Necropsy Activity

Necropsy Activity

Provide your assessment of your birds' age and sex and conditions – based on your necropsy observations (sheet "'Data 2016").

Note: Use Whittow (1997) to compare your bird to adult measurements and explain what observations / criteria you used to justify the age determination

Culmen	
Male	45.7 (43.3-50.5; 43)
Female	44.5 (42.3-47.0; 40)
Tarsus	
Male	50.2 (47.4-52.3; 30)
Female	49.9 (46.3-51.5; 28)
Wing	
Male	297.6 (285-305; 30)
Female	297.3 (288-306; 27)
Mass (*)	393.3 ± 30.7 (320-510; 113)

Table 1. *Body measurements (mm) and mass (g) of Wedge-tailed Shearwater on M&257nana I., off O'ahu, HI. Data given as means ± SD (range; n). From Shallenberger 1973, except where noted.* (*) From Byrd et al. 1984 , from birds measured at Kilauea Pt. on Kaua'i Island, H

Necropsy Activity

ID	Sex	Down %	Primaries	P10P9 Score	Sex Code	Age Class
2014-112	female	0	new	3	<1	chick
2014-114	female	0	new	3	<2	chick
2014-121	female	0	new	3	<1	chick
2014-122	female	0	new	3	<2	chick
2014-111	male	0	new	3	1.5	chick
2014-113	male	0	new	3	8	chick
2014-115	male	0	new	3	8	chick
2014-116	male	0	new	2	4	chick
2014-118	male	1	new	3	6	chick
2014-110	male	0	molting	1	15	juv
2014-117	male	0	old	3	24	juv
2014-120	male	0	molting	1	15	juv

Necropsy Activity

	female: 44.5 (42.3-47.0)		female: 49.9 (46.3-51.5)		female: 297.3 (288-306)
	male: 45.7 (43.3-50.5)		male: 50.2 (47.4-52.3)		male: 297.6 (285-305)
Culmen mm	Culmen minimum	Tarsus mm	Tarsus minimum	WingChordmm	WingChord minimum
40.2	-3.1	48.5	1.1	292	-5.6
38	-3.1	49.8	2.4	291	-6.6
39.5	-3.8	49.5	2.1	297	-0.6
40.1	-3.2	43	-4.4	259	-38.6
39.8	-2.5	46.3	0	264	-33.3
37.8	-4.5	47.1	0.8	290	-7.3
41.7	-0.6	49.6	3.3	300	2.7
37.9	-4.4	44.8	-1.5	275	-22.3
40.3	-2	48.9	2.6	246	-51.3
39	-4.3	49.7	2.3	253	-44.6
41.2	-2.1	47.5	0.1	302	4.4
40.4	-2.9	48.3	0.9	290	-7.6

Necropsy Activity

culmen	tarsus	wing chord	SUM	down%	p10p9	sex score
-1	1	-1	-1	0	3	<1
-1	1	-1	-1	0	3	<2
-1	1	-1	-1	0	3	<1
-1	-1	-1	-3	0	3	<2
-1	1	-1	-1	0	3	1.5
-1	1	-1	-1	0	3	8
-1	1	1	1	0	3	8
-1	-1	-1	-3	0	2	4
-1	1	-1	-1	1	3	6
-1	1	-1	-1	0	1	15
-1	1	1	1	0	3	24
-1	1	-1	-1	0	1	15

Necropsy Activity

Using the 12 specimens (sheet "'Data 2016"), calculate 3 pair-wise correlations between the birds' mass, the health score and the condition score. How well do they agree? Show the three scatterplots and report the correlation coefficients.

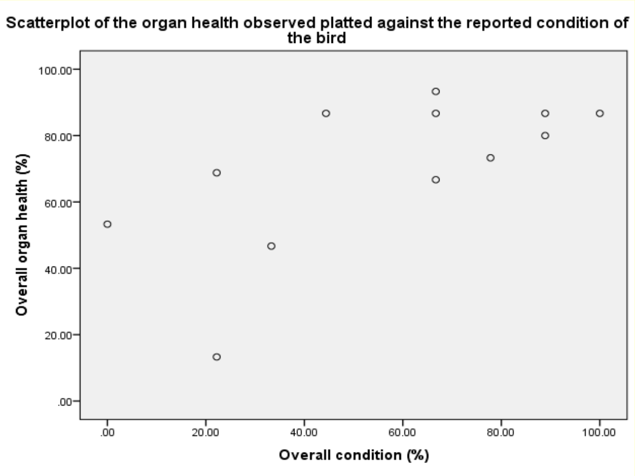
Pearson correlation matrix (n = 12)

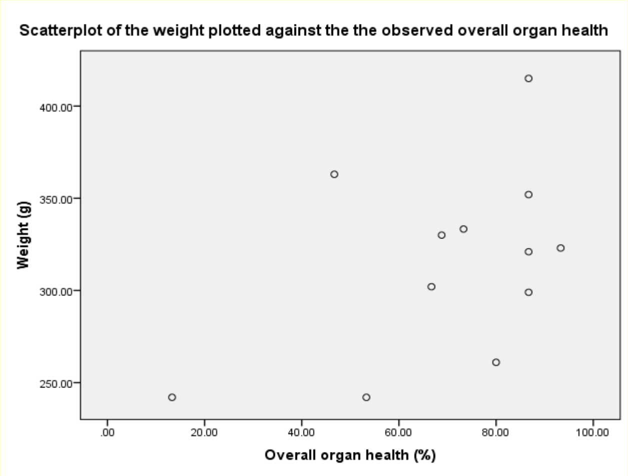
	CONDITION	HEALTH
HEALTH	0.663	-
MASS	0.367	0.474

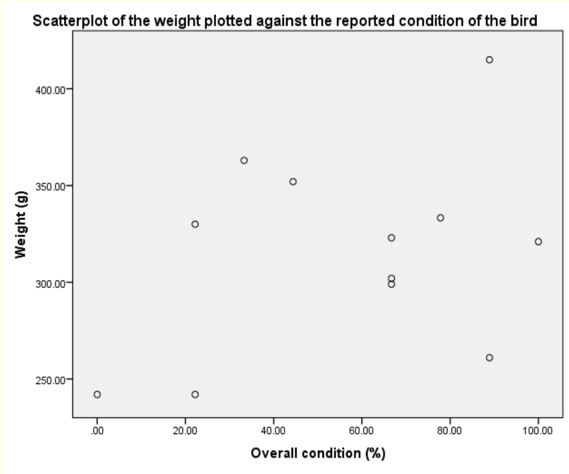
Spearman correlation matrix (n = 12)

	CONDITION	HEALTH
HEALTH	0.621	-
MASS	0.246	0.314

Necropsy Activity







Strongest correlation between condition score and health score:

$r = 0.663$
$r^2 = 0.439$

Strong correlation between health score and mass (g):

$r = 0.474$
$r^2 = 0.225$

Weakest correlation between condition score and mass (g):

$r = 0.367$
$r^2 = 0.135$

Necropsy Activity

Using the results of sections above (#1 and #2) provide a general description of your bird's condition and health, compared to the other birds in the sample (sheet "Data 2016").

These are the descriptive statistics for these variables:

	condition score %	organ health %	weight (g)
mean	56.5	70.2	315.3
sd	31.6	23.0	50.7
median	66.7	76.7	322.0
min	0.0	13.3	242.0
max	100.0	93.3	415.0

Necropsy Activity

These statistics can be used to assess each individual's condition and health, compared to entire sample (of 12 birds). I would suggest using Z scores (where Z = value – mean / SD), but any other approach of calculating the deviations from the mean / median would work.

Bird ID	condition deviation	condition Z score	health deviation	health Z score
2014-110	32.4	1.02	9.8	0.43
2014-111	10.2	0.32	23.1	1.01
2014-112	-56.5	-1.79	-16.9	-0.73
2014-113	32.4	1.02	16.5	0.72
2014-114	10.2	0.32	-3.5	-0.15
2014-115	-12.1	-0.38	16.5	0.72
2014-116	10.2	0.32	16.5	0.72
2014-117	-34.3	-1.08	-1.5	-0.06
2014-118	-34.3	-1.08	-56.9	-2.47
2014-120	-23.2	-0.73	-23.5	-1.02
2014-121	21.3	0.67	3.1	0.14
2014-122	43.5	1.38	16.5	0.72

Necropsy Activity

Examine morphometrics (20 chicks – sheet "Morphometrics"): Report the pair-wise correlations (with excel or spss) between the seven morphometric measured you made (culmen length, bill depth, bill depth at base, tarsus length and wing chord and mass), using all 20 specimens in each correlation.

	CULMEN	TARSUS	BILL_DEPTH	WING_CHORD	BILL_BASE	MASS	HEAD_LENGTH
CULMEN		NS	SIG	NS	NS	NS	SIG
TARSUS	0.066		NS	SIG	NS	NS	MS
BILL_DEPTH	0.531	-0.288		NS	MS	NS	NS
WING_CHORD	0.071	0.595	-0.059		NS	SIG	SIG
BILL_BASE	0.082	0.049	0.441	0.238		NS	NS
MASS	0.067	0.327	0.110	0.466	-0.115		MS
HEAD_LENGTH	0.525	0.424	0.289	0.465	0.302	0.424	

Select one of these variables as a proxy for bird size to create an index of body condition – that accounts for the birds' mass, given their size.

Necropsy Activity

Select one of these variables as a proxy for bird size to create an index of body condition – that accounts for the birds' mass, given their size.

Mass is significantly correlated with only one variable: wing chord (r = 0.466). The mass is marginally correlated with the tarsus length (r = 0.327) and with the head length (r = 0.424).

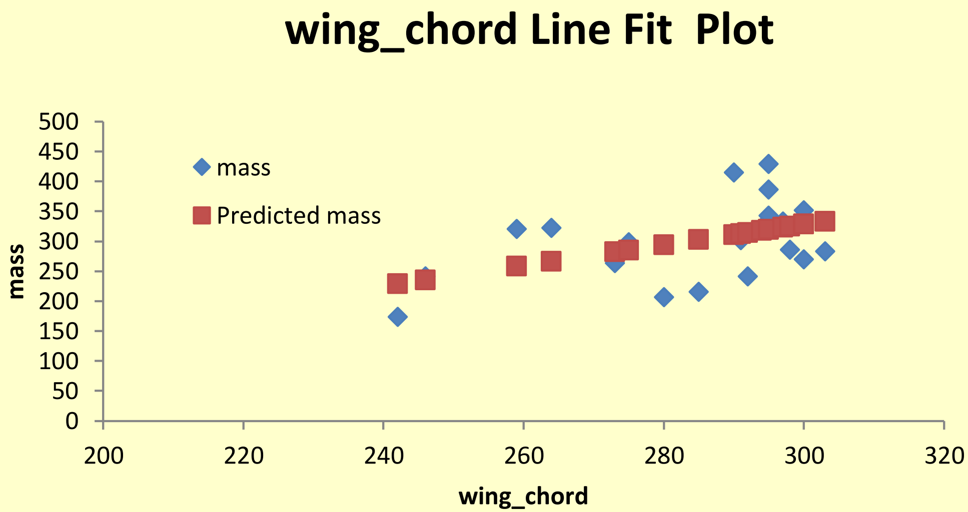
Thus, I will use the wing chord to develop a regression model, to relate mass to wing chord.

Y	X	F	p	slope	SE	95% CI	95% CI
mass	tarsus_length	2.142	0.161	9.588	6.551	-4.175	23.350
mass	wing_chord	4.984	0.039	1.719	0.770	0.101	3.336
mass	head_length	3.917	0.063	9.991	5.048	-0.615	20.598

Only wing chord is significantly related to mass (p = 0.039).

Necropsy Activity

Regression Statistics	
Multiple R	0.466
R Square	0.217
Adj R Square	0.173
Standard Error	61.110
Observations	20

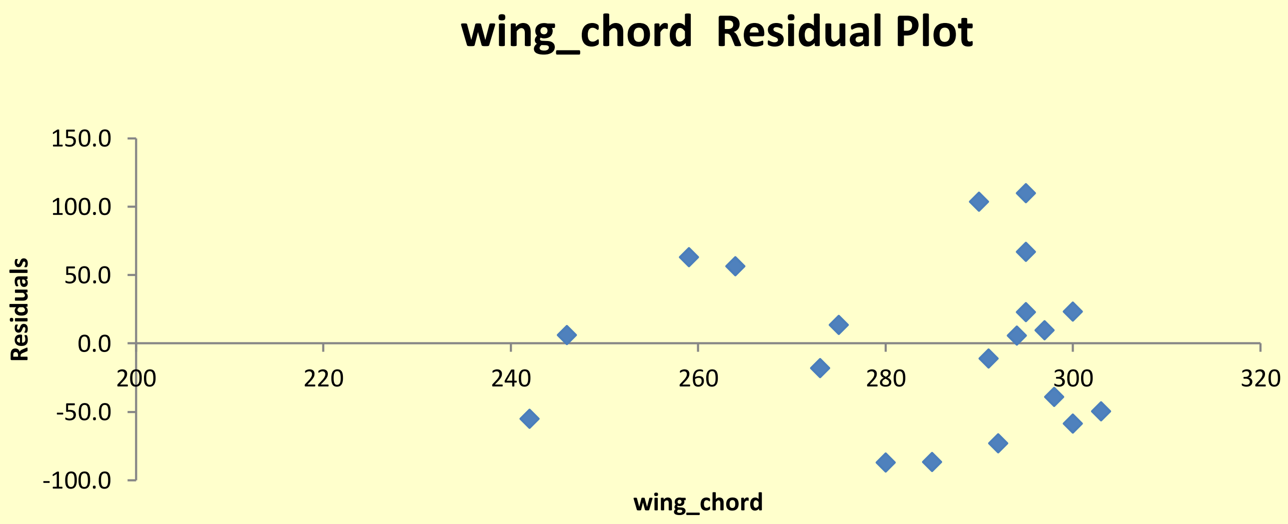


The equation for the best-fit line is: Mass in grams = -186.942 + 1.718 * (Wing_Chord in mm)

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-186.9423034	218.8488257	-0.854207478	0.404216	-646.727	272.8420179
wing_chord	1.718866068	0.769904147	2.232571515	0.038519	0.101357	3.336374659

Necropsy Activity

Develop an index of standardized body condition: Using the variable you identified above and a linear regression, figure out the body mass deviations for each bird, given its size (i.e., is a bird heavier or lighter, given its size). Show the regression plot, the equation for the best-fit line and the r-squared. Based on these deviations, identity (number) of the bird with the "best" and the "worst" body condition.



Necropsy Activity

ID	Mass (g)	Observation	Predicted mass	Residuals	Standardized Residuals
2012-053	174	1	229.0	-55.0	-0.9
2014-118	242	2	235.9	6.1	0.1
2014-122	321	3	258.2	62.8	1.1
2014-111	323	4	266.8	56.2	0.9
2012-062	264	5	282.3	-18.3	-0.3
2014-116	299	6	285.7	13.3	0.2
2012-070	207	7	294.3	-87.3	-1.5
2012-071	216	8	302.9	-86.9	-1.5
2014-113	415	9	311.5	103.5	1.7
2014-114	302	10	313.2	-11.2	-0.2
2014-112	242	11	315.0	-73.0	-1.2
2012-065	324	12	318.4	5.6	0.1
2012-042	387	13	320.1	66.9	1.1
2012-058	430	14	320.1	109.9	1.8
2012-000	343	15	320.1	22.9	0.4
2014-121	333	16	323.6	9.4	0.2
2012-060	286	17	325.3	-39.3	-0.7
2014-115	352	18	328.7	23.3	0.4
2012-050	270	19	328.7	-58.7	-1.0
2012-057	284	20	333.9	-49.9	-0.8
mean	300.7		300.7	0.0	0.0
stdev	67.2		31.3	59.5	1.0

Necropsy Activity

ID	Condition Category	Mass (g)	Residuals	Standardized Residuals
2012-070	poor	207	-87.3	-1.5
2012-071	poor	216	-86.9	-1.5
2014-112	poor	242	-73.0	-1.2
2012-050	poor	270	-58.7	-1.0
2012-053	below mean	174	-55.0	-0.9
2012-057	below mean	284	-49.9	-0.8
2012-060	below mean	286	-39.3	-0.7
2012-062	below mean	264	-18.3	-0.3
2014-114	below mean	302	-11.2	-0.2
2012-065	above mean	324	5.6	0.1
2014-118	above mean	242	6.1	0.1
2014-121	above mean	333	9.4	0.2
2014-116	above mean	299	13.3	0.2
2012-000	above mean	343	22.9	0.4
2014-115	above mean	352	23.3	0.4
2014-111	above mean	323	56.2	0.9
2014-122	good	321	62.8	1.1
2012-042	good	387	66.9	1.1
2014-113	good	415	103.5	1.7
2012-058	good	430	109.9	1.8