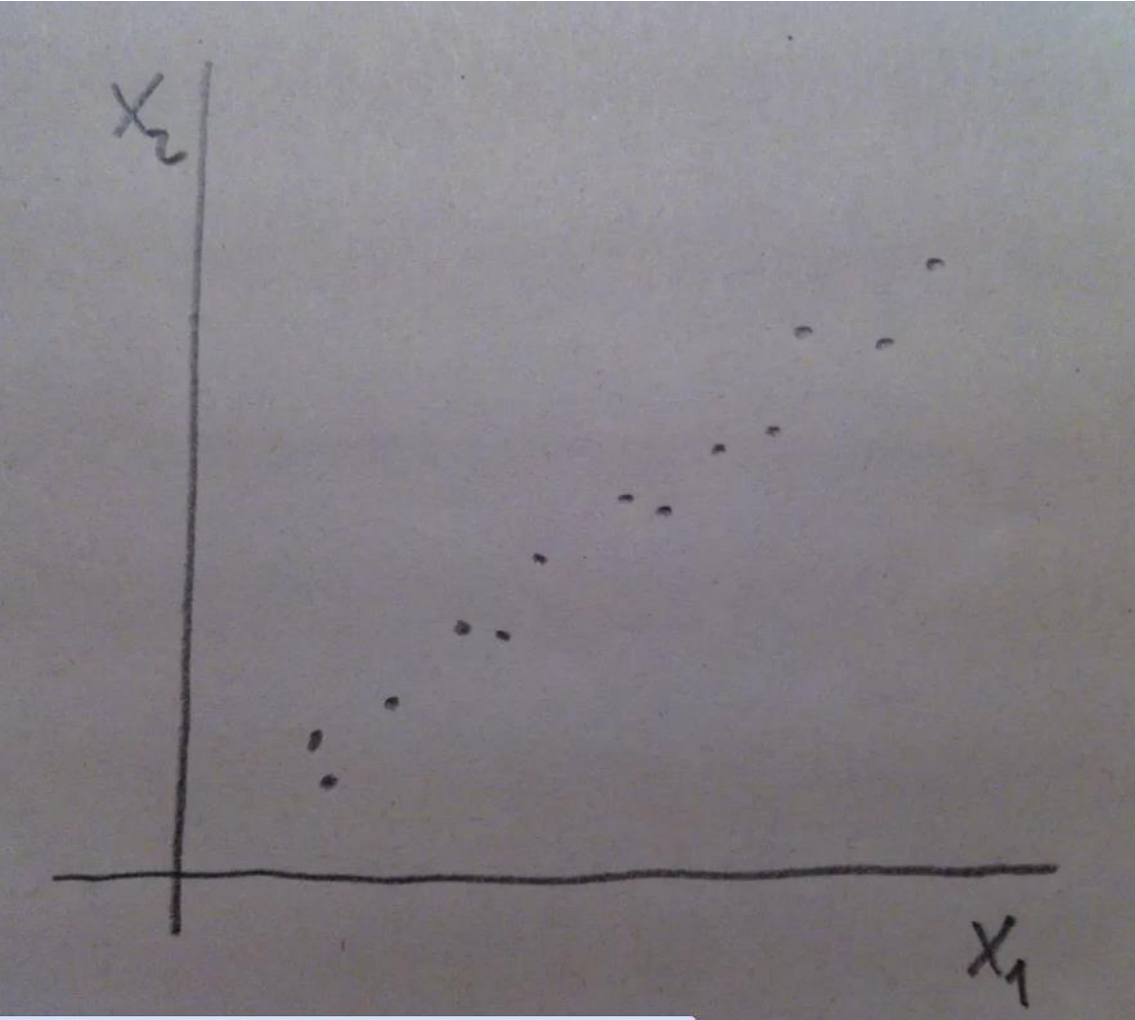
Table 4

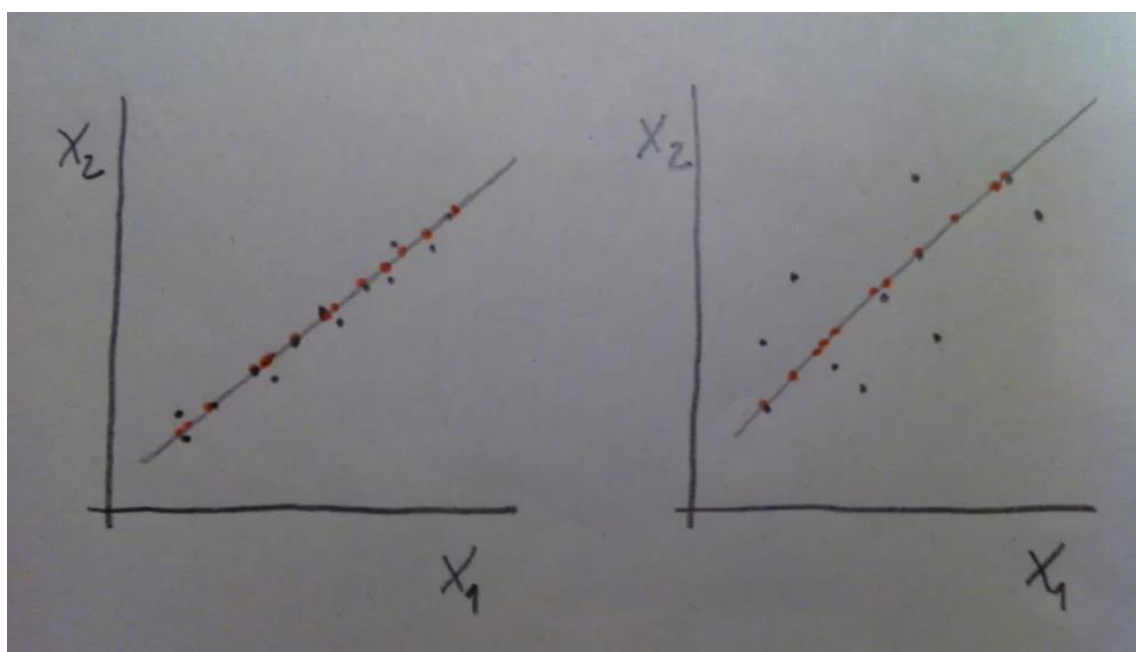
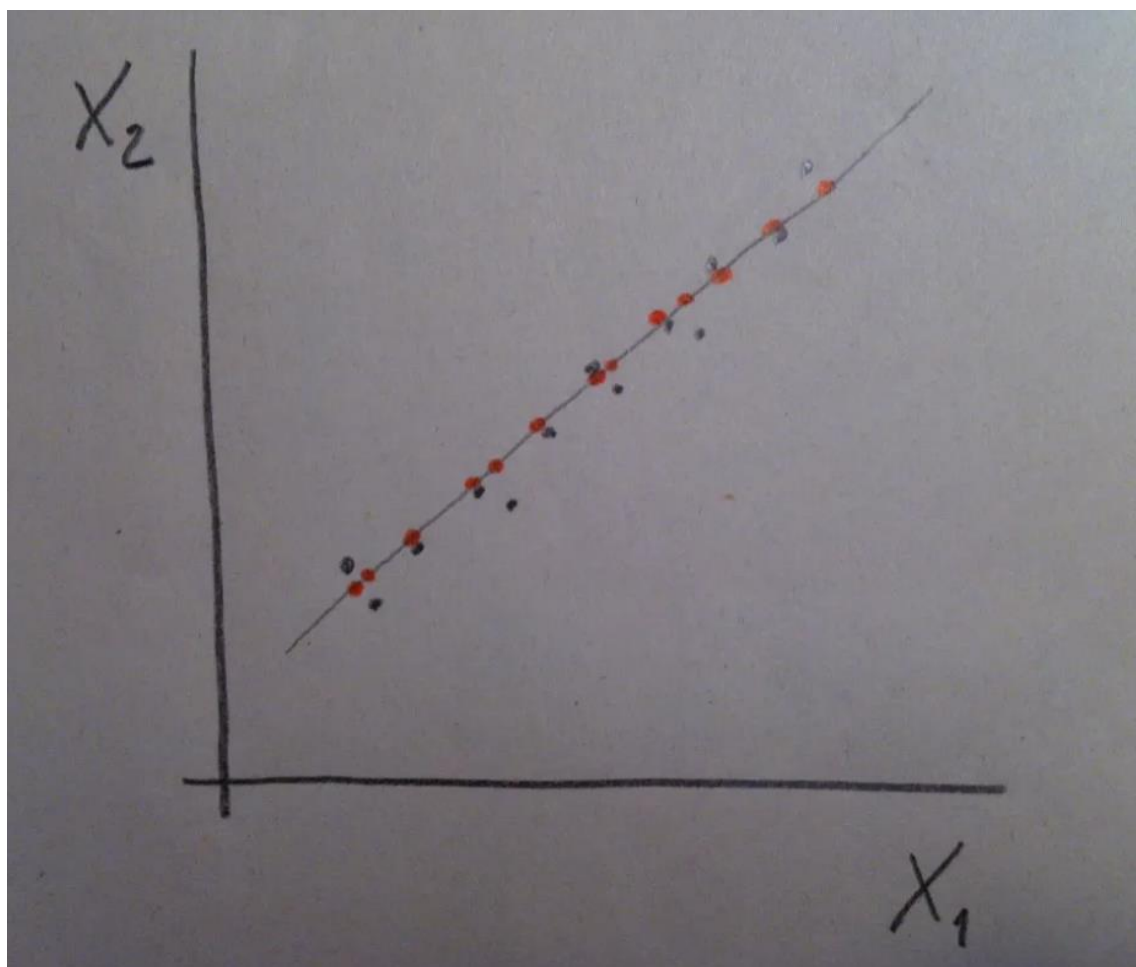
Predictor variables in Cox regression analysis and calculated hazard ratios of the odds of reaching health-ratings of interest (≤ 3) for the Bulk-oil and WAF-oil exposure series. Significant differences based on Wald test statistics; Low concentration is not present because values are constant or linearly dependent. Hazard ratios were calculated relative to the control water treatment, 0 mg/L concentration and the species *C. delta*, respectively. Significant *p*-values ($p < 0.05$) in bold.

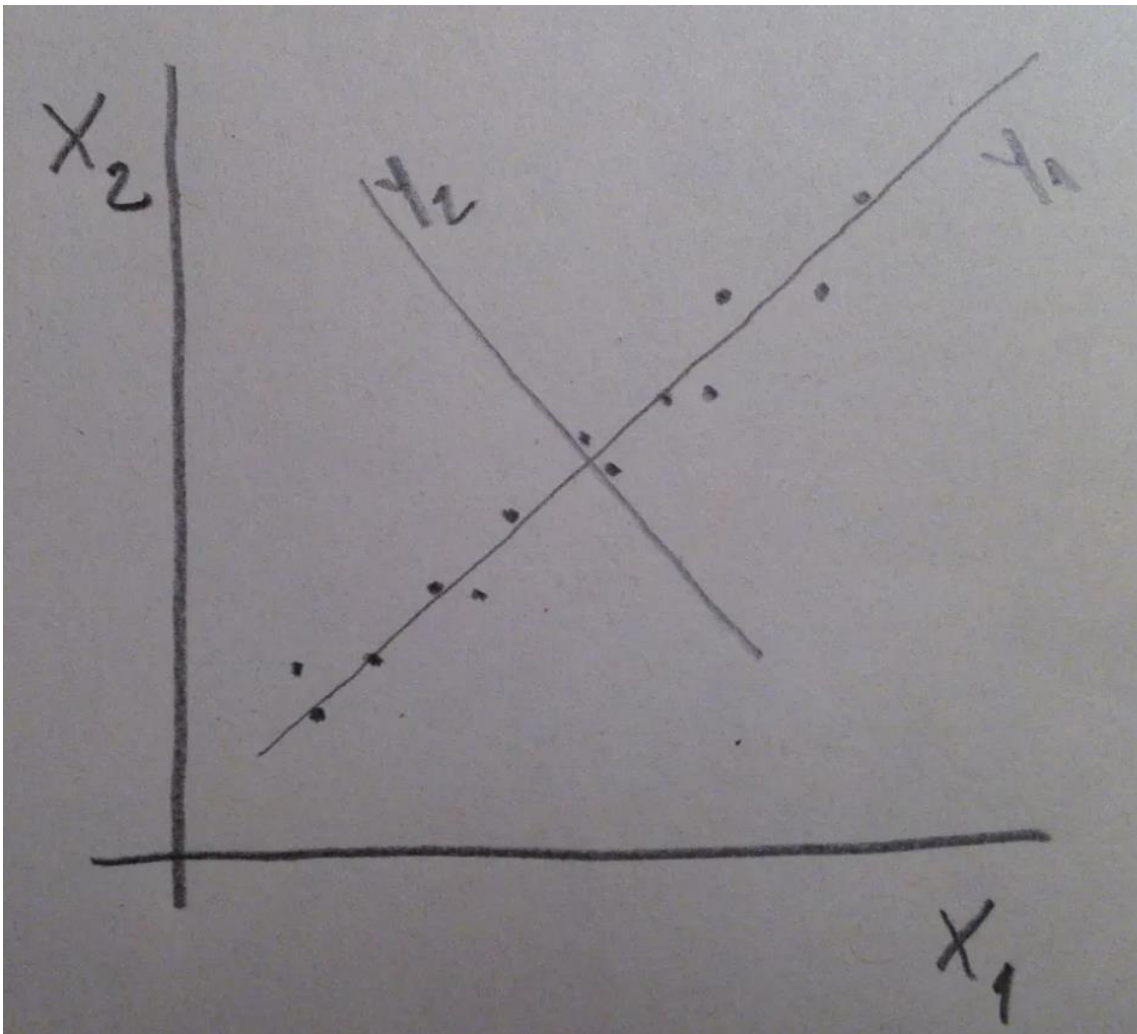
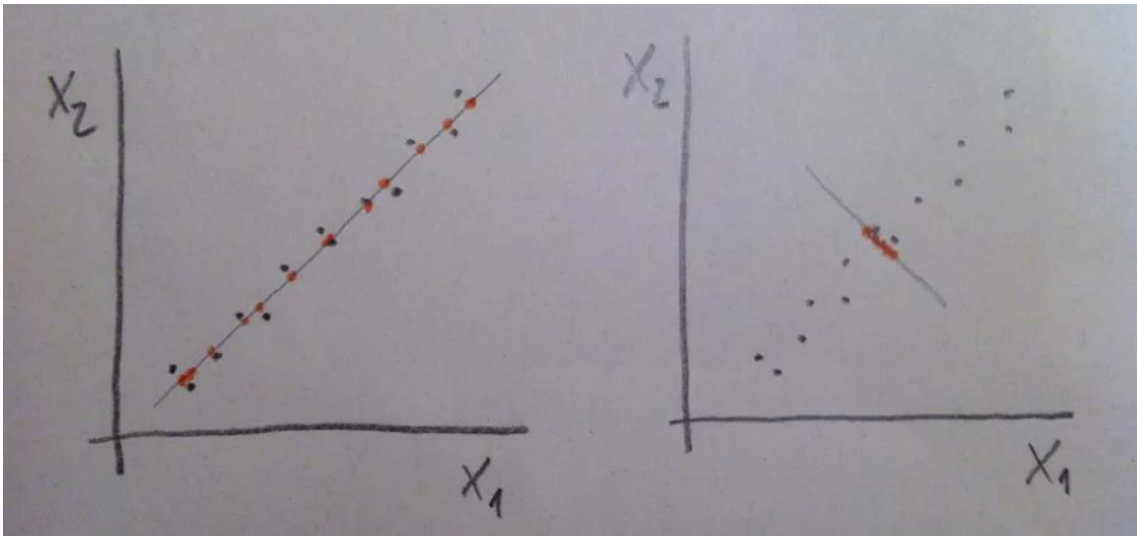
Variable	Cox regression variables					
	Level	Wald	df	<i>p</i>	Hazard ratio	Standard error
Bulk-oil						
Treatment	Treatment	14.908	3	0.002	–	–
	Bulk-oil	0.011	1	0.918	0.963	0.355
	Dispersant	7.067	1	0.008	2.322	0.317
	Oil/disp.	0.123	1	0.725	1.133	0.367
Concentration	Concentration	19.279	2	< 0.001	–	–
	Medium conc.	0.272	1	0.602	0.833	0.350
	High conc.	10.795	1	0.001	2.500	0.279
Species	Species	0.745	2	0.689	–	–
	<i>Paramuricea</i> B3	0.013	1	0.908	1.027	0.231
	<i>L. glaberrima</i>	0.645	1	0.422	1.212	0.239
WAF-oil						
Treatment	Treatment	95.263	3	< 0.001	–	–
	WAF-oil	0.026	1	0.872	0.957	0.276
	Dispersant	27.407	1	< 0.001	3.404	0.234
	Oil/disp.	41.745	1	< 0.001	4.417	0.230
Concentration	Concentration	10.977	2	0.004	–	–
	Medium conc.	3.912	1	0.048	1.342	0.149
	High conc.	10.977	1	0.001	1.608	0.143
Species	Species	15.701	2	< 0.001	–	–
	<i>Paramuricea</i> B3	1.807	1	0.179	0.817	0.137
	<i>L. glaberrima</i>	4.617	1	0.032	1.342	0.151

Componentes principales

ALUMNO	LENGUA	MATEMÁTICAS	FÍSICA	INGLÉS	FILOSOFÍA	HISTORIA	QUÍMICA	EDUCACIÓN FÍSICA
1	5	5	5	5	5	5	5	5
2	7	4	3	8	4	7	3	8
3	5	8	7	6	5	6	7	5
4	7	2	4	8	7	7	3	6
5	8	9	10	8	8	7	9	4
6	4	9	8	4	3	4	7	5
7	6	4	4	6	5	5	3	7
8	4	7	8	3	3	2	8	3
9	5	5	4	5	6	5	5	1
10	7	4	5	7	8	8	4	6
11	7	8	8	7	7	6	7	9
12	4	3	3	4	3	2	1	4
13	7	4	4	7	8	7	4	5
14	3	5	5	2	3	3	5	7
15	5	6	6	5	5	5	6	6







$$Y_1 = a_{11}X_1 + a_{12}X_2$$

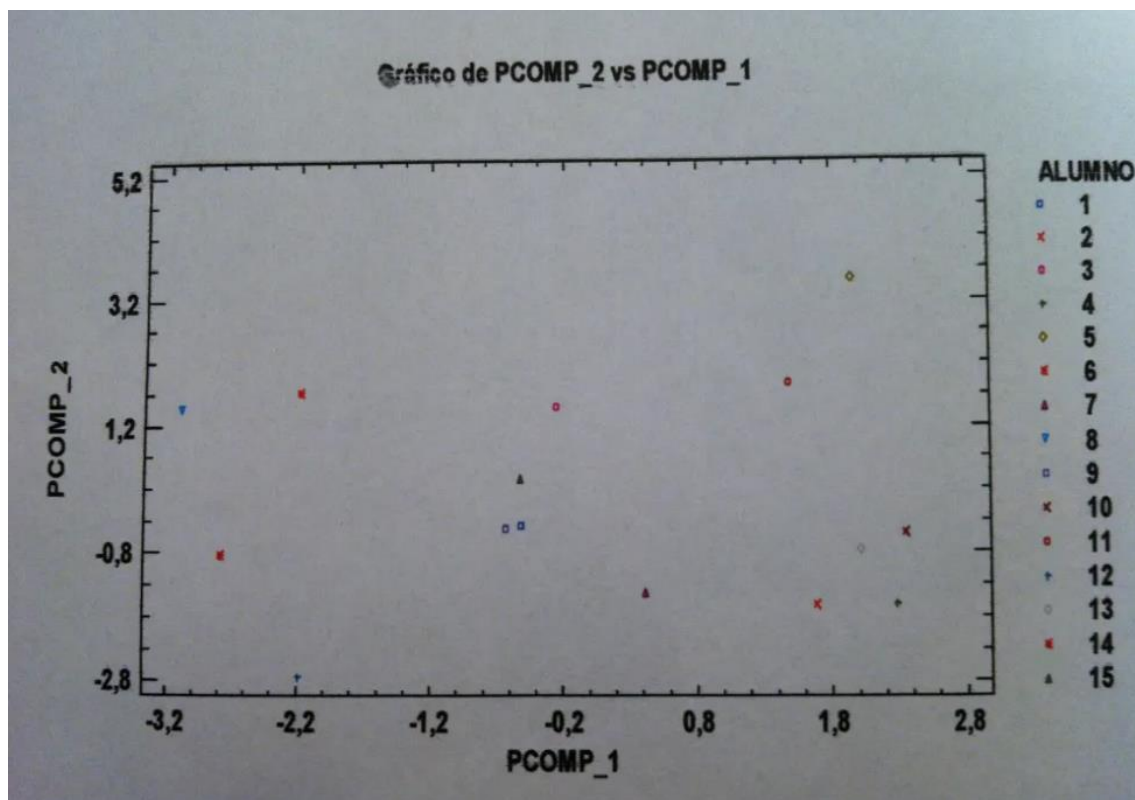
$$Y_2 = a_{21}X_1 + a_{22}X_2$$

$$Y_1 = a_{11}X_1 + a_{12}X_2 + \dots + a_{1d}X_d$$

$$Y_2 = a_{21}X_1 + a_{22}X_2 + \dots + a_{2d}X_d$$

$\vdots$

$$Y_d = a_{d1}X_1 + a_{d2}X_2 + \dots + a_{dd}X_d$$



Análisis de Componentes Principales

<i>Componente</i>		<i>Porcentaje de</i>	<i>Porcentaje</i>
<i>Número</i>	<i>Valor propio</i>	<i>Varianza</i>	<i>Acumulado</i>
1	3,71043	46,380	46,380
2	2,86078	35,760	82,140
3	0,953481	11,919	94,059
4	0,215574	2,695	96,753
5	0,151316	1,891	98,645
6	0,0628091	0,785	99,430
7	0,0317443	0,397	99,827
8	0,0138659	0,173	100,000

Tabla de Pesos de los Componentes

	<i>Componente</i>	<i>Componente</i>
	1	2
LENGUA	0,500113	0,0853043
MATEMATICAS	-0,112909	0,555049
FÍSICA	-0,0517681	0,574789
INGLÉS	0,498752	0,036556
FILOSOFÍA	0,450292	0,121881
HISTORIA	0,49264	0,0635768
QUIMICA	-0,0726488	0,573763
EDUCACIÓN FÍSICA	0,187002	-0,0694516

Tabla de Pesos de los Componentes

	<i>Componente</i>	<i>Componente</i>
	1	2
Temperatura media anual	0,521913	-0,0282158
Precipitaciones	-0,0551489	0,590282
Humedad	0,0470988	0,621072
Velocidad Viento	0,1257	-0,486115
Media temperaturas máximas	0,461348	0,0936507
Media temperaturas mínimas	0,49067	-0,0585732
Altitud	-0,502939	-0,128579

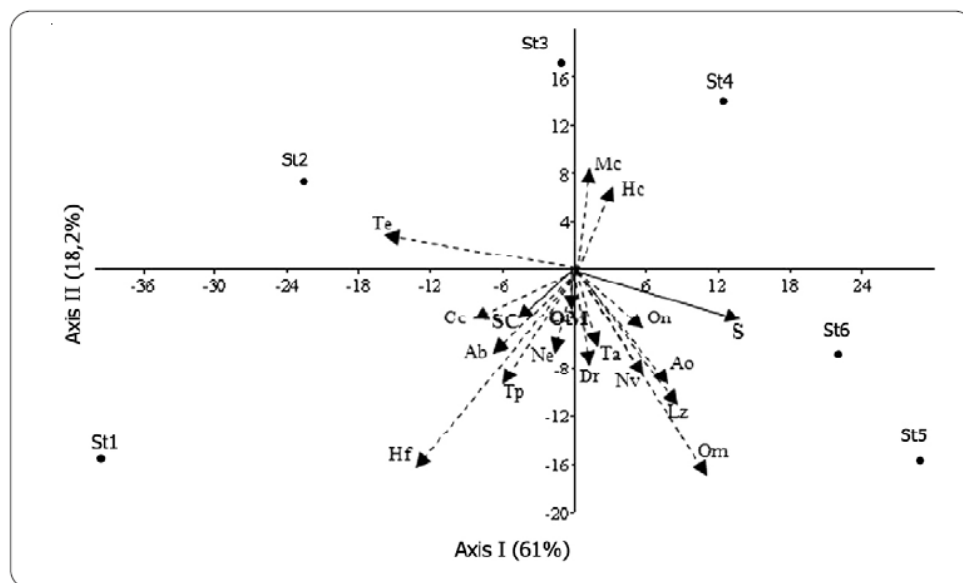


Figure 3. Graphical result of principal components analysis (PCA) with the projection of the vector-variables (abiotic factors and species) and observations (sampling stations: St1-St6) on factorial plans. Abbreviations as in Table 1 / Gráfico del análisis de componentes principales (ACP) con la proyección del vector de las variables (factores abióticos y especies) y las observaciones (estaciones de muestreo: St1-St6) sobre los planos factoriales. Abreviaciones como en la Tabla 1

Table 4

The results of a PCA carried out on a dataset where metal concentrations are corrected for the influence of grain size using normalisation to Al.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Variance explained	51%	12%	11%	6%	5%
Ba/Al	0.784	0.553			
Ca/Al	0.950				
Fe/Al	0.895				
K/Al	0.909				
Li/Al			0.565	0.428	
Mg/Al	0.909				
Mn/Al	0.715				
Na/Al	0.726				
Ti/Al	0.984				
Co/Al	0.917				
Cr/Al	0.774	0.438			
Cu/Al		0.789			
La/Al	0.978				
Ni/Al	0.887				
P/Al	0.494		-0.587		
Pb/Al		0.903			
V/Al	0.926				
Zn/Al		0.918			
pH					0.862
<63 μm	-0.928				
Sulphate			0.889		
OC	-0.895				
Carbonate				0.902	
Cl			0.826		
CEC	-0.841				
CRS	-0.650				

Comparación de medias, medianas y proporciones

1. Una población respecto a un valor de referencia

a. Variables cuantitativas

- r. Normalidad Test t de Student de una población
- s. No normalidad Test de los signos/Test de Wilcoxon

b. Variables cualitativas

- r. Dos valores Test de una proporción/Test Ji-cuadrado
- q. Más de dos valores Test Ji-cuadrado

2. Dos poblaciones

a. Variables cuantitativas

p. Muestras independientes

- r. Normalidad
 - x. Varianzas iguales Test t de Student de varianzas iguales
 - y. Varianzas distintas Test t de Student de varianzas distintas
- s. No normalidad Test de Mann-Whitney

q. Muestras relacionadas

- r. Normalidad Test t de Student de datos apareados
- s. No normalidad Test de los signos/Test de Wilcoxon

b. Variables cualitativas

p. Muestras independientes

- r. $n \geq 30$ y esperado ≥ 5 Test de proporciones/Test Ji-cuadrado
- s. $n < 30$ ó esperado < 5 Test exacto de Fisher

q. Muestras relacionadas

Test de McNemar

3. Más de dos poblaciones

a. Variables cuantitativas

p. Muestras independientes

- r. Normalidad ANOVA
- s. No normalidad Test de Kruskal-Wallis

q. Muestras relacionadas

- r. Normalidad ANOVA de medidas repetidas
- s. No normalidad Test de Friedman

b. Variables cualitativas

p. Muestras independientes

Test Ji-cuadrado

q. Muestras relacionadas

Test de la Q de Cochran

Comparación de una población

$$H_0: \mu = \mu_0$$

$$H_1: \mu \neq \mu_0$$

$$T = \frac{\bar{X}_n - \mu_0}{\frac{S_n}{\sqrt{n}}} \underset{H_0}{=} t_{n-1}$$

$$\left(\bar{X}_n - t_{\frac{\alpha}{2}} \frac{S_n}{\sqrt{n}}, \bar{X}_n + t_{\frac{\alpha}{2}} \frac{S_n}{\sqrt{n}} \right)$$

$$H_0: \mu = 13$$

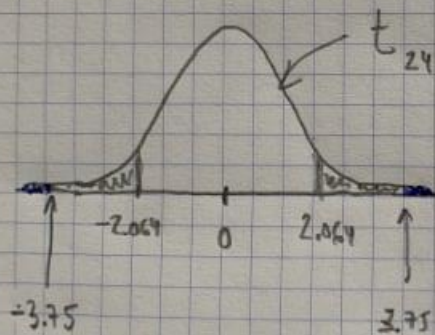
$$H_1: \mu \neq 13$$

$$n = 25$$

$$\bar{X}_n = 12.25$$

$$S_n = 1$$

$$T = \frac{12.25 - 13}{\frac{1}{\sqrt{25}}} = \frac{-0.75}{0.2} = -3.75$$



$$p\text{-value} = 0.001$$

$$\text{IC } 95\%: \left(12.25 - 2.064 \frac{1}{\sqrt{25}}, 12.25 + 2.064 \frac{1}{\sqrt{25}} \right)$$

$$(11.83, 12.66)$$

$$H_0: p = p_0$$

$$H_1: p \neq p_0$$

$$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} \stackrel[n_0 > 5]{n \geq 30} \underset{H_0}{=} N(0,1)$$

$$\left(\hat{p} - z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}, \hat{p} + z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \right)$$

$$H_0: p = 0.1$$

$$H_1: p \neq 0.1$$

$$n = 100$$

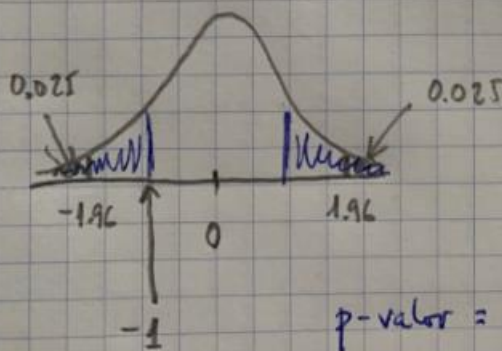
$$7/93 \rightarrow \hat{p} = 0.07$$

$$\left(0.07 - 1.96 \sqrt{\frac{0.07 \cdot 0.93}{100}}, 0.07 + 1.96 \sqrt{\frac{0.07 \cdot 0.93}{100}} \right)$$

$$(0.07 - 0.05, 0.07 + 0.05)$$

$$(0.02, 0.12)$$

$$Z = \frac{0.07 - 0.1}{\sqrt{\frac{0.1 \cdot 0.9}{100}}} = -1$$



$$H_0 = \text{Mediana} = m_0$$

$$H_1 = \text{Mediana} \neq m_0$$

$$(X_1 - m_0, \dots, X_n - m_0)$$

Se ponen en rangos según el valor absoluto.

$$T = \min_{H_0} (T_+, T_-) \stackrel{n > 25}{\equiv} N \left(\frac{n(n+1)}{4}, \sqrt{\frac{n(n+1)(2n+1)}{24}} \right)$$

T_+ = Suma de los rangos con restos positivos.

T_- = Suma de los rangos con restos negativos.

$$H_0: \text{Median} = 0$$

$$H_1: \text{Median} \neq 0$$

$$(5, 1, -2, 3, 7, -3, 4, 6, 8, 12)$$

$$(6, 1, 2, 3.5, 8, 3.5, 5, 7, 9, 10)$$

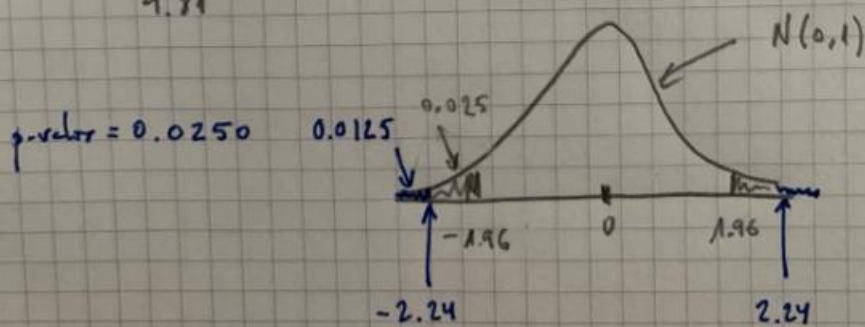
$$T_- = 5.5$$

$$T_+ = 49.5$$

$$T = \min(5.5, 49.5) = 5.5$$

$$T \stackrel{H_0}{\equiv} N\left(\frac{10 \cdot 11}{4}, \sqrt{\frac{10 \cdot 11 \cdot 21}{24}}\right) = N(27.5, 9.81)$$

$$Z = \frac{5.5 - 27.5}{9.81} = -2.24$$



Comparación de dos poblaciones

$$H_0: \mu_1 = \mu_2$$

$$H_1: \mu_1 \neq \mu_2$$

$$T = \frac{\bar{X}_1 - \bar{X}_2}{S_T \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \stackrel{H_0}{=} t_{n-2}$$

$$S_T^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2}$$

$$\left((\bar{X}_1 - \bar{X}_2) - t_{\frac{\alpha}{2}} S_T \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}, (\bar{X}_1 - \bar{X}_2) + t_{\frac{\alpha}{2}} S_T \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} \right)$$

$$H_0: \mu_1 = \mu_2$$

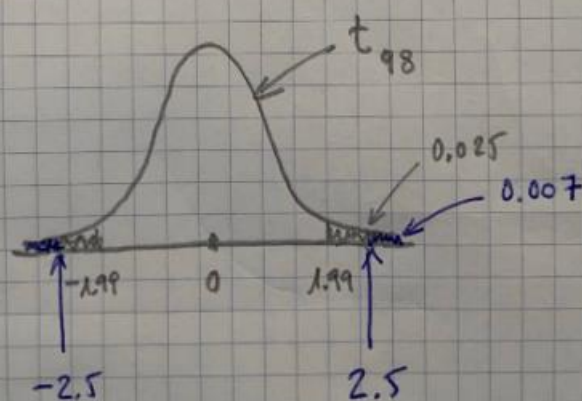
$$H_1: \mu_1 \neq \mu_2$$

$$n_1 = 50 \quad \bar{X}_1 = 14 \quad S_1 = 1$$

$$n_2 = 50 \quad \bar{X}_2 = 13.5 \quad S_2 = 1$$

$$T = \frac{14 - 13.5}{1 \cdot \sqrt{\frac{1}{50} + \frac{1}{50}}} = 2.5$$

$$p\text{-valor} = 0.014$$



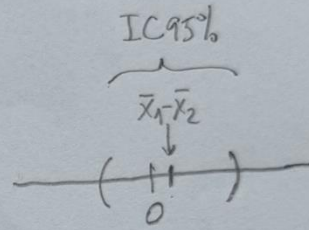
IC 95% de la diferencia de medias: $(\mu_1 - \mu_2) =$

$$\left((14 - 13.5) - 1.99 \cdot 1 \cdot \sqrt{\frac{1}{50} + \frac{1}{50}}, (14 - 13.5) + 1.99 \cdot 1 \cdot \sqrt{\frac{1}{50} + \frac{1}{50}} \right)$$

$$(0.103, 0.897)$$

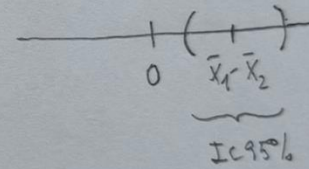
$$H_0: \mu_1 = \mu_2 \quad (\mu_1 - \mu_2 = 0)$$

$$p \geq 0.05$$



$$H_1: \mu_1 \neq \mu_2 \quad (\mu_1 - \mu_2 \neq 0)$$

$$p < 0.05$$



$$H_0: p_1 = p_2$$

$$H_1: p_1 \neq p_2$$

$$Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\frac{\hat{p}(1-\hat{p})}{n_1} + \frac{\hat{p}(1-\hat{p})}{n_2}}} \stackrel{H_0}{\equiv} N(0,1)$$

$n_1, n_2 \geq 30$
 $n_1 \hat{p}_1, n_2 \hat{p}_2 \geq 5$
 $\downarrow$

$$\hat{p} = \frac{n_1 \hat{p}_1 + n_2 \hat{p}_2}{n_1 + n_2}$$

$$\left((\hat{p}_1 - \hat{p}_2) - z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n_1} + \frac{\hat{p}(1-\hat{p})}{n_2}}, (\hat{p}_1 - \hat{p}_2) + z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n_1} + \frac{\hat{p}(1-\hat{p})}{n_2}} \right)$$

$$H_0: p_1 = p_2$$

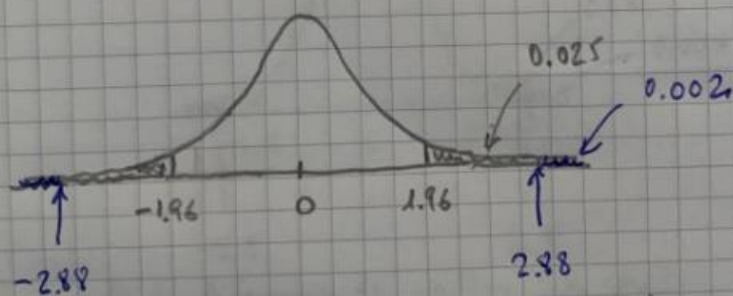
$$H_1: p_1 \neq p_2$$

$$n_1 = 100 \quad \hat{p}_1 = 0.5$$

$$n_2 = 100 \quad \hat{p}_2 = 0.3$$

$$Z = \frac{0.5 - 0.3}{\sqrt{\frac{0.4 \cdot 0.6}{100} + \frac{0.4 \cdot 0.6}{100}}} = 2.88$$

$$p\text{-value} = 0.004$$



IC 95% de la diferencia de proporciones ($p_1 - p_2$):

$$\left((0.5 - 0.3) - 1.96 \sqrt{\frac{0.4 \cdot 0.6}{100} + \frac{0.4 \cdot 0.6}{100}}, (0.5 - 0.3) + 1.96 \sqrt{\frac{0.4 \cdot 0.6}{100} + \frac{0.4 \cdot 0.6}{100}} \right)$$

$$(0.067, 0.333)$$

$(X_1, \dots, X_n)$

$(Y_1, \dots, Y_m)$

$H_0 : \text{Mediana}(X) = \text{Mediana}(Y)$

$H_1 : \text{Mediana}(X) \neq \text{Mediana}(Y)$

$$U = \sum_i \sum_j z_{ij} \stackrel{n, m > 20}{\underset{H_0}{\equiv}} N\left(\frac{nm}{2}, \sqrt{\frac{nm(n+m+1)}{12}}\right)$$

$$z_{ij} = \begin{cases} 1 & \text{si } X_i < Y_j \\ 0 & \text{si } X_i \geq Y_j \end{cases}$$

$$H_0: \text{Mediana (1)} = \text{Mediana (2)}$$

$$H_a: \text{Mediana (1)} \neq \text{Mediana (2)}$$

Muestra 1: (7.3, 8.0, 9.5, 10.8, 11.7, 12.4, 15.1)

Muestra 2: (9.9, 13.6, 16.5, 17.1, 25.2, 40.3, 40.5)

$$U = 44 \equiv N(\mu, \sigma)$$

$$E(U) = \frac{7 \cdot 7}{2} = 24.5 \quad \text{var}(U) = \frac{7 \cdot 7 (7 + 7 + 1)}{12} = 61.25$$

$$Z = \frac{44 - 24.5}{\sqrt{61.25}} = 2.49$$

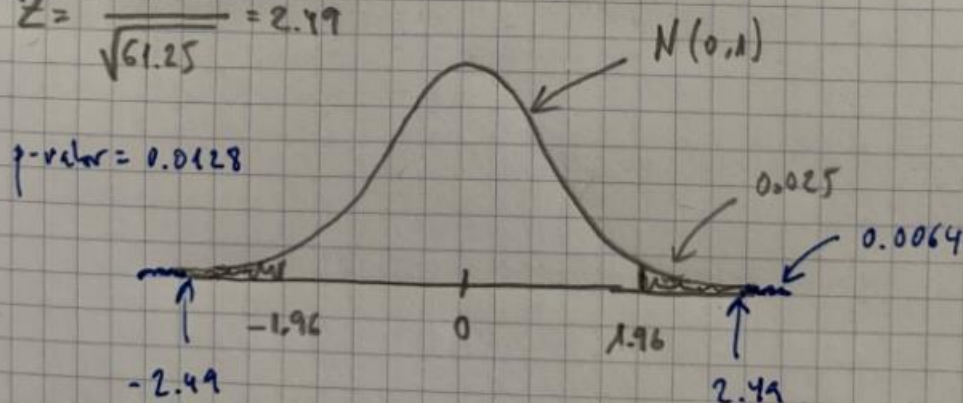


Table 4. Results of Correlation and Paired Sample T-Test

No.	Pairs	Correlation	Mean Difference	P-value of Paired T-test
1	M_CHL_LNA & M_CHL_NOR	0.92	0.058	0.00
2	M_CHL_NOR & M_CHL_ENO	0.92	-0.081	0.00
3	M_CHL_LNA & M_CHL_ENO	0.88	-0.023	0.29
4	M_NFL_LNA & M_NFL_NOR	0.86	0.009	0.00
5	M_NFL_NOR & M_NFL_ENO	0.94	-0.007	0.00
6	M_NFL_LNA & M_NFL_ENO	0.87	0.002	0.32
7	M_POC_LNA & M_POC_NOR	0.89	6.046	0.00
8	M_POC_NOR & M_POC_ENO	0.75	-26.953	0.00
9	M_POC_LNA & M_POC_ENO	0.73	-20.907	0.00
10	M_SST_LNA & M_SST_NOR	0.86	0.632	0.00
11	M_SST_NOR & M_SST_ENO	0.95	0.372	0.00
12	M_SST_LNA & M_SST_ENO	0.77	1.004	0.00

Bold characters indicate pairs with an insignificant mean difference

Table 6

The paired T test between Chlorophyll *a* and selected nutrients.

Paired Samples Statistics (a)					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Chl surface	1.02	21	2.53	0.55
	Nitrate surface	1.87	21	1.52	0.33
Pair 2	Chl surface	1.02	21	2.53	0.55
	Nitrite surface	0.505	21	0.62	0.14
Pair 3	Chl surface	1.02	21	2.53	0.55
	NH3	15.26	21	12.53	2.73

Paired Samples Test (b)									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Chl surface – Nitrate surface	−0.86	3.24	0.71	−2.33	0.62	−1.21	20	0.24
Pair 2	Chl surface – Nitrite surface	0.51	2.40	0.52	−0.58	1.61	0.98	20	0.34
Pair 3	Chl surface – NH3	−14.24	13.11	2.86	−20.21	−8.28	−4.98	20	0.00

Table 7

The independent T test was conducted between Chlorophyll *a* and salinity.

Group Statistics (a)										
Chlorophyll		1.0	21			1.01		2.53	0.55	
		2.0	21			28.67		4.64	1.01	
Independent Samples Test (b)										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Chlorophyll	Equal variances assumed	27.32	0.00	-23.96	40	0.00	-27.66	1.15	-29.99	-25.33
	Equal variances not assumed			-23.96	30.92	0.00	-27.66	1.15	-30.02	-25.30

Table 8

The independent T test between Chlorophyll *a* and SST.

Group Statistics (a)										
Parameter	Cholorophyll	21		1.02		2.53		0.55		
	SST	21		28.84		1.52		0.33		
Independent Samples Test (b)										
		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Parameter	Equal variances assumed	0.17	0.68	-43.14	40	0.00	-27.83	0.65	-29.12	-26.52
	Equal variances not assumed			-43.14	32.83	0.00	-27.83	0.65	-29.13	-26.51

Table 4

Comparison of the abundance (ind meal⁻¹) of the food items found in chick meals as well as meals biomass (mg meal⁻¹) and energy (kJ meal⁻¹) from Hornsund and Magdalenefjorden colonies. Q₁–Q₃ – first and third quartile. Statistically significant ($p < 0.050$) U-test values in bold.

	Hornsund colony n = 29			Magdalenefjorden colony n = 29			Intercolony difference Mann-Whitney U-test	
	Median	Q ₁ –Q ₃	Min–Max	Median	Q ₁ –Q ₃	Min–Max	Z	p
Total abundance (ind meal ⁻¹)	1724	1325–2313	943–2794	1346	1129–1688	816–3135	2.20	0.028
<i>C. finmarchicus</i> AF	4	0–16	0–64	15	8–30	0–70	–2.36	0.018
<i>C. finmarchicus</i> CV	144	104–224	16–360	180	120–285	45–590	–1.58	0.114
<i>C. glacialis</i> AF	4	0–8	0–128	3	1–11	0–30	–0.20	0.840
<i>C. glacialis</i> CV	1480	1040–1856	336–2576	770	535–1144	75–2450	3.73	0.000
<i>C. glacialis</i> CIV	48	20–128	0–256	20	4–45	0–90	3.08	0.002
<i>C. hyperboreus</i> CV	0	0–1	0–40	40	15–93	0–375	–5.80	0.000
<i>C. hyperboreus</i> CIV	0	0–0	0–16	20	10–50	0–343	–6.12	0.000
<i>Pagurus</i> zoea	32	3–88	0–320	0	0–1	0–2	5.10	0.000
<i>T. abyssorum</i>	6	2–15	0–104	73	34–145	3–2010	–4.84	0.000
Total biomass (mg meal ⁻¹)	992	807–1385	599–1640	809	696–985	417–1750	2.36	0.018
Total energy (kJ meal ⁻¹)	30	24–42	18–51	22	18–27	12–52	3.40	0.001

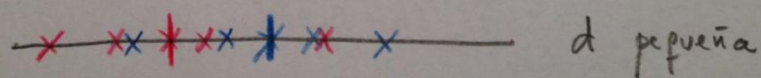
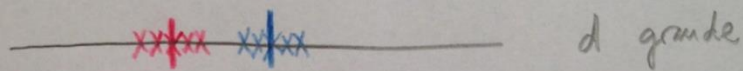
La d de Cohen

$$d = \frac{\bar{X}_1 - \bar{X}_2}{S}$$

$\bar{X}_1$ = Media muestral del grupo 1

$\bar{X}_2$ = Media muestral del grupo 2

S = Desviación estándar muestral promedio de las dos muestras



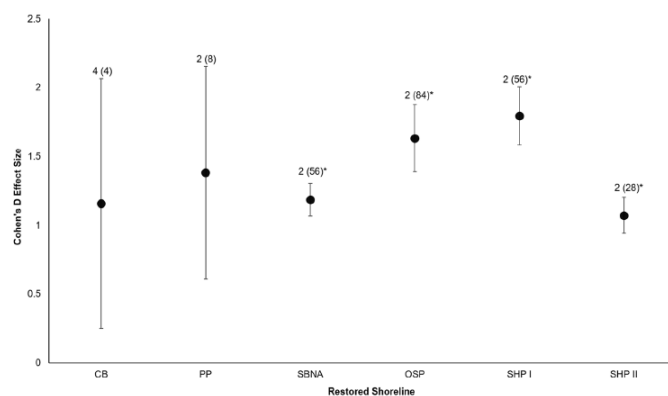
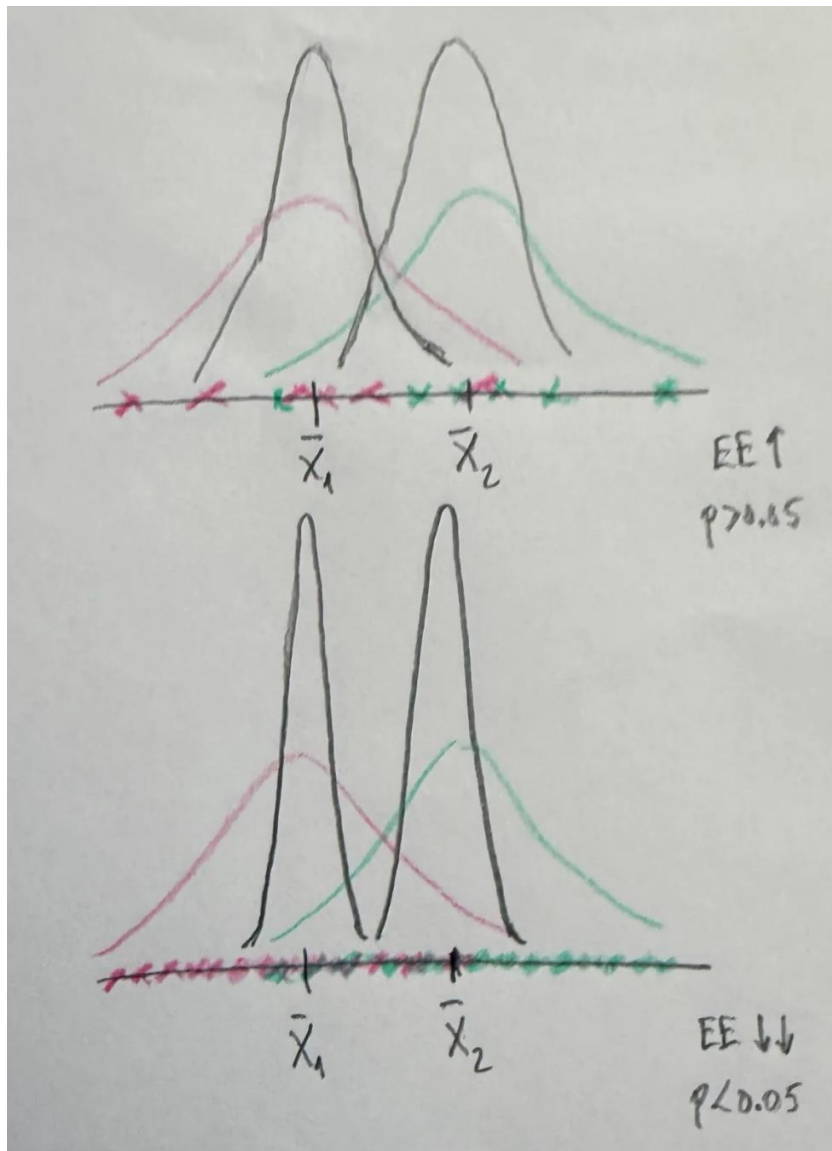


Figure 3 Cohen's *D* Effect Sizes ($\pm$ SE for error bars) across six restored sites of Puget Sound used in the analysis (site acronyms same as in Table 1). Data labels show the number of coastal biota types monitored and the sample sizes (the number of effect sizes for each site). Effect sizes with asterisks were significantly different from zero. Full-size [DOI: 10.7717/peerj.4275/fig-3](https://doi.org/10.7717/peerj.4275/fig-3)

Comparación de más de dos poblaciones

Vamos a hacerlo introduciendo unos conceptos que constituyen la columna vertebral de la in-
mensa urbe ANOVA. Se trata de los siguientes conceptos:

1. Factor
2. Nivel
3. Factor fijo/Factor aleatorio
4. Comparaciones múltiples/Componentes de la varianza
5. Factores cruzados/Factores anidados
6. Interacción entre factores
7. Factor intersujeto/Factor intrasujeto
8. Variable respuesta/Vector respuesta
9. Variable/Covariable
10. Efectos

Alumno	InglésEscrito	InglésOral	Grupo	Nivel	IO1	IO2	IO3	IO4
1	12	11	1	1	14	17	20	23
2	18	14	1	1	17	20	23	26
3	25	18	1	1	23	28	33	38
4	14	7	1	1	12	17	22	27
5	19	10	1	1	14	18	22	26
6	36	30	1	2	37	44	51	55
7	34	26	1	2	32	38	44	48
8	35	27	1	2	27	27	27	27
9	22	22	1	2	30	38	46	54
10	25	19	1	2	21	23	25	27
11	10	7	2	1	12	17	22	27
12	20	16	2	1	24	32	40	48
13	27	22	2	1	25	28	31	34
14	16	12	2	1	17	22	27	32
15	21	15	2	1	16	17	18	19
16	28	21	2	2	21	21	21	21
17	36	27	2	2	29	31	33	35
18	34	30	2	2	32	34	36	38
19	50	44	2	2	46	48	50	52
20	28	24	2	2	34	44	54	64
21	14	7	3	1	18	29	40	47
22	20	11	3	1	18	25	32	39
23	9	7	3	1	11	20	25	30
24	10	9	3	1	20	23	30	37
25	21	19	3	1	34	49	55	58
26	28	25	3	2	44	60	65	73
27	36	32	3	2	39	55	66	78
28	47	39	3	2	44	49	54	80
29	34	30	3	2	46	52	55	84
30	35	29	3	2	40	50	66	75

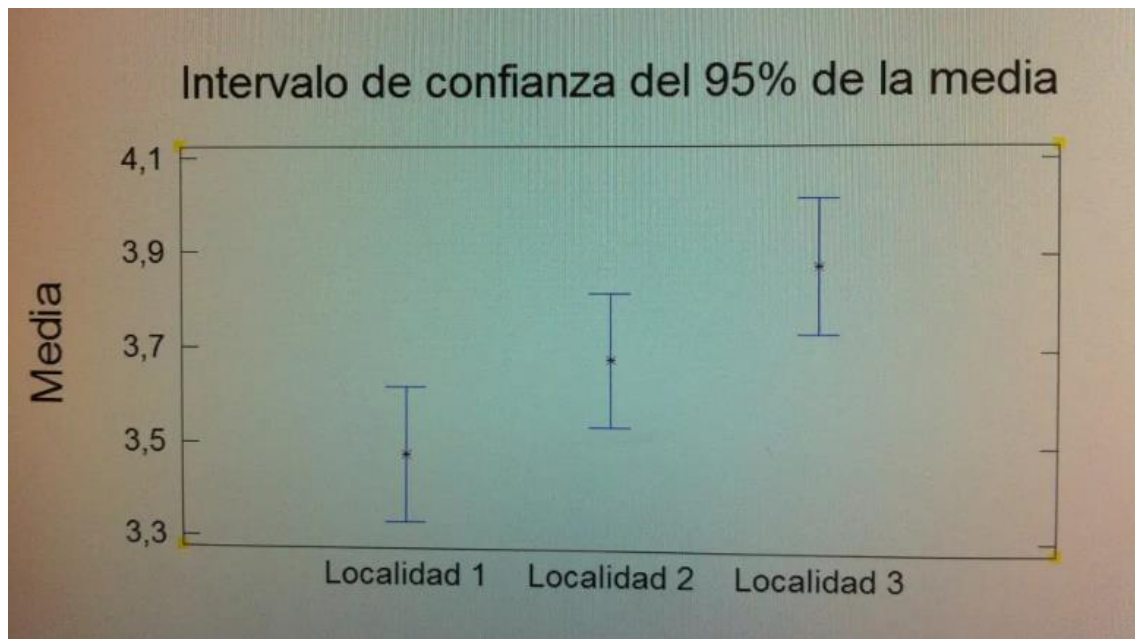
Hay dos factores fijos: Grupo y Nivel. Grupo a tres niveles y Nivel a dos niveles. Los dos factores son fijos y están cruzados. Pero hay un tercer factor: el factor ESO, con cuatro niveles fijos. La variable estudiada es el nivel de inglés oral. Los factores Grupo y Nivel son intersujetos. El factor ESO es intrasujetos. Las variables InglésEscrito e InglésOral a finales de primaria podría tratarse como covariable.

ANOVA de un factor

Factor localidad

<u>Localidad 1</u>	<u>Localidad 2</u>	<u>Localidad 3</u>
3.7	3.7	3.9
3.2	3.8	3.8
3.6	3.7	4.1
3.4	3.5	3.7

Tabla ANOVA					
Análisis de la Varianza					
Fuente	Sumas de cuad.	Gl	Cuadrado Medio	Cociente-F	P-Valor
Entre grupos	0,32	2	0,16	5,10	0,0331
Intra grupos	0,2825	9	0,0313889		
Total (Corr.)	0,6025	11			



Factor operario

<u>Operario A</u>	<u>Operario B</u>	<u>Operario C</u>
7.5	6.5	7.2
6.4	6.1	7.3
6.2	6.8	7.7
7.2	6.6	7.4

Table 5
The one way ANOVA of Chlorophyll a along estuary, near-shore, offshore.

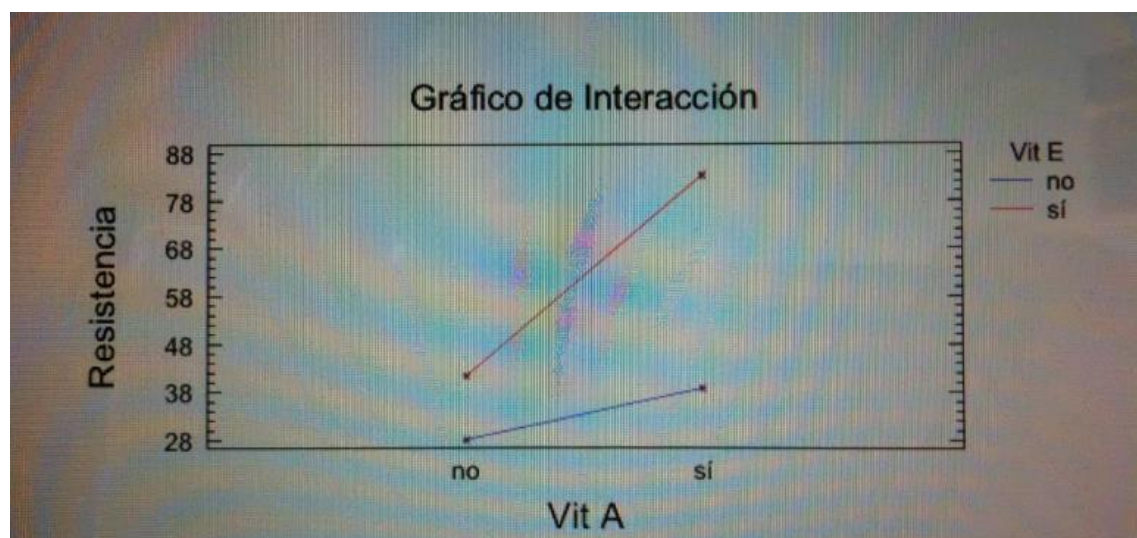
Descriptives (a)									
Chlorophyll _a									
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max	Between-Component Variance
					Lower Bound	Upper Bound			
Estuary	9	2.04	3.72	1.24	−0.81	4.90	0.051	11.51	
Nearshore	6	0.17	0.17	0.072	−0.01	0.36	0.055	0.51	
Offshore	6	0.31	0.36	0.15	−0.07	0.70	0.039	1.03	
Total	21	1.01	2.53	0.55	−0.13	2.16	0.039	11.51	
Model					−0.12	2.15			
Fixed Effects			2.49	0.543	−0.12	2.15			
Random Effects				0.63	−1.71	3.74			0.307

ANOVA (b)					
Chlorophyll _a					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.62	2	8.31	1.34	0.29
Within Groups	111.60	18	6.20		
Total	128.22	20			

ANOVA de dos factores

Se ha realizado un estudio clínico para ver si las vitaminas A y E mejoran la resistencia de la mucosa ante la afonía. Para ello se han seleccionado 12 profesores con problemas de afonía y con un nivel de resistencia de la mucosa muy similar. Se han distribuido en cuatro grupos. Durante tres meses un grupo tomó placebo, otro sólo vitamina A, otro grupo sólo vitamina E y finalmente el cuarto grupo tomó vitamina A y vitamina E conjuntamente. Se midió un índice de resistencia de la mucosa que va del 0 al 100. Los resultados obtenidos fueron los siguientes:

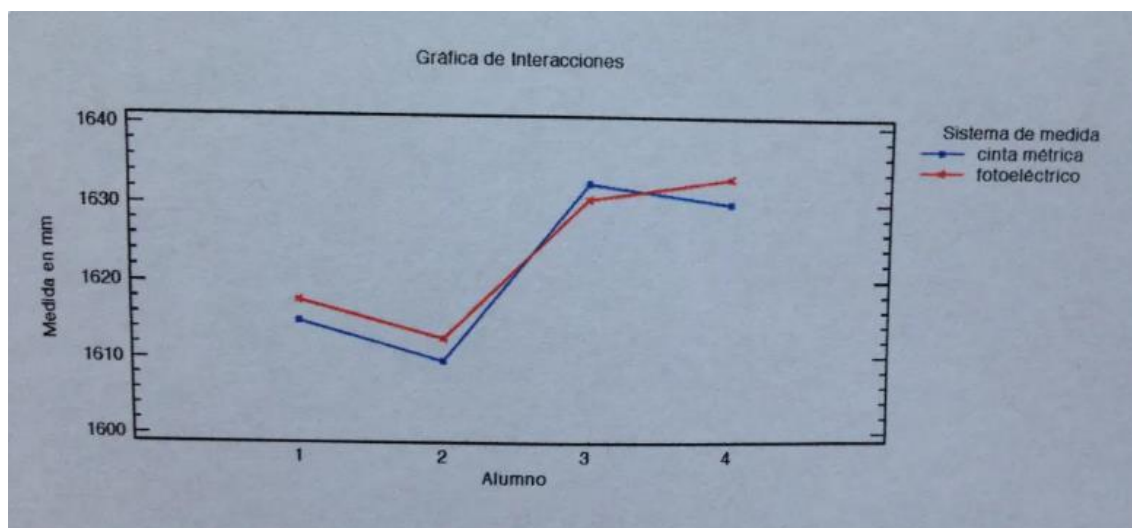
	No Vitamina E			Vitamina E		
No Vitamina A	25	28	31	40	43	41
Vitamina A	38	38	40	87	82	81



	Sistema fotoeléctrico	Cinta métrica
Alumno 1	1620 1615 1618	1615 1618 1612
Alumno 2	1612 1615 1611	1607 1610 1612
Alumno 3	1631 1633 1628	1633 1631 1634
Alumno 4	1633 1635 1632	1627 1631 1632

Tabla ANOVA

Fuente	Suma de Cuadrados	ddl	Cuadrado Medio	Razón-F	Valor-P
Sistema de medida	18,375	1	18,375	1,94	0,2582
Alumno	2006,13	3	668,708	121,58	0,0000
Sistema de medida*Alumno	28,4583	3	9,48611	1,72	0,2021
Residuo	88,0	16	5,5		
Total (corregido)	2140,96	23			



IECA

	no	si'
no	70 65 62 60	62 58 60 57
si	63 60 60 58	57 60 60 55

ARA II

		Máquinas			
		①	②	③	④
Operario	A	6.1	6.4	7.0	6.6
		6.3	6.3	7.2	6.2
		6.7	6.7	7.3	6.1
		6.2	6.1	7.7	6.4
	B	5.3	6.2	7.1	6.2
		5.8	6.3	7.3	6.3
		5.9	6.7	7.5	6.6
		5.2	6.2	7.1	6.9

Máquinas				
	①	②	③	④
<u>Operario A</u>	<u>Operario A</u>	<u>Operario B</u>	<u>Operario B</u>	
6	5	6	4.9	
6.3	5.3	6.1	5.5	
6.1	5.7	6.7	5.2	
6.7	5.5	6.2	5.1	

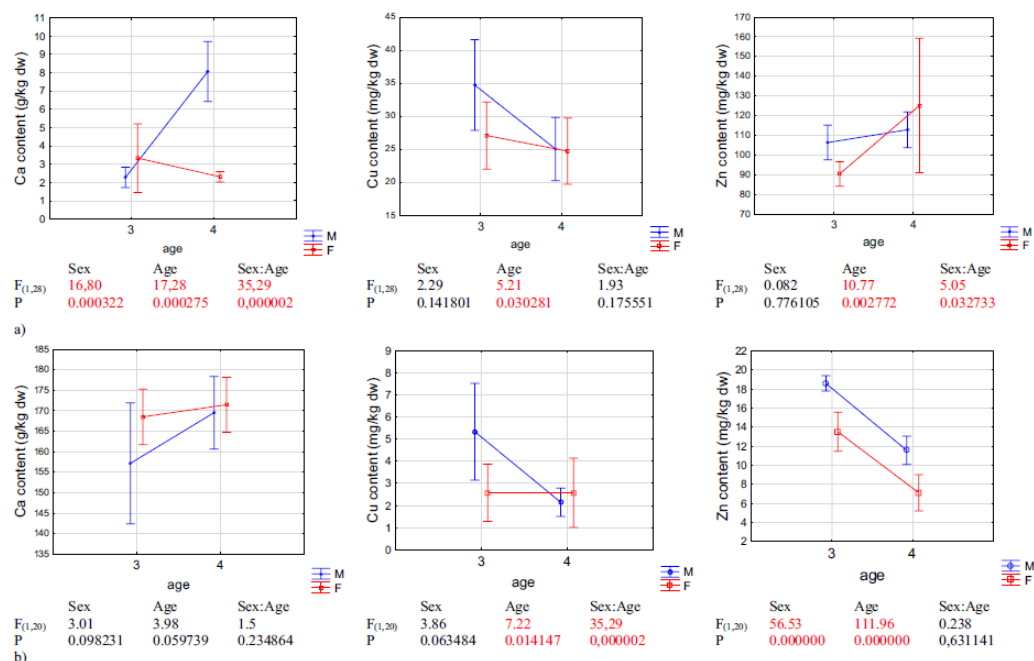


Fig. 2 Result of two-way ANOVA for each metal (Ca, Cu, and Zn) and sex in the meat (a) and exoskeleton (b) of spiny-cheek crayfish (*Faxonius limosus* Raf.) from Głowińsk reservoir (Poland)

Tabla 1. Análisis de varianza de dos vías para evaluar el efecto de la densidad [1 (D1) y 2 (D2) semillas cm⁻²] y el sustrato [con (TA) y sin arena (TSA)] y sobre el crecimiento en la longitud de la valva (mm) y la supervivencia en semillas pequeñas de la almeja *Mulinia edulis* / Two way analysis of variance to evaluate the effect of the spat density [1 (D1) and 2 (D2) spats cm⁻²] and the substrate [with (TA) and without (TS) sand] on the growth in shell length (mm) and survival in spats of the *Mulinia edulis* clam

	g.l	MS	F	P
Crecimiento				
Densidad (D1-D2)	1	0,002	0,22	0,640
Sustrato (TA-TSA)	1	7,648	1084,52	0,000*
Densidad* Sustrato	1	0,060	8,51	0,004*
Dentro del grupo	356	0,007		
Total	359			
Supervivencia				
Densidad (D1-D2)	1	139,707	1,34	0,281
Sustrato (TA-TSA)	1	4181,921	40,00	0,000*
Densidad* Sustrato	1	72,656	0,69	0,429
Dentro del grupo	8	104,535		
Total	11			

* indican diferencias significativas

Table 1. Analysis of variance of respiration rates between days and months. Days nested in months.

Species	df	SS	MS	F	P
<i>D. avara</i>					
Day	17	0.20	0.17	0.29	0.990
Month	5	10.18	3.39	58.03	<0.001
Error	452	7.37	0.06		
<i>H. papillosa</i>					
Day	17	0.06	0.03	0.22	0.800
Month	5	2.49	0.62	5.10	<0.001
Error	321	14.28	0.12		
<i>P. clavata</i>					
Day	17	0.24	0.12	0.18	0.830
Month	5	13.41	1.12	5.72	0.040
Error	254	115.08	0.65		

df, degrees of freedom; SS, sums of squares; MS, mean square; F, F ratio; P, probability.

ANOVA de tres factores

	Hospital 2 ^o nivel			Hospital 3 ^{er} nivel		
	Sala 1	Sala 2	Sala 3	Sala 1	Sala 2	Sala 3
Ap 1	50	70	81	35	25	51
	54	74	84	32	21	48
Ap 2	60	80	89	41	30	61
	63	83	93	43	35	57

Tabla ANOVA

Fuente	Suma de Cuadrados	Gl	Cuadrado Medio	Razón-F	Valor-P
Hospital	6733,5	1	6733,5	8,16	0,0461
Aparato	504,167	1	504,167	1512,50	0,0000
Sala(Hospital)	3299,33	4	824,833	128,55	0,0000
Hospital*Aparato	0,0	1	0,0	0,00	1,0000
Aparato*Sala(Hospital)	1,33333	4	0,333333	0,05	0,9943
Residuo	77,0	12	6,41667		
Total (corregido)	10615,3	23			

Hospital 1

Hospital 2

Aparato 1

Aparato 2

Aparato 1

Aparato 2

Op. 1	Op. 2	Op. 3	Op. 4	Op. 5	Op. 6	Op. 7	Op. 8
52	60	58	48	60	60	53	65
55	64	63	52	64	55	58	61

Tabla ANOVA

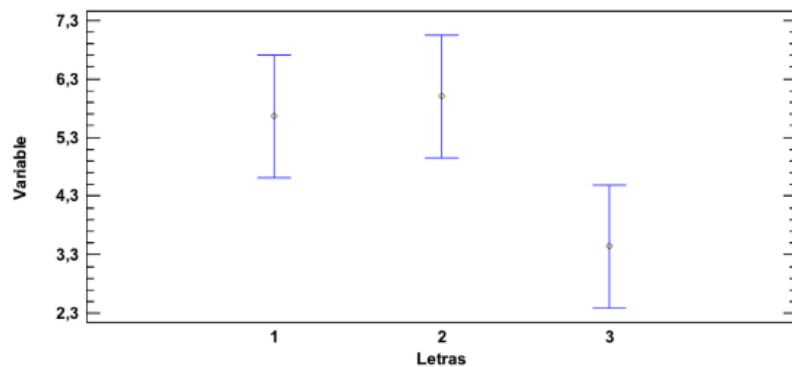
Fuente	Suma de Cuadrados	Gl	Cuadrado Medio	Razón-F	Valor-P
Hospital	36,0	1	36,0	0,56	0,4973
Aparato	9,0	1	9,0	0,14	0,7282
Hospital*Aparato	4,0	1	4,0	0,06	0,8159
Operario(Hospital*Aparato)	259,0	4	64,75	7,00	0,0100
Residuo	74,0	8	9,25		
Total (corregido)	382,0	15			

C1						C2						C3					
L1		L2		L3		L1		L2		L3		L1		L2		L3	
A1	A2	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2	A1	A2
5	7	4	7	3	3	8	5	6	5	8	5	4	8	6	8	5	4
5	7	3	8	3	3	7	3	7	5	3	4	3	8	5	7	5	3
6	6	5	7	2	4	6	3	7	7	3	4	4	7	6	5	3	3

Tabla ANOVA

Fuente	Suma de Cuadrados	Gl	Cuadrado Medio	Razón-F	Valor-P
Ciencias	1,03704	2	0,518519	0,07	0,9354
Letras	69,4815	2	34,7407	4,51	0,0440
Ciencias*Letras	3,40741	4	0,851852	0,11	0,9757
Alumno(Ciencias*Letras)	69,3333	9	7,7037	11,24	0,0000
Residuo	24,6667	36	0,685185		
Total (corregido)	167,926	53			

Medias y 95,0% Intervalos LSD



	Pub		Priv		Conc	
	G1	G2	G1	G2	G1	G2
M1	5	3	7	5	3	7
	6	5	7	4	5	6
	6	4	6	4	5	7
	4	3	5	3	5	7
	5	5	6	4	4	5
M2	7	6	8	6	6	8
	6	6	7	6	5	7
	8	7	7	5	5	7
	8	6	7	5	7	6
	7	5	8	7	5	7

Tabla ANOVA

Fuente	Suma de Cuadrados	Gl	Cuadrado Medio	Razón-F	Valor-P
Centro	0,833333	2	0,416667	0,03	0,9693
Método	32,2667	1	32,2667	107,56	0,0019
Grupo(Centro)	39,7	3	13,2333	19,85	0,0000
Centro*Método	3,03333	2	1,51667	5,06	0,1095
Método*Grupo(Centro)	0,9	3	0,3	0,45	0,7185
Residuo	32,0	48	0,666667		
Total (corregido)	108,733	59			

Medias y 95,0% Intervalos LSD

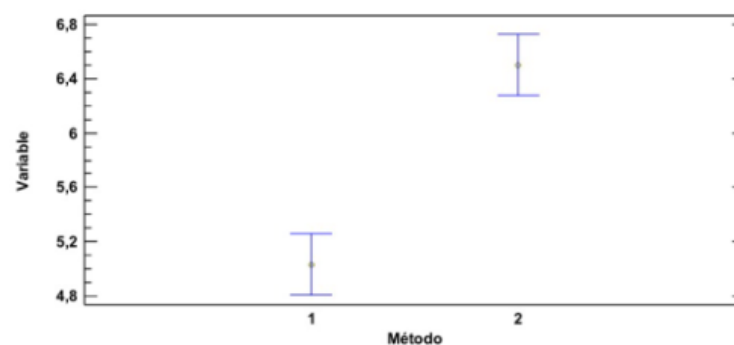


Table 1. Significance of the effect of month and site on environmental parameters, and month, site, and sex on tissue dry weight, weight index (CI), and biochemical components in the mussel *M. trossulus* from the Gulf of Gdańsk, southern Baltic Sea (two- and three-way ANOVA).

	Month	Site	Sex
(a) Environmental parameters			
Temperature			
Salinity		**	
O ₂			
Chl <i>a</i>		*	
TPM		*	
POM		*	
(b) Ecophysiological features of <i>M. trossulus</i>			
Dry weight		***	
CI	*	***	
Protein	**	*	
Lipid	***		
Carbohydrates	***	***	
Glycogen	***	***	*

Empty cell, no effect; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.