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Appendices

. Appendix 1. Morphological character description

achrymal depth – LacrD: defined as preorbital depth (POD) by Barel *et al.*, (1977) rom the rostral corner of the bony orbit to the rostral corner of the lachrymal. This orner can be detected by slightly elevating the maxillary margin of the lachrymal bone. uppress the ligamentous margins of the lachrymal. This is a measurement of taxonomic nportance and should be taken with great accuracy.

nout length – SnL: Barel *et al.*, (1977). From the rostral tip of the premaxillae to the stral point of the bony border of the orbit. More precisely this point is defined as the nction of the orbital margin of the preorbital process and that side of the lachrymal nich borders the eye. In this area the lachrymal border bears an indentation filled with gamnetous tissue connecting the lachrymal with the preorbital process. The orbital side this ligamentous tissue marks the measuring point.

wer jaw length – LJL : Barel *e. al.*, (1977). From the rostral to the caudal tip of the wer jaw. More precisely, the rostral measuring-point is defined as: the dorsal corner of lower jaw symphisis ie the corner near the teeth. Suppress the lip tissue and be careful t to impress the symphisial ligaments. The caudal measuring point is the caudal tip of retro-articular process marked by the insertion of the well-developed inter-opercular-ndibular ligament. This ligament is seen through the skin or at least may easily be felt.

remaxillary peduncle length – PPL

ken as the distance between the most rostral point of the premaxilla to the most sterior part of its ascending process. Lip tissue has to be suppressed in order to start m the bony anterior point. This measurement needs special attention in species with ck lips.

Cheek depth – CD : Barel *et al.*, (1977). From the ventral point of the bony margin of the orbit to the most ventral point along the ventral borderline of the adductor muscle. Anatomically this line is the borderline between the adductor muscle and the lateral ledge extending caudally from the articulation between lower jaw and suspensorium. When the borderline runs obliquely the measuring point is found in the corner between dorsal border of the lateral ledge and the semi-circle marking the suspensorium-lower jaw articulation.

Snoeks (1994) observed that the point along the ventral borderline of the adductor muscle is difficult to locate. It is located in the corner between the dorsal border of the lateral ledge on the suspensorium and the semi-circle marking the suspensorium-lower jaw articulation. When trying to fix the tip of the caliper on this point, it often slips off to the area slightly anterior to the point. Therefore it is recommended that the measurement be taken starting just anterior to the point, in the corner of the articulation between the lateral head of the mandibular articulation facet on the lower jaw (Barel *et al.*, 1977), which is a well-defined bony point, better suited to fix the tip of the caliper.

Snoeks (1994) defines **Eye Diameter (ED)** as the maximum eye length from the most anterior point to the most posterior point of the orbit. He deviates from the posterior measuring point defined by Barel *et al.*, (1977) as the ventral point of the postorbital process, suggesting that it is more convenient to take the maximum eye length i.e. starting from the most anterior point to the most posterior point, whether or not the latter point corresponds to the ventral part of the postorbital process. The ligamentous ring around the eye has to be suppressed without distorting the bony elements.

Horizontal Eye Diameter-Eye Depth-EyD: Barel *et al.*, (1977). From the rostral point of the orbit to the ventral point of the postorbital process.

Vertical Eye diameter –Eye Lengthy- EyLD : Barel *et al.*, (1977. The greatest vertical depth of the eye. Dorsally the measurement should be taken from the neurocranial border of the orbit and ventrally from the orbital margin of the infraorbitals Always measure

between the actual bony margins, i.e. do not suppress at both points the ligaments ring around the eye. Do not dislocate the infraorbitals.

Interorbital width – IOW: Barel *et al.*, (1977). Between points on the dorsal, bony margin of the left and the right orbits. The point giving the least width should be selected. Suppress the ligamentous ring around the eye so that only the width between the bone-margins is measured.

Head width-HW: maximal width with the opercula in a normally adducted position. Thys van den Audernaerde (1964,1966), Snoeks *et al.*, (1987).

Snoeks (1988) proposed that as reference points, the pterotics be chosen because these bony elements correspond to two well-defined points on the head, just above the dorsal extremities.

Head length – HL: Barel *et al.*, (1977). From the rostral tip of the premaxillae to the caudal end of the gill-cover. The caudal margin of the gill-cover is convex; the measuring point is the most caudal point along this convexity and is located near the dorsal-caudal corner of the gill-cover. This corner is often marked with a black blotch. Suppress the ligamentous opercular flap carefully until the tip of the dividers actually meets the bony margin which is delicate and thin at this point.

Standard length – SL: Barel *et al.*, (1977). From the rostral tip of the upper jaw to the origin of the caudal fin. Suppress lip-tissue until the point of the dividers hit the connective tissue of the premaxillary symphisis. Too much pressure causes deformation of connective tissue and dislocation of the premaxillae, resulting in incorrect measurements. The mouth should be closed and the premaxillae in a non-protruded, non-abducted position. The caudal measuring point is the middle of the border-line between caudal peduncle and caudal fin. This line is defined as the vertical line through the caudal border of the hypurals. The measuring point is more precisely located at the intersection of the vertical line through the lower part of the lateral line. Near this point there is an

obvious cartilaginous cushion on which the middle rays articulate. This cushion may be located by moving the tip of the dividers in a caudal-rostral direction between two middle rays. The best outside indication of the caudal border of the hypurals is a sharp vertical skin fold resulting from a lateral bending of the caudal fin. To the beginning taxonomist it is advised to exercise the feeling for the right placing of the dividers-tip by checking its position anatomically in a number of test fishes. Check the straightness of the body and the horizontal alignment of the caudal peduncle.

Body depth – BD: Barel *et al.*, (1977). The greatest vertical depth of the body, mostly found between points near the rostral origins of the dorsal fin and of the pelvic fin. Care should be taken not to distort the natural outline of the body by compressing the divider too hard. For deepwater fishes, the ventral outline of the body is often distorted as a result of swim bladder expansion.

Dorsal fin base length – DFB: Between the most anterior and most posterior point of the dorsal fin base. The most anterior point is situated underneath the skin slightly anterior to the first dorsal spine. The exact bony point can be located by pushing the flesh in this area. Care has to be taken not to confuse this point with the superneural bone, which is situated about halfway between the dorsal-posterior border of the neurocranium and the first dorsal fin spine.

Anal fin base length – AFB: Between the most anterior and the most posterior point of the anal fin base. The anterior measuring point has to be located by probing the fleshy parts slightly anterior to the first spine.

Pectoral fin base length-PFL: From the free tip of the longest fin-ray along the line of this ray, where it 'disappears' into the soft musculature tissue of the fin-base.

Predosal distance – PrD: From the rostral tip of the upper jaw to the most anterior point of the dorsal fin base.

Prepelvic distance-PrP: From the rostral tip of the upper jaw to the most anterior point of the pelvic fin base. The reference point for this measurement can be located by flexing the fin forwards and backwards.

Prepectoral distance (Preventral distance) – PrV: From the rostral tip of the upper jaw to the most anterior point (which is also the most dorsal one) of the pectoral fin base. The latter reference point can be found by flexing the fin forwards and backwards.

Preanal distance – PrA: From the rostral tip of the upper jaw to the most anterior point of the anal fin base. This measurement together with PrP and PrV have been found to provide taxomic information.

Caudal peduncle length – CPL: Barel *et al.*, (1977). Distance between the vertical line through the caudal point of the anal fin insertion and the line through the caudal border of the hypurals.

Caudal peduncle depth – CPD: Barel *et al.*, (1977). The least vertical depth of the caudal peduncle. Care should be taken not to disturb the natural outline by pressing dividers too hard.

Upper and lower jaw teeth (UJT AND LJT): The number of teeth in the oral jaws. All teeth are counted, including the empty sockets and emerging teeth. Snoeks (1988) reported difficulties distinguishing between teeth from the outer and those from the inner rows rows towards the angle of the mouth in some specimens. Therefore it is suggested that teeth can be counted up to the most posterior one no matter to which row these teeth appear to belong to.

Inner tooth rows: The number of teeth in the inner rows of both the upper and lower jaw. Barel *et al.*, (1977) reported that teeth are sometimes set irregularly.

Tooth shape: Outer teeth are mainly bicuspid. In situ, all teeth appear short and robust since only the upper parts of the teeth are visible, the remainder being buried in a rather

thick oral mucosa. In most specimens, some tricuspid teeth and even unicuspid teeth are present posteriorly on the lower jaw. Inner teeth are mainly tricuspid. Outer and inner teeth are strongly braded in many specimens. In a few specimens examined the teeth had a brown encrustation.

Dorsal fin formula: number of dorsal fin spiny **(DSPIN)** and soft **(DSOFT)** rays. According to custom, spines are indicated as Roman numerals while soft fin rays are in Arabic numerals.

Anal fin formula: number of anal fin spiny **(ASPIN)** and soft **(ASOFT)** rays. Spines are indicated as Roman numerals while soft fin rays are in Arabic numerals.

Pectoral fin formula (P): number of pectoral fin rays.

Lateral line scales: Presented as **ULL**, **LOL**, and **LLL**, with ULL being the number of scales on the upper lateral line and LLL the number on the lower lateral line. LOL is the total number of scaled on both upper and lower lateral lines plus those scales along the diagonal connecting the last scale on the upper lateral line to the scale directly in line with the diagonal, on the lower lateral line. Small, perforated scales on the caudal fin are excluded.

Transverse line (LLA) scales: presented as **DLLA /ALLA**, with DLLA being the number of scales starting from the dorsal fin origin towards the upper lateral line, counting backwards and ventrally and ALLA being the number of scales starting from the anal fin origin, counting forwards and dorsally towards the upper lateral line.

Between Pelvic and Ventral fins scales (PV): The number of Scales between the Pectoral and the Pelvic fin bases (ScPP) as defined by Barel *et al.*, (1977). The number of scales should be counted from the ventral angle of the pectoral fin-origin to the rostral origin of the pelvic fin. The scales are often too small and not easy to distinguish. Half a scale is a scale partly overlapping the first pelvic fin ray.

Caudal peduncle scales (CP): Number of scales around the caudal peduncle. The number of scales is counted on one side of the fish and the result is doubled.

Cheek scales (CK): Series of Scales on the cheek as defined by Barel *et. al* (1977) : The scales (arbitrarily) on the cheek ventral to the eye may be arranged in more or less horizontal rows. The number of cheek scales in a vertical line through the caudal border of the pupil is taken as the row-number.

B. Appendix 2. Table 14. List of additional (museum) samples analysed in this study

Serial #	Collection number	Identity	Locality
CK1A	MRAC 97-035-P-0075-0077	*Serranochromis macrocephalus*	Isokwe Island Lake Mweru
CK1B	MRAC 97-035-P-0075-0077	*Serranochromis macrocephalus*	Isokwe Island Mweru
CK2A	MRAC 97-035-P-0075-0077	*Serranochromis macrocephalus*	Isokwe Island Mweru
CK2B	MRAC 97-035-P-0075-0077	*Serranochromis macrocephalus*	Isokwe Island Mweru
CK2C	MRAC 97-035-P-0075-0077	*Serranochromis macrocephalus*	Isokwe Island Mweru
CK3	MRAC 97-035-P-0075-0077	*Serranochromis macrocephalus*	Isokwe Island Mweru
CK4	MRAC 94-019-P-1137-1141	*Serranochromis macrocephalus*	Pembe lagoon Luapula Swamps
CK5	MRAC 94-019-P-1137-1141	*Serranochromis macrocephalus*	Pembe lagoon Luapula
CK6	MRAC 94-019-P-1137-1141	*Serranochromis macrocephalus*	Pembe lagoon Luapula
CK7	MRAC 94-019-P-1137-1141	*Serranochromis macrocephalus*	Pembe lagoon Luapula
CK8	MRAC 94-019-P-1137-1141	*Serranochromis macrocephalus*	Pembe lagoon Luapula
CK9	MRAC 94-019-P-1145-1149	*Serranochromis macrocephalus*	Kashilu Luapula River
CK10	MRAC 4-019-P-1145-1149	*Serranochromis macrocephalus*	Kashilu Luapula River
CK11	MRAC 4-019-P-1145-1149	*Serranochromis macrocephalus*	Kashilu Luapula River
CK12	MRAC 4-019-P-1145-1149	*Serranochromis macrocephalus*	Kashilu Luapula River
CK13	MRAC 4-019-P-1145-1149	*Serranochromis macrocephalus*	Kashilu Luapula River
CK14	MRAC 97-035-P0071-0074	*Serranochromis macrocephalus*	Kanakashi Lake Mweru
CK15	MRAC 7-035-P0071-0074	*Serranochromis macrocephalus*	Kanakashi Lake Mweru
CK16	MRAC 7-035-P0071-0074	*Serranochromis macrocephalus*	Kanakashi Lake Mweru
CK17	MRAC 7-035-P0071-0074	*Serranochromis macrocephalus*	Kanakashi Lake Mweru
CK18	MRAC 94-019-P-1142-1144	*Serranochromis macrocephalus*	Mifimbo Lake Mweru
CK19	MRAC 94-019-P-1142-1144	*Serranochromis macrocephalus*	Mifimbo Lake Mweru
CK20	MRAC 94-019-P-1142-1144	*Serranochromis macrocephalus*	Mifimbo Lake Mweru
CK21	MRAC 94-019-P-0411-0415	*Serranochromis macrocephalus*	Kashilu Luapula River

Table 14 continued

CK22	MRAC 94-019-P-0411-0415	*Serranochromis macrocephalus*	Kashilu Luapula River
CK23	MRAC 94-019-P-0411-0415	*Serranochromis macrocephalus*	Kashilu Luapula River
CK24	MRAC 94-019-P-0411-0415	*Serranochromis macrocephalus*	Kashilu Luapula River
CK25	MRAC 94-019-P-0411-0415	*Serranochromis macrocephalus*	Kashilu Luapula River
CK26	MRAC 94-019-P-0385-0400	*Serranochromis macrocephalus*	Pembe lagoon Luapula Swamps
CK27	MRAC 94-019-P-0385-0400	*Serranochromis macrocephalus*	Pembe lagoon Luapula
CK28	MRAC 94-019-P-0385-0400	*Serranochromis macrocephalus*	Pembe lagoon Luapula
CK29	MRAC 94-019-P-0385-0400	*Serranochromis macrocephalus*	Pembe lagoon Luapula
CK30	MRAC 94-019-P-0385-0400	*Serranochromis macrocephalus*	Pembe lagoon Luapula
CK31	MRAC 94-019-P-1131-1133	*Serranochromis macrocephalus*	Mofwe Lagoon Mbereshi River
CK32	MRAC 94-019-P-1131-1133	*Serranochromis macrocephalus*	Mofwe Lagoon Mbereshi
CK33	MRAC 94-019-P-1131-1133	*Serranochromis macrocephalus*	Mofwe Lagoon Mbereshi
CK34	MRAC 94-019-P-1131-1136	*Serranochromis macrocephalus*	Mofwe Lagoon South Luapula Swamps
CK35	MRAC 94-019-P-1131-1136	*Serranochromis macrocephalus*	Mofwe Lagoon South
CK36	MRAC 94-019-P-1131-1136	*Serranochromis macrocephalus*	Mofwe Lagoon South
CK37	MRAC 97-035-P-0070	*Serranochromis macrocephalus*	Isokwe Island Mweru
CK38	MRAC 94-019-P-0416	*Serranochromis macrocephalus*	Pembe Lagoon Luapula
CK39	MRAC 94-019-P-0401	*Serranochromis macrocephalus*	Mofwe Lagoon South
CK40	MRAC 94-019-P-0405	*Serranochromis macrocephalus*	Kashilu Luapula River
CK41	MRAC 94-019-P-0402-404	*Serranochromis macrocephalus*	Mwatishi River mouth Lake Mweru
CK42	MRAC 94-019-P-0402-404	*Serranochromis macrocephalus*	Mwatishi Rive Mweru
CK43	MRAC 94-019-P-0402-404	*Serranochromis macrocephalus*	Mwatishi River Mweru
CK44	MRAC 94-019-P-1166	*Serranochromis angusticeps*	Mwatishi River Mweru
CK45	MRAC 94-019-P-1169	*Serranochromis angusticeps*	Pembe Lagoon Luapula
CK46	MRAC 94-019-P-1167-1168	*Serranochromis angusticeps*	Mifimbo Lake Mweru
CK47	MRAC 18748	*Serranochromis angusticeps*	Chambeshi River
CK48	MRAC 119 37C-372	*Serranochromis angusticeps*	Bwalya Mponda Ncheta Lake Bangweulu
CK49	MRAC 119 37C-372	*Serranochromis angusticeps*	Bwalya Mponda Ncheta
CK50	MRAC 119 37C-372	*Serranochromis angusticeps*	Bwalya Mponda Ncheta
CK51	MRAC 187487	*Serranochromis angusticeps*	Kafue River Rail bridge
CK52	MRAC 187497-500	*Sargochromis codringtonii*	Sanyati River West Zimbabwe
CK53	MRAC 187497-500	*Sargochromis codringtonii*	Sanyati River Zimbabwe
CK54	MRAC 187497-500	*Sargochromis codringtonii*	Sanyati River Zimbabwe
CK55	MRAC 187497-500	*Sargochromis codringtonii*	Sanyati River Zimbabwe
CK56	MRAC 187495	*Sargochromis codringtonii*	Ndora harbour Zimbabwe

Table 14 continued

CK57	MRAC 187501-509	*Sargochromis codringtonii*	Lake Kariba Game harbour Zimbabwe
CK58	MRAC 187501-509	*Sargochromis codringtonii*	Lake Kariba Game
CK59	MRAC 187501-509	*Sargochromis codringtonii*	Lake Kariba Game
CK60	MRAC 187501-509	*Sargochromis codringtonii*	Lake Kariba Game
CK61	MRAC 187501-509	*Sargochromis codringtonii*	Lake Kariba Game
CK62	MRAC 187501-509	*Sargochromis codringtonii*	Lake Kariba Game
CK63	MRAC 187501-509	*Sargochromis codringtonii*	Lake Kariba Game
CK64	MRAC 187501-509	*Sargochromis codringtonii*	Lake Kariba Game
CK65	MRAC 187501-509	*Sargochromis codringtonii*	Lake Kariba Game
CK66	MRAC 94-019-P-1176	*Serranochromis stappersi*	Kalungwishi River/ Lake Mweru Estuary
CK67	MRAC 94-019-P-1171-1175	*Serranochromis stappersi*	Mifimbo Lake Mweru
CK68	MRAC 94-019-P-1171-1175	*Serranochromis stappersi*	Mifimbo Lake Mweru
CK69	MRAC 94-019-P-1171-1175	*Serranochromis stappersi*	Mifimbo Lake Mweru
CK70	MRAC 94-019-P-1171-1175	*Serranochromis stappersi*	Mifimbo Lake Mweru
CK71	MRAC 94-019-P-1171-1175	*Serranochromis stappersi*	Mifimbo Lake Mweru
CK72	MRAC 94-019-P-0469-0471	*Serranochromis stappersi*	Kashilu Luapula River
CK73	MRAC 94-019-P-0469-0471	*Serranochromis stappersi*	Kashilu Luapula River
CK74	MRAC 94-019-P-0469-0471	*Serranochromis stappersi*	Kashilu Luapula River
CK75	MRAC 94-019-P-0469-0471	*Serranochromis stappersi*	Kashilu Luapula River
CK76	MRAC 94-019-P-0472-0473	*Serranochromis stappersi*	Pembe Katotoma Luapula
CK77	MRAC 94-019-P-1170	*Serranochromis stappersi*	Isokwe Kenani Mweru
CK78	MRAC 97-035-P-0079-0080	*Serranochromis macrocephalus?*	Isokwe Island Lake Mweru
CK79	MRAC 97-035-P-0079-0080	*Serranochromis macrocephalus?*	Isokwe Island Lake Mweru
CK80	MRAC 94-019-P-1154-1155	*Sargochromis mellandi*	Mwatishi River Mweru
CK81	MRAC 94-019-P-1154-1155	*Sargochromis mellandi*	Mwatishi River Mweru
CK82	MRAC 94-019-P-1164-1165	*Sargochromis mellandi*	Pembe Lagoon Luapula
CK83	MRAC 94-019-P-1164-1165	*Sargochromis mellandi*	Pembe Lagoon Luapula
CK84	MRAC 154783	*Haplochromis frederici*	Rio Cunene Capelango Angola
CK85	MRAC 187601-635	*Haplochromis darlingi*	Lake Kariba Redcliff Island Jetty
CK86	MRAC 34037-34046	*Haplochromis moeruensis*	Lukonzolwa
CK87	MRAC 34037-34046	*Haplochromis moeruensis*	Lukonzolwa
CK88	MRAC 34037-34046	*Haplochromis moeruensis*	Lukonzolwa
CK89	MRAC 34037-34046	*Haplochromis moeruensis*	Lukonzolwa
CK90	MRAC 34037-34046	*Haplochromis moeruensis*	Lukonzolwa
CK91	MRAC 190495-496	*Serranochromis thumbergii*	Lake Chila Mbala

Table 14 continued

CK92	MRAC 190495-496	*Serranochromis thumbergii*	Lake Chila Mbala
CK93	MRAC 190497-505	*Serranochromis thumbergii*	Lake Chila Mbala
CK94	MRAC 190497-505	*Serranochromis thumbergii*	Lake Chila Mbala
CK95	MRAC 190497-505	*Serranochromis thumbergii*	Lake Chila Mbala
CK96	MRAC 190497-505	*Serranochromis thumbergii*	Lake Chila Mbala
CK97	MRAC 190497-505	*Serranochromis thumbergii*	Lake Chila Mbala
CK98	MRAC 187488-494	*Serranochromis robustus*	Chambeshi River
CK99	MRAC 187488-494	*Serranochromis robustus*	Chambeshi River
CK100	MRAC 187488-494	*Serranochromis robustus*	Chambeshi River
CK101	MRAC 187488-494	*Serranochromis robustus*	Chambeshi River
CK102	MRAC 187488-494	*Serranochromis robustus*	Chambeshi River
CK103	MRAC 187488-494	*Serranochromis robustus*	Lualaba River Kisangani Congo DR
CK104	MRAC 90-30-P-1800-876	*Orthochromis polyacanthus*	Chambeshi River
CK105	MRAC 90-30-P-1800-876	*Orthochromis polyacanthus*	Lualaba River Kisangani
CK106	MRAC 90-30-P-1800-876	*Orthochromis polyacanthus*	Lualaba River Kisangani
CK107	MRAC 90-30-P-1800-876	*Orthochromis polyacanthus*	Lualaba River Kisangani
CK108	MRAC 90-30-P-1800-876	*Orthochromis polyacanthus*	Lualaba River Kisangani
CK109	MRAC 187601-635	*Haplochromis darlingi*	Lake Kariba Redcliff Island Jetty
CK110	MRAC 187601-635	*Haplochromis darlingi*	Lake Kariba Redcliff
CK111	MRAC 187601-635	*Haplochromis darlingi*	Lake Kariba Redcliff
CK112	MRAC 187601-635	*Haplochromis darlingi*	Lake Kariba Redcliff
CK113	MRAC 187601-635	*Haplochromis darlingi*	Lake Kariba Redcliff
CK114	MRAC 190497-505	*Serranochromis thumbergii*	Lake Chila Mbala
CK115	MRAC 190497-505	*Serranochromis thumbergii*	Lake Chila Mbala
CK116	MRAC 190497-505	*Serranochromis thumbergii*	Lake Chila Mbala
CK117	MRAC 190497-505	*Serranochromis thumbergii*	Lake Chila Mbala
CK118	MRAC 190497-505	*Serranochromis thumbergii*	Lake Chila Mbala
CK119	RUSI 062863	*Sargochromis Species*	Below Itezhi-tezhi Dam Kafue River
CK120	RUSI 062863	*Sargochromis Species*	Below Itezhi-tezhi Dam
CK121	RUSI 062863	*Sargochromis Species*	Below Itezhi-tezhi Dam
CK122	RUSI 062863	*Sargochromis Species*	Below Itezhi-tezhi Dam
CK123	RUSI 062863	*Sargochromis Species*	Below Itezhi-tezhi Dam
CK124	RUSI 44036	*Serranochromis macrocephalus*	Chate Gorge Lake Kariba MZR Zimbabwe
CK125	RUSI 44036	*Serranochromis macrocephalus*	Chate Gorge Lake Kariba
CK126	RUSI 44036	*Serranochromis macrocephalus*	Chate Gorge Lake Kariba
CK127	RUSI 35782	*Sargochromis giardi*	Mongu East Upper Zambezi River

Table 14 continued

CK128	RUSI 35782	*Sargochromis giardi*	Mongu East Upper Zambezi River
CK129	RUSI 35782	*Sargochromis giardi*	Mongu East Upper
CK130	RUSI 062865	*Seranochromis robustus*	Below Itezhi-tezhi Dam
CK131	RUSI 062865	*Serranochromis robustus*	Below Itezhi-tezhi Dam
CK132	RUSI 46764	*Serranochromis robustus*	Musumbizi River Chambeshi River system
CK133	RUSI 056956	*Sargochromis cordringtonii*	Upper Zambezi River Namibia
CK134	RUSI 056956	*Sargochromis cordringtonii*	Upper Zambezi River
CK135	Texas NHC-C17625	*Sargochromis carlottae*	Liyolelo Luanginga/Zambezi confluence
CK136	Texas NHC-C17625	*Sargochromis carlottae*	Liyolelo
CK137	RUSI 41054	*Serranochromis robustus*	Lumwana/ Zambezi confluence Mwinilunga
CK138	RUSI 41018	*Serranochromis macrocephalus*	Lumwana/ Zambezi
CK139	RUSI 022130	*Sargochromis giardi*	Okavango River Namibia
CK140	RUSI 035777	*Sargochromis cordringtonii*	Lungwebungu River Western Zambia
CK141	RUSI 035777	*Sargochromis cordringtonii*	Lungwebungu River
CK142	RUSI 035777	*Sargochromis cordringtonii*	Lungwebungu River
CK143	RUSI 040050	*Serranochromis thumbergii*	Mwambeshi R Kitwe/Chingola Rd Bridge
CK144	RUSI 040050	*Serranochromis thumbergii*	Mwambeshi R
CK145	RUSI 040050	*Serranochromis thumbergii*	Mwambeshi R
CK146	RUSI 40052	*Serranochromis angusticeps*	Mwambeshi R
CK147	RUSI 42576	*Serranochromis species*	Mwambeshi R
CKI48	MRAC 97-001-P-0143	*Serranochromis species*	Ngoma R below Ntumbachushi Falls
CK149	MRAC 97-001-P-0142	*Serranochromis species*	Luapula River
CK150	BMNH 1990.6.12.1-2	*Serranochromis altus*	Namushakende Flood Plain Zambezi River
CK151	BMNH 1990.6.12.1-2	*Serranochromis altus*	Namushakende
CK152	BMHN 1910.5.31.62-64	*Serranochromis longimanus*	Lake Ngami Botswana
CK153	BMHN 1910.5.31.62-64	*Serranochromis longimanus*	Lake Ngami Botswana
CK154	BMHN 1910.5.31.62-64	*Serranochromis longimanus*	Lake Ngami Botswana
CK155	BMHN 1910.5.31.62-64	*Serranochromis longimanus*	Lake Ngami Botswana
CK156	RUSI 023696	*Sargochromis giardi*	Okavango R system Namibia
CK157	RUSI 023696	*Sargochromis giardi*	Okavango R system
CK 546	CH-AT632-1	*Sargochromis codringtonii*	Chipepo, ZGC, Middle Zambezi River
CK547	CH-AT632-2	*Sargochromis codringtonii*	Chipepo, ZGC

Table 14 continued

CK548	CH-AT632-3	*Sargochromis codringtonii*	Chipepo, ZGC, Middle Zambezi River
CK549	CH-AT632-4	*Sargochromis codringtonii*	Chipepo, ZGC, Middle Zambezi River
CK550	CK550	*Sargochromis codringtonii?*	Chunga Lagoon, Kafue River
CK551	CK551	*Sargochromis codringtonii?*	Chunga Lagoon, Kafue River
CK552	CK552	*Sargochromis codringtonii?*	Chunga Lagoon, Kafue River
CK553	CK553	*Sargochromis codringtonii?*	Chunga Lagoon, Kafue River
CK554	CH-DA732	*Sargochromis codringtonii*	Chief Nzambu's area, Kabompo River, UZR
CK555	CH-NRH 12586	*Serranochromis stappersi*	Isokwe Island, Lake Mweru
CK556	CH-DA 306	*Sargochromis carlottae*	Chief Nzambu's area, Kabompo River, UZR
CK557	CH-DA 310	*Sargochromis carlottae*	Chief Nzambu's area,
CK558	CH-KA342	*Sargochromis carlottae*	Mashi River, Upper Zambezi River
CK559	CH-AT 605	*Sargochromis giardi*	Lake Luye, Kafue River
CK560	CH-KA247-1	*Sargochromis giardi?*	Chilanga, Kafue River
CK561	CH-KA247-2	*Sargochromis giardi?*	Chilanga, Kafue River
CK562	CH-KA 475-1	*Haplochromis frederici*	Chunga Lagoon, Kafue River
CK563	CH-KA 475-2	*Haplochromis frederici*	Chunga Lagoon, Kafue River
CK564	CH-KA 475-3	*Haplochromis frederici*	Chunga Lagoon, Kafue River
CK565	CH-PL	*Sargochromis giardi*	Cunene River
CK566	CH-UV 553-1	*Serranochromis thumbergii*	Luswishi River, Ndola
CK567	CH-UV 553-2	*Serranochromis thumbergii*	Luswishi River, Ndola
CK568	CH-UV560-2	*Serranochromis thumbergii*	KL Ricket's Dam, Chisamba
CK569	CH-UV560-1	*Serranochromis thumbergii*	KL Ricket's Dam, Chisamba
CK570	CH-UV 554	*Serranochromis thumbergii?*	Lake Bangweulu
CK571	MRAC 96-083-P-0181	*Psedocrenilabrus philander*	Kasembe River, Lufubu Basin Mbala/Kasama
CK572	MRAC 96-031-P-0524-0527	*Psedocrenilabrus philander*	Kasembe River, Lufubu
CK573	MRAC 96-031-P-0524-0527	*Psedocrenilabrus philander*	Kasembe River, Lufubu
CK574	MRAC 96-031-P-0524-0527	*Psedocrenilabrus philander*	Kasembe River, Lufubu
CK575	MRAC 96-083-P-0182-0184	*Psedocrenilabrus philander*	Lwomba River, Lukulu/Chambeshi drainage
CK576	MRAC 96-083-P-0182-0184	*Psedocrenilabrus philander*	Lwomba River

Table 14 continued

CK578	MRAC 96-031-P-0523-0524	*Psedocrenilabrus philander*	Musitu River, Lufubu basin, Mbala/Kasama
CK579	MRAC 96-031-P-0523-0524	*Psedocrenilabrus philander*	Musitu River, Lufubu basin, Mbala/Kasama
CK580	MRAC 94-019-P-0436-0455	*Sargochromis mellandi?*	Mofwe, Mbereshi River, Luapula Swamps
CK581	MRAC 94-019-P-0436-0455	*Sargochromis mellandi?*	Mofwe, Mbereshi River, Luapula Swamps
CK582	MRAC 94-019-P-0436-0455	*Sargochromis mellandi?*	Mofwe, Mbereshi River, Luapula Swamps
CK583	MRAC 94-019-P-0436-0455	*Sargochromis mellandi?*	Mofwe, Mbereshi River, Luapula Swamps
CK584	MRAC 94-019-P-0436-0455	*Sargochromis mellandi?*	Mofwe, Mbereshi River, Luapula Swamps
CK585	MRAC 94-019-P-0436-0455	*Sargochromis mellandi?*	Mofwe, Mbereshi River, Luapula Swamps
CK586	MRAC 94-019-P-1156-1163	*Sargochromis mellandi?*	Kalungwishi River/Lake Mweru confluence
CK587	MRAC 94-019-P-1156-1163	*Sargochromis mellandi?*	Kalungwishi River/Lake Mweru confluence
CK588	MRAC 94-019-P-1156-1163	*Sargochromis mellandi?*	Kalungwishi River/Lake Mweru confluence
CK589	MRAC 94-019-P-1156-1163	*Sargochromis mellandi?*	Kalungwishi River/Lake Mweru confluence
CK590	MRAC 94-019-P-1156-1163	*Sargochromis mellandi?*	Kalungwishi River/Lake Mweru confluence
CK591	MRAC 163974	*Sargochromis mellandi?*	Lake Calundo, Angola
CK592	MRAC 98-007-P-0061-0062	*Serranochromis/Chetia?*	Luongo River, Mansa-Kawambwa Road
CK593	MRAC 98-007-P-0061-0062	*Serranochromis/Chetia?*	Luongo River, Mansa-Kawambwa Road
CK594	MRAC 98-007-P-0063	*Serranochromis/Chetia?*	Kalungwishi River
CK595	MRAC 98-007-P-0064-0067	*Serranochromis species*	Luwombwa River
CK596	MRAC 98-007-P-0064-0067	*Serranochromis species*	Luwombwa River
CK597	MRAC 98-007-P-0064-0067	*Serranochromis species*	Luwombwa River
CK598	MRAC 98-007-P-0064-0067	*Serranochromis species*	Luwombwa River
CK599	UZ 3F4-3	*Pharyngochromis 'deep'*	Likundu Camp Upper Zambezi River
CK600	MRAC-98-048-P-0245	*Pseudocrenilbrus philander*	Chibomfuma, Nchelenge Fisheries beach
CK601	MRAC 87-11-P-2885	*Pseudocrenilabrus multicolor*	Ouest du lac Rwanyiakizinga, Rwanda
CK602	MRAC 87-11-P-2885	*Pseudocrenilabrus multicolor*	Ouest du lac Rwanyiakizinga
CK603	MRAC 87-11-P-2885	*Pseudocrenilabrus multicolor*	Ouest du lac Rwanyiakizinga
CK604	MRAC 87-11-P-2885	*Pseudocrenilabrus multicolor*	Ouest du lac Rwanyiakizinga
CK605	MRAC 87-11-P-2885	*Pseudocrenilabrus multicolor*	Ouest du lac Rwanyiakizinga

Table 14 continued

CK606	MRAC 88609-631	*Pseudocrenilbrus philander*	Kanda, Katanga, DRC
CK607	MRAC 89-08-P-79	*Pseudocrenilabrus multicolor*	Othi River at Athi River, Kenya
CK608	MRAC 79-001-P-5823-5949	*Pseudocrenilabrus nicholsi*	Mabwe Estuary, Lac Upemba DRC
CK609	MRAC 79-001-P-5823-5949	*Pseudocrenilabrus nicholsi*	Mabwe Estuary

Key to prefixes

BMNH Bristish Museum of Natural History collections, London, United Kingdom

CH Chilanga Fishries Museum collections, Chilanga, Zambia

MRAC Royal Museum of Central Africa collections, Tervuren, Belgium

RUSI RUSI Institute collections, Grahamstown, South Africa

Texas Texas Museum of Natural History collections, Texas, United States

C. Appendix 3. Table 15. Sequences of Tanganyika cichlids used in this study

Identity	Control region	Cytochrome B	ND2
Heterochromis multidens	-	AF428151	AF398214
Bathybates ferox	-	AF428152	U07239
Cyprochromis leptosoma	-	AF428154	AF398224
Paracyprochromis brieni	AF400700	Z21776	AF398223
Callochromis macrops	-	Z21760	U07242
Opthalmotilapia vetralis	-	Z21771	U07257
Xenotilapia sima	AF400706	Z21772	U07270
Eretmodus cyanostictus	AF400707	AF428155	AF398220
Spathodus erythrodon	AF400708	AF428156	AF398218
Tanganicoidus irsacae	AF400709	Z21778	AF398219
Astatotilapia burtoni	AF400710	Z21773	AF317266
Cyclopharynx fwae	AF400711	AF428158	-
Orthochromis polyacanthus	AF400712	AF428159	AF398231
Schwetzochromis malagarezensis	AF400713	AF428161	AF398232

Table 15 continued

Altolamprologus compressiceps	-	AF428154	AF398229
Juridochromis marlieri	AF400717	Z30077	AF398230
Lamprologus callipterus	AF400718	Z29992	AF398226
Lamprologus mocquardi	AF400720	Z29995	AF398225
Neolamprologus brichardi	AF400721	Z29997	AF398227
Telmatochromis bifrenatus	AF400724	Z30185	AF398228
Benthochromis species	AF400725	AF428164	-
Gnathochromis pfefferi	AF400727	AF428166	U07248
Limnochromis auritus	AF400728	Z21775	AF398216
Triglachromis ostostigma	AF400729	Z30004	AF398217
Perrissodus microlepis	AF400730	AF428167	AF398222
Plecodus straelini	AF400731	Z21777	AF398221
Boulengerochromis microlepis	-	Z30076	U07240
Oreochromis tanganicae	-	Z12046	AF317240
Trematocara unimaculatum	-	AF428168	AF317268
Cyphotilapia frontosa	AF400732	AF428169	U07247
Lobochilotes labiatus	AF400733	AF428169	U07254
Tropheus moorii	-	Z1237	U07267
Tylochromis polylepis	-	AF428173	AF398215

Control region, cytochrome B and ND2 represent the sequences for the different regions of the mitochondrial genome. The numbers used for the different sequences are GENBANK Accesssion numbers. These sequences are based on previous studies by Salzburger *et al.* (2002)

D. Appendix 4. Descriptive statistics

Table 16. Genus *Pharyngochromis* percentages

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	50	21.80446	21.10101	22.5079	16.1435	26.39175	10.24825	6.126671	2.475211
SNL-HL	50	36.46941	35.81992	37.11891	31.19658	40.20619	9.009604	5.222943	2.285376
LJL-HL	50	36.13809	35.42179	36.85438	30.12048	40.54054	10.42006	6.35253	2.520423
PPL-HL	50	32.0037	31.46647	32.54092	27.14286	35.07246	7.929607	3.573343	1.890329
CHD-HL	50	26.9467	26.28462	27.60879	20.85308	31.79724	10.94415	5.427346	2.329667
ED-HL	50	30.12374	29.30327	30.94421	24.14634	35.58559	11.43924	8.334629	2.886976
IOW-HL	50	21.37472	20.48473	22.26471	14.85714	27.01031	12.15317	9.806823	3.131585
IOW-HW	50	53.26481	50.30047	56.22916	37.68116	103.7736	66.09243	108.7976	10.43061
HW-HL	50	40.49555	39.61528	41.37583	21.63265	44.59459	22.96194	9.593889	3.0974
HL-SL	50	34.6813	34.31072	35.05188	31.35593	39.24812	7.892188	1.700306	1.303958
BD-SL	50	31.34361	30.52272	32.1645	26.71233	37.90614	11.19381	8.343172	2.888455
DFB-SL	50	52.87662	52.2976	53.45563	48.27586	56.28141	8.005545	4.150878	2.03737
AFB-SL	50	15.7543	15.18879	16.31981	11.2069	23.3871	12.1802	3.959554	1.989863
PRD-SL	50	37.26541	36.71244	37.81837	32.29167	41.79894	9.507275	3.785846	1.945725
PRP-SL	50	40.09927	39.59465	40.6039	36.29032	45.03817	8.747845	3.152825	1.77562
PRV-SL	50	35.01762	34.59088	35.44437	31.77966	39.68254	7.902879	2.254734	1.501577
PRA-SL	50	69.62125	68.8198	70.42269	60.54422	75.72816	15.18394	7.952591	2.820034
CPL-SL	50	18.11687	17.5289	18.70483	15.87302	28.28283	12.40981	4.280213	2.068868
CPD-SL	50	12.55001	11.95598	13.14404	10.28481	23.80952	13.52471	4.368983	2.090211
CPD-CPL	50	69.84325	66.51843	73.16807	42.85714	112.9032	70.04608	136.8665	11.699

Table 17. Genus *Pharyngochromis* meristics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	50	48.76	46.49838	51.02162	32	66	34	63.32898	7.957951
LJT	50	36	34.49837	37.50163	28	50	22	27.91837	5.283783
UJIR	50	1.92	1.749289	2.090711	1	3	2	0.360816	0.60068
LJIR	50	1.82	1.660779	1.979221	1	3	2	0.313878	0.560248
CERATO	50	8.14	7.767855	8.512145	6	11	5	1.714694	1.309463
EPI	50	2.6	2.270168	2.929832	1	5	4	1.346939	1.160577
DSPIN	50	14.72	14.5572	14.8828	13	16	3	0.328163	0.572855
DSOFT	50	10.26	9.888742	10.63126	8	12	4	1.706531	1.306342
ASOFT	50	7.54	7.331317	7.748683	6	9	3	0.539184	0.734291
P	50	12.24	12.02857	12.45143	11	13	2	0.553469	0.743955
ULL	50	20.96	20.66746	21.25254	19	23	4	1.059592	1.029365
LLL	50	11.9	11.54957	12.25043	9	14	5	1.520408	1.233048
LOL	50	32.26	31.69799	32.82201	22	35	13	3.910612	1.977527
DLLA	50	6.02	5.873729	6.166271	5	7	2	0.264898	0.514682
ALLA	50	6.84	6.64648	7.03352	6	8	2	0.463673	0.680936
PV	50	4.62	4.316778	4.923222	4	7	3	1.138367	1.066943
CP	50	14.68	14.40801	14.95199	14	16	2	0.915918	0.957036
CK	50	3.38	3.229289	3.530711	3	5	2	0.281224	0.530306

Table 18. Genus *Serranochromis* percentages

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	258	17.64806	17.29996	17.99617	11.05991	24.28078	13.22087	8.061865	2.839342
SNL-HL	258	31.64998	31.14976	32.15019	19.42857	46.38783	26.95926	16.64713	4.08009
LJL-HL	258	47.55978	46.99414	48.12541	30.63725	57.61124	26.97399	21.28587	4.613661
PPL-HL	258	35.14441	34.58744	35.70138	20	44.3769	24.3769	20.63879	4.542993
CHD-HL	258	28.84626	28.32561	29.36691	17.69231	50.22624	32.53394	18.03511	4.246777
ED-HL	258	23.28086	22.6726	23.88912	14.60905	40.94488	26.33583	24.61514	4.961365
IOW-HL	258	18.95364	18.58955	19.31773	12.68293	40.20833	27.52541	8.819268	2.969725
IOW-HW	258	57.0534	55.83287	58.27393	40	107.8212	67.82123	99.11101	9.955451
HW-HL	258	33.64417	33.06165	34.22669	17.28763	49.37186	32.08423	22.57558	4.751376
HL-SL	258	36.49888	36.26498	36.73277	28.22222	42.8777	14.65548	3.639674	1.907793
BD-SL	258	32.44273	32.06529	32.82018	21.66667	52.59516	30.92849	9.478251	3.078677
DFB-SL	258	52.34938	51.85615	52.84261	17.93722	68.57143	50.63421	16.18539	4.023107
AFB-SL	258	17.92225	17.5152	18.32931	11.05991	53.36323	42.30332	11.02374	3.320202
PRD-SL	258	37.16651	36.88312	37.4499	26.39594	45.24715	18.85121	5.343055	2.311505
PRP-SL	258	41.57319	41.21577	41.93062	35.85526	70.20202	34.34676	8.499565	2.915401
PRV-SL	258	36.734	36.47059	36.99742	28.57143	44.44444	15.87302	4.616366	2.148573
PRA-SL	258	68.93341	68.59994	69.26688	58.27506	81.06509	22.79003	7.398341	2.719989
CPL-SL	258	16.52758	16.31132	16.74384	9.836066	21.875	12.03893	3.111579	1.763967
CPD-SL	258	12.63293	12.44841	12.81746	8.256881	21.30178	13.04489	2.265266	1.50508
CPD-CPL	258	77.46242	75.89149	79.03336	39.13043	120.8333	81.7029	164.1871	12.81355

Table 19. Genus *Serranochromis* meristics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	268	53.14179	51.34556	54.93803	24	90	66	223.0585	14.93514
LJT	268	39.05597	37.6411	40.47085	20	70	50	138.3976	11.76425
UJIR	269	1.468401	1.387083	1.54972	0	4	4	0.458886	0.677411
LJIR	269	0.98513	0.909655	1.060605	0	4	4	0.3953	0.628729
CERATO	275	10.74545	10.61357	10.87734	8	15	7	1.23424	1.110964
ARTIC	275	1.047273	0.954209	1.140337	1	14	13	0.614545	0.783929
EPI	275	3.334545	3.25891	3.410181	2	5	3	0.405919	0.637118
DSPIN	275	15.12727	15.04286	15.21169	12	18	6	0.50564	0.711084
DSOFT	275	13.94909	13.80364	14.09454	8	17	9	1.501048	1.225173
ASOFT	275	9.843636	9.698724	9.988549	7	15	8	1.49006	1.22068
P	275	13.20727	13.09682	13.31772	11	16	5	0.86564	0.930398
ULL	275	23.08	22.88995	23.27005	17	28	11	2.56292	1.600912
LLL	275	14.77455	14.58974	14.95935	10	19	9	2.423437	1.556739
LOL	275	36.78545	36.53948	37.03143	31	44	13	4.293218	2.072008
DLLA	275	7.370909	7.273582	7.468237	5	10	5	0.672143	0.819843
ALLA	275	7.756364	7.670698	7.842029	6	11	5	0.520717	0.721607
PV	275	4.92	4.830931	5.009069	3	7	4	0.56292	0.75028
CP	275	17.45455	17.32266	17.58643	16	20	4	1.23424	1.110964
CK	275	6.236364	6.057839	6.414888	3	11	8	2.261447	1.503811

Table 20. Genus *Sargochromis* percentages

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	202	20.68625	20.25718	21.11533	10.81081	29.38776	18.57694	9.564778	3.092698
SNL-HL	202	34.21026	33.72202	34.6985	24.32432	43.80734	19.48302	12.38442	3.519151
LJL-HL	202	35.9389	35.46679	36.41102	27.41313	46.31579	18.90266	11.57977	3.402906
PPL-HL	202	30.79177	30.3871	31.19643	22.29508	42.20532	19.91024	8.507616	2.916782
CHD-HL	202	28.38358	27.9089	28.85826	18.91892	39.56522	20.6463	11.70592	3.421391
ED-HL	202	26.33221	25.76501	26.8994	20	54.67626	34.67626	16.71368	4.088237
IOW-HL	202	25.81224	25.40183	26.22265	18.43137	32.08955	13.65818	8.750923	2.958196
IOW-HW	202	63.25182	62.16069	64.34296	46.25	93.47826	47.22826	61.85338	7.864692
HW-HL	202	41.0913	40.47019	41.71241	26.44628	58.20569	31.75941	20.04209	4.47684
HL-SL	202	34.58679	34.33773	34.83585	28.08081	39.32836	11.24755	3.222696	1.795187
BD-SL	202	37.79217	37.31716	38.26717	31.29252	47.65957	16.36706	11.72213	3.423759
DFB-SL	202	55.36606	54.84663	55.8855	14.98471	62.5	47.51529	14.01752	3.743998
AFB-SL	202	18.29666	18.0504	18.54292	12.20657	25.92593	13.71935	3.150681	1.775016
PRD-SL	202	37.8101	37.5548	38.06539	33.03835	43.00971	9.971361	3.386059	1.840125
PRP-SL	202	41.45186	41.05605	41.84767	35.62232	69.96047	34.33816	8.139228	2.852933
PRV-SL	202	35.35591	35.05651	35.65532	28.44037	44.70588	16.26552	4.657192	2.158053
PRA-SL	202	70.70767	70.35444	71.06091	63.91304	79.81221	15.89916	6.482408	2.546057
CPL-SL	202	15.98577	15.72913	16.24241	11.33333	20.72072	9.387387	3.421932	1.849846
CPD-SL	202	14.46801	14.27242	14.6636	11.4094	21.25984	9.850447	1.987477	1.409779
CPD-CPL	202	92.24698	89.8181	94.67587	63.63636	145.9459	82.30958	306.4946	17.50699

Table 21. Genus *Sargochromis* meristics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	182	43.8022	42.7412	44.8632	30	64	34	52.62364	7.254215
LJT	182	34.98352	34.15351	35.81352	20	48	28	32.20415	5.67487
UJIR	191	1.806283	1.478872	2.133694	0	32	32	5.262276	2.293965
LJIR	191	1.685864	1.358564	2.013163	0	32	32	5.258694	2.293184
CERATO	205	10.27317	10.1187	10.42764	5	15	10	1.258345	1.12176
ARTIC	205	1			1	1	0	0	0
EPI	205	3.614634	3.527032	3.702236	2	5	3	0.404687	0.63615
DSPIN	206	14.84466	14.77479	14.91453	13	16	3	0.258679	0.508605
DSOFT	206	12.32524	12.16152	12.48897	10	15	5	1.42053	1.19186
ASOFT	206	8.737864	8.642962	8.832767	7	11	4	0.477291	0.690863
P	206	12.80583	12.69384	12.91781	11	15	4	0.664551	0.8152
ULL	206	21.56311	21.42319	21.70302	18	24	6	1.037462	1.018559
LLL	206	13.26699	13.1312	13.40278	11	16	5	0.977149	0.988508
LOL	206	33.81553	33.65244	33.97863	30	37	7	1.409709	1.187312
DLLA	206	6.441748	6.35877	6.524726	5	8	3	0.364883	0.604055
ALLA	206	7.23301	7.152273	7.313747	6	9	3	0.345442	0.587743
PV	206	4.18932	4.102645	4.275996	3	6	3	0.398129	0.630975
CP	206	15.66019	15.54028	15.78011	12	18	6	0.762018	0.872936
CK	206	3.684466	3.577418	3.791514	2	6	4	0.60727	0.779275

Table 22. *Pseudocrenilabrus philander philander* **percentages**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance
LACRD-HL	22	17.24747	16.41183	18.0831	14.59227	21.2766	6.684321	3.552148
SNL-HL	22	30.90125	29.99381	31.80868	27.55102	35.25641	7.70539	4.188809
LJL-HL	22	33.26464	31.66456	34.86473	25.3012	39.48498	14.18377	13.02393
PPL-HL	22	27.95581	26.92724	28.98438	24.07407	32.0442	7.970125	5.38177
CHD-HL	22	25.14537	24.18527	26.10547	20.25316	28.37838	8.125214	4.689073
ED-HL	22	28.40542	27.73227	29.07857	25.45455	31.03448	5.579937	2.305052
IOW-HL	22	23.08506	22.00454	24.16558	18.6747	26.57005	7.89535	5.939129
IOW-HW	22	56.35954	53.51976	59.19931	43.66197	67.90123	24.23926	41.02267
HW-HL	22	41.05718	40.04332	42.07104	37.5	45.71429	8.214286	5.228909
HL-SL	22	37.71287	36.8362	38.58955	33.83178	42.09524	8.263462	3.909631
BD-SL	22	34.61736	33.58867	35.64605	28.40909	37.97468	9.565593	5.383037
DFB-SL	22	54.9049	53.5105	56.29929	47.61905	61.40351	13.78446	9.890697
AFB-SL	22	18.39707	17.67835	19.11579	15.84158	21.46341	5.62183	2.627683
PRD-SL	22	38.02803	37.00889	39.04717	33.64486	43.90244	10.25758	5.283539
PRP-SL	22	43.09486	42.12517	44.06455	39.80583	47.57282	7.76699	4.783263
PRV-SL	22	37.79593	37.02066	38.57121	35	41.66667	6.666667	3.057498
PRA-SL	22	69.70341	68.48607	70.92075	64.63415	76.19048	11.55633	7.538419
CPL-SL	22	16.73671	16.13193	17.34149	12.65823	19.14894	6.490708	1.860611
CPD-SL	22	13.80421	13.40118	14.20723	12.2807	15.53398	3.253279	0.826275
CPD-CPL	22	83.11742	78.53602	87.69882	72.22222	120	47.77778	106.7712

Table 23. *Pseudocrenilabrus philander philander* **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	22	46.63636	43.67143	49.6013	36	60	24	44.71861	6.687198
LJT	22	39	35.87084	42.12916	22	52	30	49.80952	7.057586
UJIR	22	1.727273	1.483203	1.971343	1	3	2	0.30303	0.550482
LJIR	22	1.590909	1.367787	1.814032	1	2	1	0.253247	0.503236
CERATO	22	7.363636	7.013573	7.7137	6	9	3	0.623377	0.789542
EPI	22	2.409091	2.185968	2.632213	2	3	1	0.253247	0.503236
DSPIN	22	14.09091	13.85753	14.32428	13	15	2	0.277056	0.526361
DSOFT	22	9.590909	8.597991	10.58383	7	19	12	5.015152	2.239453
ASOFT	22	7.181818	6.920896	7.44274	6	8	2	0.34632	0.58849
P	22	10.95455	10.58039	11.3287	9	12	3	0.712121	0.843873
ULL	22	17.59091	17.16566	18.01616	16	20	4	0.919913	0.959121
LLL	22	8.772727	8.26201	9.283445	6	12	6	1.32684	1.151885
LOL	22	26.31818	25.7992	26.83716	25	29	4	1.37013	1.170525
DLLA	22	5.772727	5.538442	6.007013	5	7	2	0.279221	0.528413
ALLA	22	8.090909	7.901853	8.279965	7	9	2	0.181818	0.426401
PV	22	3.5	3.235033	3.764967	3	5	2	0.357143	0.597614
CP	22	13.45455	12.89493	14.01416	12	16	4	1.593074	1.26217
CK	22	3.136364	2.980628	3.292099	3	4	1	0.123377	0.35125

Table 24. *Pseudocrenilabrus* **'sp haplochromis-orange' percentage data**

Variables	Valid N	Mean	-95.000%	+95.000%	Minimum	Maximum	Std.Dev.
LACRD-HL	7	17.80877	16.55297	19.06457	15.95092	19.75309	1.357845
SNL-HL	7	33.00742	30.13571	35.87912	27.54491	36.45833	3.105063
LJL-HL	7	34.49421	32.10695	36.88148	30.8642	37.9085	2.58126
PPL-HL	7	27.09497	23.93476	30.25517	22.75449	32.67974	3.417005
CHD-HL	7	23.10067	20.58855	25.61279	20.35928	28.10458	2.716263
ED-HL	7	37.14392	35.53064	38.7572	34.375	39.2638	1.744379
IOW-HL	7	15.93868	14.48281	17.39455	14.59459	18.51852	1.574179
IOW-HW	7	39.32638	35.2314	43.42136	34.17722	46.875	4.427747
HW-HL	7	40.59222	39.56835	41.6161	39.50617	42.7027	1.107075
HL-SL	7	34.18875	32.89101	35.48649	32.27723	36.27451	1.403198
BD-SL	7	29.27216	26.90367	31.64065	25.74257	32.35294	2.56096
DFB-SL	7	53.60745	52.09614	55.11876	50.49505	55.55556	1.634119
AFB-SL	7	18.8225	17.67769	19.96732	16.83168	20.20202	1.237847
PRD-SL	7	35.81565	34.15241	37.47888	33.33333	38.29787	1.798394
PRP-SL	7	40.10934	37.44768	42.771	36.36364	44.44444	2.877951
PRV-SL	7	35.56456	33.43455	37.69456	31.68317	38.29787	2.303093
PRA-SL	7	65.7253	63.03324	68.41736	61.38614	70.58824	2.910821
CPL-SL	7	19.22747	18.29686	20.15809	17.89474	20.79208	1.00624
CPD-SL	7	10.82323	10.12563	11.52082	9.677419	11.76471	0.754282
CPD-CPL	7	56.50113	50.98995	62.01231	50	64.70588	5.959026

Table 25. *Pseudocrenilabrus* **'sp haplochromis-orange' meristics**

Variables	Valid N	Mean	-95.000%	+95.000%	Minimum	Maximum	Std.Dev.
HL	7	16.91429	15.61793	18.21064	15.3	19.2	1.4017
UJT	7	51.71429	43.41272	60.01585	38	68	8.976159
LJT	7	43.14286	39.02656	47.25915	34	48	4.450789
UJIR	7	2.857143	2.025026	3.689259	2	4	0.899735
LJIR	7	2.714286	2.263007	3.165564	2	3	0.48795
CERATO	7	8.714286	8.263007	9.165564	8	9	0.48795
EPI	7	3.142857	2.793298	3.492416	3	4	0.377964
DSPIN	7	14.14286	13.15416	15.13156	13	15	1.069045
DSOFT	7	9.857143	9.218939	10.49535	9	11	0.690066
ASOFT	7	7.428571	6.526014	8.331128	6	9	0.9759
P	7	10.85714	10.21894	11.49535	10	12	0.690066
ULL	7	19.57143	18.39464	20.74822	17	21	1.272418
LLL	7	10.57143	8.982313	12.16054	8	13	1.718249
LOL	7	29.85714	28.61305	31.10123	28	32	1.345185
DLLA	7	6.285714	5.834436	6.736993	6	7	0.48795
ALLA	7	7.428571	6.934221	7.922922	7	8	0.534522
PV	7	4.714286	4.263007	5.165564	4	5	0.48795
CP	7	12.28571	11.5866	12.98483	12	14	0.755929
CK	7	3.142857	2.793298	3.492416	3	4	0.377964

Table 26. Lufubu *Pseudocrenilabrus* species percentage data

Variables	Valid N	Mean	-95.000%	+95.000%	Minimum	Maximum	Std.Dev.
LACRD-HL	9	19.07376	17.94835	20.19918	16.92308	20.89552	1.464113
SNL-HL	9	30.02498	27.73318	32.31678	25.38462	34.21053	2.981516
LJL-HL	9	33.74818	31.08306	36.41329	29.23077	39.47368	3.467185
PPL-HL	9	28.61003	26.6236	30.59646	23.84615	31.51515	2.584248
CHD-HL	9	23.0163	20.91596	25.11664	20	28.94737	2.732438
ED-HL	9	29.02083	27.06461	30.97705	24.87562	33.7931	2.544952
IOW-HL	9	22.39913	21.29512	23.50315	19.31034	24	1.436274
IOW-HW	9	57.18487	53.2104	61.15934	47.45763	64.61538	5.170591
HW-HL	9	39.29716	37.63317	40.96116	35.38462	41.66667	2.164777
HL-SL	9	37.48162	36.30529	38.65794	35.48387	40.22989	1.530342
BD-SL	9	34.54708	33.48813	35.60602	31.88406	36.78161	1.377637
DFB-SL	9	52.93739	50.17167	55.70312	44.92754	56.47059	3.598073
AFB-SL	9	15.67307	14.51041	16.83572	13.63636	17.56757	1.512559
PRD-SL	9	38.50012	36.55781	40.44242	34.78261	42.04545	2.526845
PRP-SL	9	44.1628	41.53382	46.79178	38.70968	49.41176	3.420179
PRV-SL	9	37.66278	36.39382	38.93173	34.4086	39.18919	1.650852
PRA-SL	9	69.64058	66.91315	72.368	64.51613	76.47059	3.548253
CPL-SL	9	18.97519	17.86205	20.08834	16.53543	20.68966	1.448145
CPD-SL	9	13.08306	12.43798	13.72813	12.16216	15.05376	0.839212
CPD-CPL	9	69.25064	64.61799	73.8833	60	76.19048	6.026861

Table 27. Lufubu *Pseudocrenilabrus* species meristics data

Variables	Valid N	Mean	-95.000%	+95.000%	Minimum	Maximum	Std.Dev.
SL	9	45.44444	38.60847	52.28042	34.5	63.5	8.893271
HL	9	15.85556	12.40315	19.30796	6.8	22.8	4.491412
UJT	9	35.77778	32.38827	39.16729	26	42	4.409586
LJT	9	28.22222	25.40377	31.04067	26	36	3.666667
UJIR	9	1.222222	0.883271	1.561173	1	2	0.440959
LJIR	9	1.444444	1.039321	1.849568	1	2	0.527046
CERATO	9	7.777778	7.438827	8.116729	7	8	0.440959
EPI	9	2.777778	2.438827	3.116729	2	3	0.440959
DSPIN	9	14.33333	13.7898	14.87686	13	15	0.707107
DSOFT	9	9.555556	8.877654	10.23346	8	11	0.881917
ASOFT	9	7.888889	7.632666	8.145112	7	8	0.333333
P	9	11.77778	11.43883	12.11673	11	12	0.440959
ULL	9	18.77778	18.03077	19.52479	17	20	0.971825
LLL	9	9.111111	7.600701	10.62152	6	11	1.964971
LOL	9	27.77778	26.02588	29.52967	24	30	2.279132
ALLA	9	7.333333	6.948999	7.717667	7	8	0.5
PV	9	4.555556	4.150432	4.960679	4	5	0.527046
CP	9	14.22222	13.70978	14.73467	14	16	0.666667
CK	9	3			3	3	0

Table 28. Lunzua *Pseudocrenilabrus* species percentages

Variables	Valid N	Mean	-95.000%	+95.000%	Minimum	Maximum	Std.Dev.
LACRD-HL	5	18.45447	17.69971	19.20923	17.89883	19.36759	0.60786
SNL-HL	5	31.65646	30.154	33.15892	29.64427	32.78689	1.210041
LJL-HL	5	34.48755	33.18194	35.79316	33.16062	35.8209	1.051498
PPL-HL	5	29.44651	26.97336	31.91966	27.86885	32.83582	1.991804
CHD-HL	5	27.27556	24.80071	29.75041	24.87562	29.91803	1.993172
ED-HL	5	26.02496	22.85004	29.19989	23.32016	29.35323	2.556993
IOW-HL	5	22.20066	19.85425	24.54707	19.36759	24.35233	1.889732
IOW-HW	5	54.54054	51.32083	57.76024	51.45631	58.02469	2.593056
HW-HL	5	40.68314	37.59111	43.77517	36.75889	42.78607	2.490228
HL-SL	5	37.64434	34.44845	40.84023	35.20548	41.81818	2.573878
BD-SL	5	32.89737	32.39081	33.40394	32.2314	33.33333	0.40797
DFB-SL	5	52.24413	48.19097	56.2973	47.10744	55.47945	3.264302
AFB-SL	5	17.60596	15.09443	20.11748	15.50388	20.54795	2.022708
PRD-SL	5	37.44931	35.34625	39.55236	35.53719	39.80583	1.69374
PRP-SL	5	42.33334	37.95065	46.71602	38.35616	47.93388	3.529687
PRV-SL	5	37.39573	35.25839	39.53306	34.93151	39.66942	1.721345
PRA-SL	5	66.92031	63.72052	70.1201	63.39286	70.24793	2.577017
CPL-SL	5	18.60904	16.97971	20.23836	16.43836	19.83471	1.312211
CPD-SL	5	11.95901	10.77083	13.1472	10.85271	13.39286	0.956929
CPD-CPL	5	64.61905	54.71508	74.52302	58.33333	75	7.976368

Table 29. Lunzua *Pseudocrenilabrus* species meristics

Variables	Valid N	Mean	-95.000%	+95.000%	Minimum	Maximum	Std.Dev.
HL	5	22.96	19.20245	26.71755	19.3	25.7	3.026219
UJT	5	44	40.07351	47.92649	40	48	3.162278
LJT	5	36.4	31.95769	40.84231	32	40	3.577709
UJIR	5	2.2	1.644711	2.755289	2	3	0.447214
LJIR	5	1.4	0.719913	2.080087	1	2	0.547723
CERATO	5	6.4	5.719913	7.080087	6	7	0.547723
EPI	5	2			2	2	0
DSPIN	5	13.8	12.76115	14.83885	13	15	0.83666
DSOFT	5	9.2	8.161149	10.23885	8	10	0.83666
ASOFT	5	7.8	7.244711	8.355289	7	8	0.447214
P	5	11.4	10.71991	12.08009	11	12	0.547723
ULL	5	17.8	17.24471	18.35529	17	18	0.447214
LLL	5	10	9.122011	10.87799	9	11	0.707107
LOL	5	27.8	26.76115	28.83885	27	29	0.83666
DLLA	5	5.8	5.244711	6.355289	5	6	0.447214
ALLA	5	7.8	7.244711	8.355289	7	8	0.447214
PV	5	3.4	2.719913	4.080087	3	4	0.547723
CP	5	12.8	11.43983	14.16017	12	14	1.095445
CK	5	3			3	3	0

Table 30. ***Pharyngochromis acuticeps*** **percentages**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	13	19.38674	18.23995	20.53353	16.82243	24.02235	7.199916	3.601412	1.897739
SNL-HL	13	34.37132	33.12272	35.61991	30.45977	37.94643	7.486658	4.269194	2.066203
LJL-HL	13	36.65055	34.82111	38.47999	30.87558	40.54054	9.664965	9.165165	3.027402
PPL-HL	13	31.60883	30.36515	32.85251	27.14286	33.62069	6.477833	4.235664	2.058073
CHD-HL	13	27.44495	26.25307	28.63683	25.2381	31.79724	6.55914	3.890186	1.972355
ED-HL	13	33.00344	32.06253	33.94434	30.64516	35.58559	4.940424	2.424344	1.557031
IOW-HL	13	17.9583	16.87298	19.04361	15.49296	21.62162	6.128664	3.225621	1.796002
IOW-HW	13	43.66135	41.88408	45.43862	39.77273	49.51456	9.741836	8.649877	2.941067
HW-HL	13	41.07186	39.96074	42.18298	38.49765	44.59459	6.096942	3.380851	1.838709
HL-SL	13	34.66379	34.05086	35.27672	32.87879	36.2069	3.328109	1.028785	1.014291
BD-SL	13	31.37265	29.4392	33.3061	27.55906	39.39394	11.83488	10.23693	3.19952
DFB-SL	13	52.81851	51.65915	53.97787	48.54369	55.30303	6.759341	3.680777	1.918535
AFB-SL	13	14.0701	12.97788	15.16232	11.2069	16.53543	5.328537	3.266819	1.807434
PRD-SL	13	37.78524	36.828	38.74248	35.60606	40.7767	5.170638	2.509256	1.584063
PRP-SL	13	39.80421	38.85781	40.7506	36.50794	43	6.492063	2.452714	1.566114
PRV-SL	13	35.32982	34.57961	36.08002	33.33333	37.37374	4.040404	1.541216	1.241457
PRA-SL	13	72.92161	71.81736	74.02587	69.84127	75.75758	5.916306	3.339192	1.827346
CPL-SL	13	17.48777	16.84588	18.12967	15.94203	19.23077	3.28874	1.128321	1.062225
CPD-SL	13	12.21458	11.80404	12.62513	11.11111	13.70968	2.598566	0.461557	0.67938
CPD-CPL	13	70.17096	66.10135	74.24056	58.33333	80.95238	22.61905	45.35315	6.734475

Table 31. ***Pharyngochromis acuticeps*** **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	13	47.07692	43.08019	51.07366	40	62	22	43.74359	6.613894
LJT	13	34.15385	31.61574	36.69195	28	44	16	17.64103	4.200122
UJIR	13	2.153846	1.818644	2.489048	1	3	2	0.307692	0.5547
LJIR	13	1.923077	1.624829	2.221325	1	3	2	0.24359	0.493548
CERATO	13	7.769231	7.266428	8.272034	7	9	2	0.692308	0.83205
ARTIC	13	1			1	1	0	0	0
EPI	13	2.692308	2.402014	2.982601	2	3	1	0.230769	0.480384
DSPIN	13	14.84615	14.61922	15.07309	14	15	1	0.141026	0.375534
DSOFT	13	9	8.5727	9.4273	8	10	2	0.5	0.707107
ASPIN	13	3			3	3	0	0	0
ASOFT	13	6.923077	6.624829	7.221325	6	8	2	0.24359	0.493548
P	13	11.53846	11.13949	11.93743	11	13	2	0.435897	0.660225
ULL	13	20.46154	20.06257	20.86051	19	21	2	0.435897	0.660225
LLL	13	11.23077	10.6707	11.79083	9	12	3	0.858974	0.926809
LOL	13	31.53846	30.95386	32.12307	30	33	3	0.935897	0.967418
DLLA	13	6.076923	5.689865	6.463981	5	7	2	0.410256	0.640513
ALLA	13	7.076923	6.55583	7.598016	6	8	2	0.74359	0.862316
PV	13	6	5.395706	6.604294	4	7	3	1	1
CP	13	14.61538	14.0348	15.19597	14	16	2	0.923077	0.960769
CK	13	3.153846	2.926913	3.380779	3	4	1	0.141026	0.375534

Table 34. ***Pharyngochromis*** **' sp elongatus small' percentages**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	5	21.84583	19.50704	24.18461	19.6	24.20635	4.606349	3.5479	1.883587
SNL-HL	5	35.83566	34.45584	37.21547	34.12322	36.90476	2.781539	1.234905	1.111263
LJL-HL	5	36.41305	35.36027	37.46583	35.54502	37.6	2.054976	0.718897	0.847878
PPL-HL	5	31.46752	29.1579	33.77714	28.43602	33.33333	4.897314	3.459965	1.860098
CHD-HL	5	25.53393	21.79176	29.2761	20.85308	28.96825	8.115173	9.083218	3.013838
ED-HL	5	29.19047	27.91879	30.46214	27.65957	30.33175	2.672179	1.048923	1.024169
IOW-HL	5	21.3056	19.08463	23.52657	19.04762	23.69668	4.649063	3.199457	1.788703
IOW-HW	5	52.81133	47.54609	58.07656	47.52475	58.13953	10.61478	17.98156	4.240467
HW-HL	5	40.33427	39.95648	40.71206	40	40.75829	0.758294	0.092575	0.304261
HL-SL	5	34.058	33.48491	34.63109	33.33333	34.52055	1.187215	0.213028	0.46155
BD-SL	5	28.828	27.93015	29.72586	27.89116	29.87805	1.986892	0.522884	0.723107
DFB-SL	5	51.64658	50.41245	52.88071	50.60976	53.06122	2.451468	0.987901	0.993932
AFB-SL	5	15.8592	14.1389	17.5795	14.96599	18.29268	3.326697	1.919548	1.385477
PRD-SL	5	35.7421	34.62731	36.85689	34.69388	36.9863	2.292424	0.806076	0.897817
PRP-SL	5	39.82671	38.83469	40.81873	38.77551	40.85366	2.078148	0.638314	0.798946
PRV-SL	5	34.43077	32.47918	36.38236	33.06452	36.9863	3.921785	2.470405	1.571752
PRA-SL	5	65.79145	62.03938	69.54352	60.54422	67.80822	7.264001	9.131327	3.021808
CPL-SL	5	20.85775	19.04399	22.67151	19.17808	23.12925	3.95117	2.133791	1.46075
CPD-SL	5	15.22753	8.398711	22.05635	10.9589	23.80952	12.85062	30.24703	5.49973
CPD-CPL	5	72.4798	42.59964	102.36	55.88235	112.9032	57.02087	579.1056	24.06461

Table 35. ***Pharyngochromis*** **' sp elongatus small' meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	5	52.8	45.86444	59.73556	48	62	14	31.2	5.585696
LJT	5	37.6	33.51948	41.68052	34	42	8	10.8	3.286335
UJIR	5	1.8	1.244711	2.355289	1	2	1	0.2	0.447214
LJIR	5	1.6	0.919913	2.280087	1	2	1	0.3	0.547723
CERATO	5	7.4	6.289422	8.510578	6	8	2	0.8	0.894427
ARTIC	5	1			1	1	0	0	0
EPI	5	3.2	2.644711	3.755289	3	4	1	0.2	0.447214
DSPIN	5	14.8	14.24471	15.35529	14	15	1	0.2	0.447214
DSOFT	5	10.4	8.516923	12.28308	8	12	4	2.3	1.516575
ASPIN	5	3			3	3	0	0	0
ASOFT	5	7.8	7.244711	8.355289	7	8	1	0.2	0.447214
P	5	12.2	11.16115	13.23885	11	13	2	0.7	0.83666
ULL	5	20.6	19.48942	21.71058	20	22	2	0.8	0.894427
LLL	5	12.8	12.24471	13.35529	12	13	1	0.2	0.447214
LOL	5	33	32.12201	33.87799	32	34	2	0.5	0.707107
DLLA	5	6			6	6	0	0	0
ALLA	5	6.6	5.919913	7.280087	6	7	1	0.3	0.547723
PV	5	4			4	4	0	0	0
CP	5	15.2	13.83983	16.56017	14	16	2	1.2	1.095445
CK	5	3.4	2.719913	4.080087	3	4	1	0.3	0.547723

Table 36. ***Pharyngochromis*** **'sp elongatus' percentages**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	3	22.35585	17.63641	27.07528	20.57971	24.35897	3.779264	3.609354	1.89983
SNL-HL	3	38.69156	34.63127	42.75185	36.81159	39.77591	2.964316	2.671549	1.634487
LJL-HL	3	37.38256	33.43648	41.32864	36.41026	39.21569	2.80543	2.523369	1.588512
PPL-HL	3	32.92547	28.28012	37.57082	31.65266	35.07246	3.419803	3.496915	1.870004
CHD-HL	3	27.33965	24.91012	29.76919	26.66667	28.46154	1.794872	0.956523	0.97802
ED-HL	3	27.96493	24.09588	31.83397	26.66667	29.69188	3.02521	2.425807	1.5575
IOW-HL	3	23.78795	18.77424	28.80165	22.30769	26.08696	3.779264	4.073483	2.018287
IOW-HW	3	58.50645	51.46427	65.54863	56.12903	61.64384	5.514803	8.03643	2.83486
HW-HL	3	40.61278	36.94227	44.28329	39.74359	42.31884	2.575251	2.183243	1.47758
HL-SL	3	34.88997	34.65089	35.12905	34.82143	35	0.178571	0.009263	0.096243
BD-SL	3	33.22918	31.92483	34.53352	32.82828	33.82353	0.995247	0.275699	0.525071
DFB-SL	3	54.92026	53.01274	56.82779	54.41176	55.80357	1.391807	0.589643	0.767882
AFB-SL	3	15.86338	12.8094	18.91736	14.73214	17.17172	2.439574	1.511405	1.229392
PRD-SL	3	36.24675	35.31507	37.17842	35.85859	36.60714	0.748557	0.140663	0.37505
PRP-SL	3	39.11551	37.77349	40.45753	38.72549	39.73214	1.006653	0.291854	0.540235
PRV-SL	3	34.33415	31.89714	36.77116	33.33333	35.29412	1.960784	0.96242	0.98103
PRA-SL	3	68.7027	67.69098	69.71441	68.30357	69.11765	0.814076	0.165868	0.407269
CPL-SL	3	18.22214	17.26144	19.18284	17.85714	18.62745	0.770308	0.149563	0.386734
CPD-SL	3	12.46534	10.76628	14.1644	11.76471	13.13131	1.366607	0.467805	0.683963
CPD-CPL	3	68.46004	56.7242	80.19588	63.15789	72.22222	9.064327	22.31912	4.724311

Table 37. ***Pharyngochromis*** **'sp elongatus' meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	3	50.66667	39.19293	62.14041	48	56	8	21.33333	4.618802
LJT	3	36	10.18408	61.81592	30	48	18	108	10.3923
UJIR	3	2.333333	0.899116	3.767551	2	3	1	0.333333	0.57735
LJIR	3	1.666667	0.232449	3.100884	1	2	1	0.333333	0.57735
CERATO	3	7.666667	4.798232	10.5351	7	9	2	1.333333	1.154701
ARTIC	3	1			1	1	0	0	0
EPI	3	3			3	3	0	0	0
DSPIN	3	15	12.51586	17.48414	14	16	2	1	1
DSOFT	3	10.66667	9.232449	12.10088	10	11	1	0.333333	0.57735
ASOFT	3	7.666667	6.232449	9.100884	7	8	1	0.333333	0.57735
P	3	12.33333	10.89912	13.76755	12	13	1	0.333333	0.57735
ULL	3	21.33333	17.53875	25.12792	20	23	3	2.333333	1.527525
LLL	3	12	9.515862	14.48414	11	13	2	1	1
LOL	3	33			33	33	0	0	0
DLLA	3	5.666667	4.232449	7.100884	5	6	1	0.333333	0.57735
ALLA	3	6.333333	4.899116	7.767551	6	7	1	0.333333	0.57735
PV	3	4			4	4	0	0	0
CP	3	14			14	14	0	0	0
CK	3	3.333333	1.899116	4.767551	3	4	1	0.333333	0.57735

Table 38. ***Serranochromis altus*** **percentages**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	10	21.07243	19.69073	22.45412	16.75774	23.28918	6.531442	3.730596	1.931475
SNL-HL	10	34.4698	33.20622	35.73339	31.82674	36.67861	4.851872	3.120067	1.766371
LJL-HL	10	51.38737	49.98726	52.78748	48.26762	53.74677	5.479148	3.830716	1.957221
PPL-HL	10	39.87276	38.39325	41.35227	35.88342	43.15245	7.26903	4.277515	2.068215
CHD-HL	10	32.9943	30.86756	35.12104	27.3913	36.82171	9.430401	8.838604	2.972979
ED-HL	10	18.97576	17.29592	20.65561	15.84906	22.3913	6.542248	5.514325	2.34826
IOW-HL	10	20.56362	19.29625	21.831	18.54305	24.13381	5.590765	3.138808	1.771668
IOW-HW	10	63.84692	61.56448	66.12937	58.33333	70.13889	11.80556	10.1802	3.190642
HW-HL	10	32.18802	30.87241	33.50362	29.1439	34.4086	5.264704	3.382249	1.839089
HL-SL	10	36.465	35.53593	37.39407	33.72549	37.55102	3.82553	1.686747	1.298748
BD-SL	10	36.30524	34.80669	37.80379	32.2449	39.49192	7.247019	4.388291	2.094825
DFB-SL	10	54.42706	52.69844	56.15568	49.79592	57.27069	7.474775	5.839174	2.416438
AFB-SL	10	20.21545	19.08265	21.34824	18	22.44094	4.440945	2.507587	1.583536
PRD-SL	10	37.18659	36.52897	37.84422	35.51198	38.47875	2.966765	0.845114	0.919301
PRP-SL	10	41.52478	40.45661	42.59295	39.17323	43.33333	4.160105	2.22965	1.493201
PRV-SL	10	35.77596	34.43992	37.11199	31.37255	37.66667	6.294118	3.48811	1.867648
PRA-SL	10	67.769	65.76992	69.76807	63.74134	71.83673	8.095395	7.809337	2.794519
CPL-SL	10	15.87803	14.86528	16.89078	13.73239	18.2448	4.512409	2.004278	1.415725
CPD-SL	10	14.01884	13.39317	14.64451	12.9386	15.46841	2.529813	0.764971	0.874626
CPD-CPL	10	88.72034	83.46101	93.97966	80.4878	105.1282	24.6404	54.05226	7.352024

Table 39. ***Serranochromis altus*** **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	10	81.2	76.61576	85.78424	72	90	18	41.06667	6.408328
LJT	10	55.2	49.88086	60.51914	48	68	20	55.28889	7.43565
UJIR	10	3.1	2.572163	3.627837	2	4	2	0.544444	0.737865
LJIR	10	2.7	2.217171	3.182829	2	4	2	0.455556	0.674949
CERATO	10	12.2	11.32063	13.07937	10	13	3	1.511111	1.229273
EPI	10	3.8	3.498379	4.101621	3	4	1	0.177778	0.421637
DSPIN	10	15			15	15	0	0	0
DSOFT	10	16.2	15.89838	16.50162	16	17	1	0.177778	0.421637
ASOFT	10	11.8	11.34757	12.25243	11	13	2	0.4	0.632456
P	10	13.3	12.71107	13.88893	12	14	2	0.677778	0.823273
ULL	10	22.7	22.02135	23.37865	21	24	3	0.9	0.948683
LLL	10	15.7	14.68553	16.71447	12	17	5	2.011111	1.418136
LOL	10	37.8	36.98786	38.61214	36	39	3	1.288889	1.135292
DLLA	10	8.3	7.817171	8.782829	7	9	2	0.455556	0.674949
ALLA	10	7.8	7.498379	8.101621	7	8	1	0.177778	0.421637
PV	10	4.8	4.498379	5.101621	4	5	1	0.177778	0.421637
CP	10	18.8	18.06118	19.53882	18	20	2	1.066667	1.032796
CK	10	8.5	7.592001	9.407999	7	11	4	1.611111	1.269296

Table 40. *Serranochromis angusticeps* **percentages**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	31	20.15946	19.18524	21.13367	12.04013	23.63636	11.59623	7.054119	2.655959
SNL-HL	31	33.60674	32.48285	34.73063	22.22222	36.9697	14.74747	9.388228	3.064022
LJL-HL	31	51.15471	50.4003	51.90911	43.93939	54.05405	10.11466	4.230044	2.056707
PPL-HL	31	40.45905	39.44415	41.47395	32.93651	44.3769	11.44039	7.655624	2.76688
CHD-HL	31	32.01007	30.86942	33.15073	22.5	38.30787	15.80787	9.67042	3.10973
ED-HL	31	19.69364	18.50444	20.88284	15.59508	30	14.40492	10.51102	3.24207
IOW-HL	31	17.46127	16.85661	18.06593	14.28571	21.1039	6.818182	2.717404	1.648455
IOW-HW	31	58.87128	56.88642	60.85615	47.30769	67.93893	20.63124	29.2818	5.411266
HW-HL	31	29.72299	28.98423	30.46174	26.08696	34.09091	8.003953	4.056331	2.014034
HL-SL	31	36.87671	36.41002	37.34339	35.05155	40.81633	5.76478	1.618765	1.272307
BD-SL	31	32.70852	31.99304	33.42399	29.56204	36.33952	6.777479	3.804705	1.950565
DFB-SL	31	52.35027	51.64765	53.05288	48.70466	57.63098	8.926316	3.669144	1.915501
AFB-SL	31	20.40961	19.46513	21.35409	17.64706	32.75862	15.11156	6.630102	2.574898
PRD-SL	31	37.89842	37.40392	38.39292	35.6701	40.31621	4.646102	1.817443	1.348126
PRP-SL	31	41.55082	41.08781	42.01384	39.05724	43.9834	4.926163	1.593416	1.262306
PRV-SL	31	37.02687	36.46081	37.59292	34.31953	41.56627	7.246738	2.381523	1.543218
PRA-SL	31	67.14457	66.53321	67.75592	64	71.78423	7.784232	2.777939	1.666715
CPL-SL	31	16.47767	16.00541	16.94992	13.52785	19.38776	5.859904	1.657646	1.287496
CPD-SL	31	12.01002	11.61625	12.4038	9.090909	13.84083	4.749921	1.152466	1.073529
CPD-CPL	31	73.50559	69.82778	77.1834	52.63158	94.11765	41.48607	100.5341	10.02667

Table 41. *Serranochromis angusticeps* **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	34	67.58824	64.86769	70.30878	54	80	26	60.79501	7.797115
LJT	34	47.52941	45.09951	49.95931	34	62	28	48.49911	6.96413
UJIR	34	1.882353	1.642998	2.121708	1	3	2	0.470588	0.685994
LJIR	34	1.352941	1.127596	1.578286	0	3	3	0.417112	0.645842
CERATO	34	11.26471	11.03248	11.49693	10	13	3	0.442959	0.665552
ARTIC	34	1			1	1	0	0	0
EPI	34	3.617647	3.425293	3.810002	3	5	2	0.303922	0.551291
DSPIN	34	15.08824	14.88923	15.28724	14	16	2	0.325312	0.570361
DSOFT	34	15	14.66732	15.33268	13	17	4	0.909091	0.953463
ASOFT	34	11.26471	10.83257	11.69684	9	15	6	1.533868	1.238494
P	34	12.85294	12.59336	13.11252	11	14	3	0.553476	0.74396
ULL	34	22.58824	22.14925	23.02722	20	25	5	1.582888	1.258129
LLL	34	15.64706	15.13974	16.15438	13	18	5	2.114082	1.453988
LOL	34	37.55882	36.94425	38.1734	34	40	6	3.102496	1.76139
DLLA	34	7.735294	7.446434	8.024155	6	9	3	0.685383	0.827879
ALLA	34	7.735294	7.433933	8.036656	6	11	5	0.745989	0.863707
PV	34	4.676471	4.45379	4.899152	4	7	3	0.407308	0.638207
CP	34	17.70588	17.35666	18.05511	16	20	4	1.001783	1.000891
CK	34	7.235294	6.880518	7.59007	5	9	4	1.033868	1.016793

Table 42. *Serranochromis macrocephalus* **percentage**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	87	16.37452	15.98692	16.76213	11.05991	19.70534	8.645433	3.307436	1.818636
SNL-HL	87	30.5881	30.02445	31.15174	23.20675	36.3964	13.18965	6.993994	2.644616
LJL-HL	87	46.84052	45.85505	47.82599	27.96006	55.69044	27.73038	21.37985	4.623835
PPL-HL	87	35.00468	34.33306	35.6763	21.85185	49.78602	27.93417	9.930441	3.15126
CHD-HL	87	27.60654	26.96591	28.24716	20.4918	35.2459	14.7541	9.034883	3.005808
ED-HL	87	24.09642	23.15508	25.03776	17.96537	34.83607	16.8707	19.50778	4.416761
IOW-HL	87	18.37548	17.88018	18.87078	12.68293	29.14485	16.46192	5.400728	2.323947
IOW-HW	87	52.24774	50.86373	53.63176	40	83.5	43.5	42.16946	6.493802
HW-HL	87	35.3023	34.60922	35.99538	27.01422	41.52174	14.50752	10.57496	3.251916
HL-SL	87	36.82057	36.56598	37.07516	33.70166	39.70588	6.004225	1.426944	1.194548
BD-SL	87	33.07074	32.47163	33.66985	27.90698	52.59516	24.68818	7.901843	2.811022
DFB-SL	87	52.08313	51.24781	52.91844	21.79931	57.07196	35.27265	15.3608	3.919285
AFB-SL	87	17.77924	17.22855	18.32994	11.05991	32.92683	21.86692	6.676331	2.58386
PRD-SL	87	37.6636	37.34807	37.97912	33.46304	41.2844	7.821369	2.191724	1.480447
PRP-SL	87	41.95814	41.21516	42.70112	36.46209	70.20202	33.73993	12.1525	3.486044
PRV-SL	87	36.93262	36.56447	37.30077	30.21583	44.07895	13.86312	2.983817	1.727373
PRA-SL	87	69.7208	69.22681	70.2148	62.5	77.77778	15.27778	5.372361	2.317835
CPL-SL	87	16.36861	16.02912	16.7081	12.09302	21.62162	9.528598	2.537283	1.592885
CPD-SL	87	12.72199	12.47298	12.97101	9.859155	18.79195	8.932791	1.365112	1.16838
CPD-CPL	87	78.28364	76.40833	80.15896	58.33333	103.7037	45.37037	77.42176	8.798963

Table 43. *Serranochromis macrocephalus* **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	112	43.96429	42.70687	45.2217	26	64	38	45.09781	6.71549
LJT	112	32.125	30.86478	33.38522	20	46	26	45.29955	6.730494
UJIR	112	1.116071	1.055827	1.176316	1	2	1	0.103523	0.32175
LJIR	112	0.75	0.668558	0.831442	0	1	1	0.189189	0.434959
CERATO	112	10.04464	9.875316	10.21397	8	13	5	0.817809	0.904328
EPI	112	3.107143	2.999458	3.214828	2	4	2	0.330759	0.575117
DSPIN	112	14.9375	14.85691	15.01809	14	16	2	0.185248	0.430404
DSOFT	112	13.4375	13.25148	13.62352	8	16	8	0.98705	0.993504
ASOFT	112	9.428571	9.282636	9.574507	7	11	4	0.607465	0.7794
P	112	13.39286	13.21628	13.56943	11	16	5	0.889318	0.943037
ULL	112	22.5	22.2352	22.7648	17	25	8	2	1.414214
LLL	112	14.24107	14.00099	14.48115	10	17	7	1.644064	1.28221
LOL	112	35.69643	35.45296	35.9399	31	38	7	1.690798	1.300307
DLLA	112	7.410714	7.260851	7.560577	5	9	4	0.640605	0.800378
ALLA	112	7.723214	7.587377	7.859051	6	11	5	0.526303	0.725467
PV	112	5.044643	4.895128	5.194157	3	7	4	0.637629	0.798517
CP	112	17.5	17.30859	17.69141	16	20	4	1.045045	1.022274
CK	112	5.946429	5.710871	6.181986	3	8	5	1.58269	1.25805

Table 44. *Serranochromis longimanus* **percentages**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	4	16.1061	12.59184	19.62035	12.96703	17.88491	4.917881	4.877584	2.208525
SNL-HL	4	31.26829	30.0001	32.53649	30.54945	32.03733	1.487874	0.6352	0.796994
LJL-HL	4	46.77983	43.55281	50.00685	44.89796	49.658	4.760044	4.112843	2.028015
PPL-HL	4	34.84311	30.60197	39.08425	32.28454	38.13776	5.853213	7.104004	2.665334
CHD-HL	4	25.53399	23.03384	28.03414	23.79471	26.91327	3.118553	2.46871	1.571213
ED-HL	4	22.73947	18.51984	26.95911	19.77041	25.93407	6.163658	7.032147	2.65182
IOW-HL	4	15.76537	14.88878	16.64195	15.16484	16.48523	1.32039	0.303477	0.550887
IOW-HW	4	50.34303	41.72686	58.9592	44.35798	56.88073	12.52276	29.32017	5.41481
HW-HL	4	31.54564	26.76849	36.32279	27.80612	35.15732	7.351196	9.013132	3.002188
HL-SL	4	37.42164	37.16446	37.67881	37.27536	37.60331	0.327943	0.026121	0.161621
BD-SL	4	36.29381	33.5316	39.05601	34.29752	37.97101	3.673494	3.013349	1.7359
DFB-SL	4	49.04596	47.23592	50.85599	47.93388	50.43478	2.500898	1.293932	1.137511
AFB-SL	4	16.67476	15.92569	17.42384	16.1157	17.22488	1.109178	0.22161	0.470754
PRD-SL	4	40.20876	38.69055	41.72697	39.28571	41.44928	2.163561	0.910334	0.954114
PRP-SL	4	45.9608	44.0774	47.8442	44.97608	47.44898	2.472903	1.400955	1.183619
PRV-SL	4	38.75951	37.92673	39.59229	38.42975	39.54082	1.111064	0.273902	0.523356
PRA-SL	4	72.28601	68.53255	76.03947	70.09569	75.5102	5.41451	5.564186	2.358853
CPL-SL	4	14.49452	13.44187	15.54716	13.8756	15.28926	1.413658	0.437625	0.661532
CPD-SL	4	13.26626	12.55076	13.98177	12.91866	13.91304	0.994383	0.202193	0.449659
CPD-CPL	4	91.60871	86.09523	97.1222	86.48649	94.11765	7.631161	12.00579	3.464937

Table 45. *Serranochromis longimanus* **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	6	54.66667	52.12481	57.20853	52	58	6	5.866667	2.42212
LJT	6	40.33333	38.75336	41.91331	38	42	4	2.266667	1.505545
UJIR	6	1			1	1	0	0	0
LJIR	6	0.666667	0.12474	1.208593	0	1	1	0.266667	0.516398
CERATO	6	10			10	10	0	0	0
ARTIC	6	1			1	1	0	0	0
EPI	6	3			3	3	0	0	0
DSOFT	6	12.83333	12.4049	13.26176	12	13	1	0.166667	0.408248
ASPIN	6	3			3	3	0	0	0
ASOFT	6	9.5	8.621979	10.37802	8	10	2	0.7	0.83666
P	6	12.33333	11.79141	12.87526	12	13	1	0.266667	0.516398
ULL	6	23.16667	21.62194	24.71139	21	25	4	2.166667	1.47196
LLL	6	13.16667	11.7718	14.56153	11	15	4	1.766667	1.32916
LOL	6	35.33333	33.89953	36.76714	33	37	4	1.866667	1.36626
DLLA	6	6.833333	6.043347	7.62332	6	8	2	0.566667	0.752773
ALLA	6	7.166667	6.738236	7.595097	7	8	1	0.166667	0.408248
PV	6	5.666667	4.809806	6.523527	5	7	2	0.666667	0.816497
CP	6	16			16	16	0	0	0
CK	6	4.5	3.9252	5.0748	4	5	1	0.3	0.547723

Table 46. ***Serranochromis robustus*** **percentage data**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	39	18.56529	17.78889	19.34169	12.25296	22.26721	10.01424	5.736496	2.395098
SNL-HL	39	34.32477	33.24335	35.40618	19.6319	40.15748	20.52558	11.12905	3.336023
LJL-HL	39	46.36883	44.94077	47.79689	34.28571	52.01005	17.72434	19.40732	4.405374
PPL-HL	39	32.29594	31.63629	32.9556	28.19767	36.55779	8.360115	4.14103	2.034952
CHD-HL	39	31.22198	29.97774	32.46622	21.47239	38.53712	17.06473	14.73273	3.838324
ED-HL	39	21.25997	19.41437	23.10558	15.875	40.94488	25.06988	32.4154	5.693452
IOW-HL	39	21.86041	21.10543	22.6154	15.95092	27.55906	11.60813	5.424356	2.329025
IOW-HW	39	57.28494	55.90935	58.66053	47.31183	63.80368	16.49185	18.00752	4.243527
HW-HL	39	38.29562	36.87798	39.71327	25.76687	49.37186	23.60499	19.12539	4.373258
HL-SL	39	36.6071	35.89033	37.32388	28.22222	40.95238	12.73016	4.889235	2.211162
BD-SL	39	32.66341	32.06791	33.2589	28.75	36.89567	8.145674	3.374653	1.837023
DFB-SL	39	53.64968	52.7867	54.51267	47.74194	64.97462	17.23268	7.087302	2.662199
AFB-SL	39	17.1567	16.80261	17.5108	14.44444	19.67655	5.232105	1.193205	1.092339
PRD-SL	39	36.73487	35.99787	37.47186	26.39594	40	13.60406	5.16897	2.273537
PRP-SL	39	40.98459	40.39309	41.57609	39.03002	49.40476	10.37474	3.329539	1.824703
PRV-SL	39	36.90663	36.38152	37.43173	33.78016	42.2619	8.481744	2.624033	1.619887
PRA-SL	39	68.96865	68.00118	69.93612	58.27506	76.35783	18.08277	8.907404	2.984527
CPL-SL	39	16.29195	15.82673	16.75716	13.85681	20	6.143187	2.059629	1.435141
CPD-SL	39	13.02213	12.65817	13.38609	10.76923	14.91841	4.149184	1.260631	1.122778
CPD-CPL	39	80.82202	76.97703	84.667	56.25	97.67442	41.42442	140.6903	11.8613

Table 47. ***Serranochromis robustus*** **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	39	39.58974	37.85405	41.32543	24	50	26	28.66937	5.354378
LJT	39	29.84615	28.67138	31.02093	24	38	14	13.1336	3.624031
UJIR	39	1.153846	1.013954	1.293738	0	2	2	0.186235	0.431549
LJIR	39	0.871795	0.739188	1.004401	0	2	2	0.167341	0.409074
CERATO	39	10.94872	10.72625	11.17119	10	13	3	0.470985	0.686284
EPI	39	3.794872	3.595606	3.994138	3	5	2	0.377868	0.614709
DSPIN	39	15.53846	15.35865	15.71827	15	17	2	0.307692	0.5547
DSOFT	39	13.79487	13.27334	14.3164	9	16	7	2.588394	1.608849
ASOFT	39	10.02564	9.689031	10.36225	8	12	4	1.078273	1.038399
P	39	13.92308	13.66136	14.18479	13	16	3	0.651822	0.807355
ULL	39	23.17949	22.79398	23.565	21	26	5	1.414305	1.189246
LLL	39	14.51282	13.90468	15.12097	10	17	7	3.519568	1.876051
LOL	39	37.17949	36.51903	37.83995	33	40	7	4.151147	2.037436
DLLA	39	7.128205	6.902887	7.353523	5	8	3	0.483131	0.695076
ALLA	39	8.102564	7.882017	8.323111	7	9	2	0.462888	0.680359
PV	39	4.923077	4.720985	5.125169	4	6	2	0.388664	0.623429
CP	39	17.48718	17.10167	17.87269	16	20	4	1.414305	1.189246
CK	39	6.948718	6.515409	7.382027	3	8	5	1.786775	1.336703

Table 48. ***Serranochromis thumbergi*** **percentages**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.De
LACRD-HL	22	17.05267	15.63327	18.47206	12.42938	22.17054	9.741164	10.24853	3.201
SNL-HL	22	33.00425	30.64099	35.3675	21.05263	39.59184	18.53921	28.41053	5.330
LJL-HL	22	43.22163	40.69529	45.74798	34.18182	51.88406	17.70224	32.46701	5.697
PPL-HL	22	28.7106	26.9013	30.5199	20	37.67606	17.67606	16.65245	4.080
CHD-HL	22	26.64158	24.72841	28.55475	20.33898	36.37681	16.03783	18.61938	4.315
ED-HL	22	25.69411	23.32718	28.06104	17.82946	35.71429	17.88483	28.49888	5.338
IOW-HL	22	18.64658	17.89651	19.39666	15.22491	21	5.775087	2.861981	1.691
IOW-HW	22	57.02689	54.95745	59.09633	50	71.59091	21.59091	21.78526	4.667
HW-HL	22	32.75579	31.63599	33.87558	28.57143	38.27993	9.708504	6.378715	2.525
HL-SL	22	34.37657	33.46305	35.29008	31.61905	38.03922	6.420168	4.245114	2.060
BD-SL	22	27.059	26.28651	27.83148	22.93578	30.39216	7.456377	3.03554	1.742
DFB-SL	22	52.45091	50.13785	54.76397	46.79487	68.57143	21.77656	27.21644	5.216
AFB-SL	22	16.07908	15.42731	16.73085	12.84404	19.58763	6.743592	2.160959	1.470
PRD-SL	22	33.89639	32.48979	35.30298	26.90058	42.85714	15.95656	10.06458	3.172
PRP-SL	22	40.81084	38.71331	42.90837	35.85526	55.71429	19.85902	22.38068	4.730
PRV-SL	22	35.34138	33.91718	36.76558	28.57143	43.78698	15.21555	10.31809	3.212
PRA-SL	22	67.1547	65.6696	68.6398	64.10256	81.06509	16.96252	11.21932	3.349
CPL-SL	22	19.38537	18.70248	20.06826	16.58768	22.08589	5.498212	2.372242	1.540
CPD-SL	22	11.10657	9.952693	12.26046	8.256881	21.30178	13.04489	6.772976	2.602
CPD-CPL	22	57.68439	51.57254	63.79625	39.13043	102.8571	63.72671	190.0218	13.784

Table 49. ***Serranochromis thumbergi*** **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	20	66.5	63.92536	69.07464	58	80	22	30.26316	5.50119
LJT	20	53.3	50.01126	56.58874	40	62	22	49.37895	7.02701
UJIR	20	2.05	1.945349	2.154651	2	3	1	0.05	0.22360
LJIR	20	0.95	0.765586	1.134414	0	2	2	0.155263	0.39403
CERATO	20	11.1	10.80013	11.39987	10	12	2	0.410526	0.64072
EPI	20	3.15	2.978544	3.321456	3	4	1	0.134211	0.36634
DSPIN	20	16.05	15.60795	16.49205	15	17	2	0.892105	0.94451
DSOFT	20	13.95	13.56362	14.33638	12	15	3	0.681579	0.82557
ASOFT	20	8.9	8.354629	9.445371	7	12	5	1.357895	1.16528
P	20	12.8	12.55516	13.04484	12	14	2	0.273684	0.52314
ULL	20	25.6	24.94866	26.25134	22	27	5	1.936842	1.39170
LLL	20	15.85	15.2763	16.4237	13	19	6	1.502632	1.22581
LOL	20	40.55	39.67147	41.42853	37	44	7	3.523684	1.87714
DLLA	20	7.05	6.811117	7.288883	6	8	2	0.260526	0.51041
ALLA	20	8.1	7.841419	8.358581	7	9	2	0.305263	0.55250
PV	20	4.95	4.563618	5.336382	4	6	2	0.681579	0.82557
CP	20	17.1	16.62223	17.57777	16	18	2	1.042105	1.02083
CK	20	4.85	4.237427	5.462573	3	8	5	1.713158	1.30887

Table 50. *Serranochromis stappersi* '1' percentages

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	15	15.44575	14.28834	16.60316	11.07692	20.56075	9.483825	4.368132	2.090008
SNL-HL	15	28.67507	27.43634	29.9138	24.92401	31.56863	6.644615	5.00354	2.236859
LJL-HL	15	47.46602	44.59308	50.33895	33.33333	52.7451	19.41176	26.91375	5.187846
PPL-HL	15	35.49926	32.96419	38.03433	26	41.56863	15.56863	20.95579	4.57775
CHD-HL	15	27.13211	26.02437	28.23984	23.07692	29.89691	6.819984	4.001242	2.000311
ED-HL	15	25.65083	24.10842	27.19325	19.62617	29.85507	10.2289	7.757582	2.785244
IOW-HL	15	19.99796	19.0434	20.95253	15.8	22.56342	6.763418	2.971221	1.723723
IOW-HW	15	66.92447	59.5683	74.28064	53.61446	101.4085	47.79399	176.452	13.28352
HW-HL	15	30.87453	27.48947	34.2596	19.72222	39.38585	19.66363	37.36433	6.112637
HL-SL	15	36.33343	35.4053	37.26156	33.58744	39.63415	6.046702	2.808925	1.675985
BD-SL	15	35.32255	34.25935	36.38575	31.34328	38.4106	7.067312	3.685973	1.919889
DFB-SL	15	54.06436	52.81113	55.3176	48.78049	57.62332	8.842831	5.121381	2.263047
AFB-SL	15	17.81196	16.11618	19.50774	12.7551	24.79339	12.03829	9.376971	3.062184
PRD-SL	15	37.51388	36.62865	38.39911	34.30493	39.84962	5.544691	2.555273	1.598522
PRP-SL	15	42.96682	42.09397	43.83967	40.79422	46.95122	6.156996	2.484293	1.576164
PRV-SL	15	36.79993	35.70693	37.89294	31.63265	40.85366	9.221005	3.895537	1.973712
PRA-SL	15	69.32155	68.15706	70.48604	64.28571	72.1831	7.897384	4.421758	2.102798
CPL-SL	15	15.52751	14.91201	16.14301	13.57616	17.24138	3.66522	1.235304	1.111442
CPD-SL	15	13.38833	12.64285	14.13381	9.917355	15.24664	5.329281	1.81216	1.346165
CPD-CPL	15	86.57071	80.83719	92.30424	66.66667	104.878	38.21138	107.1929	10.3534

Table 51. *Serranochromis stappersi* '1' meristics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	15	69.46667	62.03141	76.90193	40	86	46	180.2667	13.42634
LJT	15	50.33333	42.59831	58.06836	22	70	48	195.0952	13.96765
UJIR	15	1.466667	1.180695	1.752638	1	2	1	0.266667	0.516398
LJIR	15	0.933333	0.790348	1.076319	0	1	1	0.066667	0.258199
CERATO	15	11.73333	11.29097	12.1757	10	13	3	0.638095	0.798809
EPI	15	3.466667	3.004918	3.928415	2	5	3	0.695238	0.833809
DSPIN	15	14.6	14.31918	14.88082	14	15	1	0.257143	0.507093
DSOFT	15	14	13.70399	14.29601	13	15	2	0.285714	0.534522
ASPIN	15	3			3	3	0	0	0
ASOFT	15	9.533333	9.178946	9.887721	9	11	2	0.409524	0.63994
P	15	12.73333	12.47985	12.98682	12	13	1	0.209524	0.457738
ULL	15	23.26667	22.77728	23.75605	22	25	3	0.780952	0.883715
LLL	15	14.66667	13.95174	15.3816	13	17	4	1.666667	1.290994
LOL	15	35.93333	35.49097	36.3757	34	37	3	0.638095	0.798809
DLLA	15	6.866667	6.512279	7.221054	6	8	2	0.409524	0.63994
ALLA	15	7.2	6.970713	7.429287	7	8	1	0.171429	0.414039
PV	15	4.733333	4.34362	5.123047	4	6	2	0.495238	0.703732
CP	15	17.6	16.85115	18.34885	16	20	4	1.828571	1.352247
CK	15	5.533333	5.178946	5.887721	5	7	2	0.409524	0.63994

Table 52. ***Serranochromis stappersi*** **'2' percentages**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev
LACRD-HL	9	16.14863	15.48343	16.81384	14.8581	17.45098	2.592884	0.748922	0.8654
SNL-HL	9	28.89376	28.00459	29.78294	26.21035	30.26549	4.055136	1.338131	1.1567
LJL-HL	9	47.87023	46.17437	49.56609	43.23873	50.78431	7.545583	4.867442	2.2062
PPL-HL	9	37.9255	36.27005	39.58095	33.38898	40.35398	6.965001	4.63824	2.1536
CHD-HL	9	27.3558	25.94715	28.76444	23.54571	29.41176	5.866058	3.358348	1.832
ED-HL	9	26.82988	25.27346	28.38631	23.53923	28.43373	4.894503	4.099947	2.0248
IOW-HL	9	18.10601	17.29864	18.91338	16.6205	20.18349	3.562988	1.103236	1.050
IOW-HW	9	48.70204	47.38998	50.0141	46.15385	52.1327	5.978855	2.913601	1.7069
HW-HL	9	37.16618	36.07992	38.25244	35.42169	38.93805	3.516366	1.997053	1.4131
HL-SL	9	33.42013	32.53867	34.30159	32.10227	35.86826	3.765991	1.315007	1.1467
BD-SL	9	29.55958	27.47112	31.64804	25.56452	32.63473	7.070214	7.382016	2.7169
DFB-SL	9	53.99352	52.0073	55.97974	47.90476	55.68862	7.783861	6.676927	2.5839
AFB-SL	9	16.67464	15.4036	17.94568	13.65269	19.74922	6.096522	2.734268	1.6535
PRD-SL	9	33.7667	32.6283	34.9051	31.53409	36.66667	5.132576	2.193374	1.4810
PRP-SL	9	39.41118	38.50432	40.31805	37.65182	41.42857	3.77675	1.391896	1.1797
PRV-SL	9	33.71418	33.07901	34.34935	32.63473	34.7619	2.127174	0.682812	0.8263
PRA-SL	9	69.99921	68.89237	71.10605	66.93548	72.38095	5.445469	2.073446	1.4399
CPL-SL	9	16.96971	16.45366	17.48576	16.30094	18.57143	2.270488	0.45072	0.6713
CPD-SL	9	13.40542	12.97604	13.8348	12.5	14.07186	1.571856	0.312033	0.5585
CPD-CPL	9	79.15857	75.00218	83.31496	69.23077	83.92857	14.6978	29.23847	5.4072

Table 53. ***Serranochromis stappersi*** **'2' meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	9	68	63.01846	72.98154	60	80	20	42	6.48074
LJT	9	48.88889	44.20625	53.57153	40	58	18	37.11111	6.09188
UJIR	9	1.888889	1.632666	2.145112	1	2	1	0.111111	0.33333
LJIR	9	0.555556	0.150432	0.960679	0	1	1	0.277778	0.52704
CERATO	9	12.33333	11.66765	12.99902	11	13	2	0.75	0.86602
ARTIC	9	1			1	1	0	0	
EPI	9	3.555556	2.776285	4.334826	2	5	3	1.027778	1.01379
DSPIN	9	14.77778	14.43883	15.11673	14	15	1	0.194444	0.44095
DSOFT	9	14.22222	13.88327	14.56117	14	15	1	0.194444	0.44095
ASOFT	9	9	8.45647	9.54353	8	10	2	0.5	0.70710
P	9	12	11.45647	12.54353	11	13	2	0.5	0.70710
ULL	9	25.22222	24.08354	26.3609	23	28	5	2.194444	1.48136
LLL	9	16.33333	15.56467	17.102	15	18	3	1	
LOL	9	37.11111	36.39782	37.8244	36	39	3	0.861111	0.92796
DLLA	9	7			7	7	0	0	
ALLA	9	7.444444	7.039321	7.849568	7	8	1	0.277778	0.52704
PV	9	4.111111	3.854888	4.367334	4	5	1	0.111111	0.33333
CP	9	16.88889	16.07864	17.69914	16	18	2	1.111111	1.05409
CK	9	5			5	5	0	0	

Table 54. ***Serranochromis*** **'sp elongatus' morphometrics**

Variables	Valid N	Mean	-95.000%	95.000	Sum	Minimum	Maximum	Range	Varian
LACRD	11	9.272727	8.613059	9.932395	102	8	10.7	2.7	0.964
SNL	11	16.51818	15.47793	17.55843	181.7	14.5	18.7	4.2	2.397
LJL	11	25.34545	23.71464	26.97627	278.8	21.8	29	7.2	5.892
PPL	11	18.97273	17.88818	20.05727	208.7	16.3	21.7	5.4	2.606
CHD	11	14.92727	14.05129	15.80325	164.2	13.2	17	3.8	1.700
ED	11	11.70909	11.30327	12.11492	128.8	10.7	13	2.3	0.364
IOW	11	9.1	8.356747	9.843253	100.1	7.3	11	3.7	1.
HW	11	18.11818	16.69819	19.53817	199.3	14.6	22	7.4	4.467
HL	11	50.56364	48.24006	52.88722	556.2	46	56	10	11.96
SL	11	139.2364	132.5322	145.9405	1531.6	127	155	28	99.58
BD	11	44.63636	41.0559	48.21683	491	37.5	52	14.5	28.40
DFB	11	71.93636	67.79426	76.07847	791.3	64.5	83.3	18.8	38.01
AFB	11	23.22727	21.30724	25.14731	255.5	20	27	7	8.168
PRD	11	51.13636	47.91767	54.35506	562.5	43	58.5	15.5	22.95
PRP	11	58.36364	55.41191	61.31536	642	52	64.5	12.5	19.30
PRV	11	50.59091	48.17418	53.00764	556.5	46.5	56.5	10	12.94
PRA	11	100.4091	94.9228	105.8954	1104.5	89	114	25	66.69
CPL	11	23.40909	21.7579	25.06028	257.5	19.5	27	7.5	6.040
CPD	11	17.59091	16.6794	18.50242	193.5	15.5	19.5	4	1.840

Table 55. ***Serranochromis*** **'sp elongatus' log-transformed data**

Variables	Valid N	Mean	-95.000%	95.000	Sum	Minimum	Maximum	Range	Varian
LOGLACRD	11	2.221996	2.151018	2.292975	24.44196	2.079442	2.370244	0.290802	0.011
LOGSNL	11	2.800468	2.737504	2.863432	30.80515	2.674149	2.928524	0.254375	0.008
LOGLJL	11	3.228405	3.163776	3.293034	35.51246	3.08191	3.367296	0.285386	0.009
LOGPPL	11	2.939706	2.882452	2.99696	32.33677	2.791165	3.077312	0.286147	0.007
LOGCHD	11	2.699722	2.641038	2.758406	29.69694	2.580217	2.833213	0.252997	0.00
LOGED	11	2.459175	2.424911	2.493438	27.05092	2.370244	2.564949	0.194706	0.002
LOGIOW	11	2.20153	2.119556	2.283504	24.21683	1.987874	2.397895	0.410021	0.014
LOGHW	11	2.890771	2.812705	2.968836	31.79848	2.681022	3.091042	0.410021	0.013
LOGHL	11	3.921112	3.875259	3.966965	43.13223	3.828641	4.025352	0.19671	0.004
LOGSL	11	4.933836	4.88565	4.982021	54.27219	4.844187	5.043425	0.199238	0.005
LOGBD	11	3.792001	3.711161	3.872841	41.71201	3.624341	3.951244	0.326903	0.01
LOGDFB	11	4.272487	4.215469	4.329505	46.99736	4.166665	4.422449	0.255783	0.007
LOGAFB	11	3.138375	3.055082	3.221668	34.52212	2.995732	3.295837	0.300105	0.015
LOGPRD	11	3.930439	3.866691	3.994187	43.23483	3.7612	4.069027	0.307827	0.009
LOGPRP	11	4.064118	4.013556	4.114679	44.7053	3.951244	4.166665	0.215422	0.005
LOGPRV	11	3.921492	3.874003	3.96898	43.13641	3.839452	4.034241	0.194788	0.004
LOGPRA	11	4.606243	4.551549	4.660936	50.66867	4.488636	4.736198	0.247562	0.006
LOGCPL	11	3.148036	3.076667	3.219406	34.6284	2.970414	3.295837	0.325422	0.011
LOGCPD	11	2.864652	2.812454	2.91685	31.51117	2.74084	2.970414	0.229574	0.006

Table 56. *Serranochromis* 'sp elongatus' percentages

Variables	Valid N	Mean	-95.000%	95.000	Sum	Minimum	Maximum	Range	Variance
LACRD-HL	11	18.32655	17.47061	19.1825	201.5921	15.53571	19.70534	4.169626	1.623305
SNL-HL	11	32.62636	31.82285	33.42987	358.89	31.48936	35.53398	4.044619	1.430504
LJL-HL	11	50.05515	48.76389	51.34642	550.6067	47.3913	53.98058	6.589278	3.694365
PPL-HL	11	37.50545	36.49569	38.51522	412.56	35.43478	40.38835	4.953567	2.259151
CHD-HL	11	29.50089	28.76022	30.24157	324.5098	27.38589	31.36842	3.982529	1.215528
ED-HL	11	23.22401	22.20056	24.24747	255.4641	20.99448	25.47368	4.479209	2.320854
IOW-HL	11	17.97013	16.96857	18.9717	197.6715	15.53191	20.2952	4.763288	2.222618
IOW-HW	11	50.26215	48.43045	52.09384	552.8836	45.71429	55.49133	9.777044	7.433874
HW-HL	11	35.76895	34.07968	37.45821	393.4584	31.06383	40.59041	9.526576	6.322721
HL-SL	11	36.32725	35.92827	36.72623	399.5998	35.15358	37.50973	2.356144	0.352702
BD-SL	11	31.99271	30.50324	33.48218	351.9198	28.95753	35.25424	6.296708	4.915556
DFB-SL	11	51.64218	50.47444	52.80993	568.064	48.81356	53.74194	4.928376	3.021382
AFB-SL	11	16.64369	15.84118	17.44621	183.0806	15.20913	18.30508	3.095959	1.426969
PRD-SL	11	36.69023	35.70986	37.6706	403.5925	33.46304	38.46154	4.998503	2.129556
PRP-SL	11	41.916	41.30405	42.52795	461.076	40.61433	43.36043	2.746099	0.829734
PRV-SL	11	36.34383	35.83657	36.85109	399.7822	34.81229	37.35409	2.541799	0.570121
PRA-SL	11	72.08533	70.9002	73.27046	792.9386	69.49807	74.70817	5.210102	3.112013
CPL-SL	11	16.79652	16.09136	17.50169	184.7617	15	18.29268	3.292683	1.101763
CPD-SL	11	12.63517	12.35441	12.91592	138.9868	11.92308	13.24042	1.317341	0.174647
CPD-CPL	11	75.47649	72.12424	78.82874	830.2414	66.66667	81.25	14.58333	24.89897

Table 57. *Serranochromis* 'sp elongatus' meristics

Variables	Valid N	Mean	-95.000%	95.000	Sum	Minimum	Maximum	Range	Variance
UJT	14	38.57143	33.74753	43.39533	540	26	52	26	69.8022
LJT	14	25.57143	23.8068	27.33605	358	22	32	10	9.340659
UJIR	14	1			14	1	1	0	0
LJIR	14	0.285714	0.015033	0.556396	4	0	1	1	0.21978
CERATO	14	9.571429	9.19832	9.944537	134	8	10	2	0.417582
EPI	14	2.785714	2.539856	3.031573	39	2	3	1	0.181319
DSPIN	14	15	14.77353	15.22647	210	14	16	2	0.153846
DSOFT	14	13.07143	12.49563	13.64722	183	12	15	3	0.994505
ASOFT	14	8.642857	8.212738	9.072976	121	7	10	3	0.554945
P	14	12.71429	12.36136	13.06721	178	12	14	2	0.373626
ULL	14	23.28571	22.59032	23.98111	326	21	25	4	1.450549
LLL	14	13.57143	13.07971	14.06315	190	12	15	3	0.725275
LOL	14	35.42857	34.99211	35.86503	496	34	36	2	0.571429
DLLA	14	6.857143	6.412368	7.301918	96	6	8	2	0.593407
ALLA	14	7.5	7.200411	7.799589	105	7	8	1	0.269231
PV	14	5	4.679726	5.320274	70	4	6	2	0.307692
CP	14	16.14286	15.83423	16.45148	226	16	18	2	0.285714
CK	14	5.785714	5.451448	6.119981	81	5	7	2	0.335165

Table 58. ***Sargochromis giardi*** **percentage data**

Variable	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	7	21.24765	17.16666	25.32863	17.60563	29.38776	11.78212	19.47114	4.412611
SNL-HL	7	32.79621	29.50301	36.08942	30.81633	40.70796	9.891638	12.6794	3.560815
LJL-HL	7	33.95067	32.72343	35.1779	31.76471	35.48387	3.719165	1.760828	1.326962
PPL-HL	7	27.1989	26.15411	28.24368	26.07843	29.20354	3.125108	1.276194	1.129688
CHD-HL	7	28.31229	25.97705	30.64754	25.35211	33.09735	7.745232	6.375685	2.525012
ED-HL	7	21.76116	20.78916	22.73317	20.40816	23.00885	2.600686	1.104585	1.050992
IOW-HL	7	29.62095	28.63863	30.60327	27.95918	30.95238	2.993197	1.128157	1.062147
IOW-HW	7	69.91405	62.0639	77.76421	63.97059	88.48921	24.51862	72.04731	8.488069
HW-HL	7	42.84871	38.3538	47.34362	32.62911	48.14159	15.51248	23.6213	4.860174
HL-SL	7	34.53339	33.36942	35.69737	32.75362	36.2963	3.542673	1.583975	1.258561
BD-SL	7	40.56634	39.12111	42.01157	37.71044	42.59259	4.882155	2.441942	1.562671
DFB-SL	7	57.5413	56.84856	58.23404	56.30252	58.84058	2.538059	0.561049	0.749032
AFB-SL	7	19.68557	19.18076	20.19038	18.95911	20.51282	1.553713	0.297931	0.54583
PRD-SL	7	36.84258	35.24548	38.43968	33.67003	38.65546	4.985429	2.982114	1.72688
PRP-SL	7	41.17585	39.95266	42.39904	39.13043	42.59259	3.462158	1.749235	1.322586
PRV-SL	7	35.20558	34.34525	36.06591	33.62319	36.66667	3.043478	0.865356	0.930245
PRA-SL	7	71.5712	70.75787	72.38454	70.69597	72.68908	1.993105	0.773393	0.879428
CPL-SL	7	14.95643	14.02671	15.88615	13.75465	16.49832	2.74367	1.010562	1.005267
CPD-SL	7	15.56402	15.04138	16.08666	15.07246	16.38655	1.314091	0.319351	0.565111
CPD-CPL	7	104.505	96.56903	112.441	91.83673	118.9189	27.08218	73.63115	8.580859

Table 59. ***Sargochromis giardi*** **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	12	130.0417	109.4727	150.6106	72	172	100	1048.021	32.37315
HL	12	79.13333	2.242798	156.0239	25.9	462	436.1	14645.12	121.017
UJT	12	38	34.57307	41.42693	32	48	16	29.09091	5.393599
LJT	12	29.33333	26.5528	32.11387	22	34	12	19.15152	4.376244
LJIR	12	0.916667	0.733251	1.100082	0	1	1	0.083333	0.288675
CERATO	12	8.083333	7.089438	9.077229	5	10	5	2.44697	1.564279
EPI	12	3.583333	3.256163	3.910503	3	4	1	0.265152	0.514929
DSPIN	12	15			15	15	0	0	0
DSOFT	12	14	13.53075	14.46925	13	15	2	0.545455	0.738549
ASOFT	12	9.5	9.168189	9.831811	9	10	1	0.272727	0.522233
P	12	13.5	13.07163	13.92837	13	15	2	0.454545	0.6742
ULL	12	22.58333	21.95037	23.21629	21	24	3	0.992424	0.996205
LLL	12	14	13.53075	14.46925	12	15	3	0.545455	0.738549
LOL	12	35.58333	35.07951	36.08716	34	37	3	0.628788	0.792961
DLLA	12	6.583333	6.256163	6.910503	6	7	1	0.265152	0.514929
ALLA	12	7.833333	7.586016	8.080651	7	8	1	0.151515	0.389249
PV	12	4.666667	4.172032	5.161301	4	6	2	0.606061	0.778499
CP	12	16			16	16	0	0	0
CK	12	5.166667	4.63623	5.697103	4	6	2	0.69697	0.834847

Table 60. *Sargochromis carlottae* **percentage data**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	18	19.76742	19.10767	20.42716	17.24891	22.15321	4.904301	1.760094	1.326685
SNL-HL	18	33.10238	32.24837	33.95638	30.64516	36.44444	5.799283	2.949211	1.717327
LJL-HL	18	40.39091	38.94617	41.83564	35.47672	45.5516	10.07488	8.440303	2.90522
PPL-HL	18	32.56621	31.82953	33.30289	29.55556	34.94624	5.390681	2.194544	1.481399
CHD-HL	18	30.09353	28.53696	31.6501	26.6129	39.56522	12.95231	9.797664	3.130122
ED-HL	18	25.33809	24.43669	26.23949	23.18841	30.33708	7.148673	3.285626	1.81263
IOW-HL	18	27.27328	26.42589	28.12067	23.4714	30.24911	6.77771	2.903699	1.704024
IOW-HW	18	62.9355	60.97684	64.89416	57.07071	68.22917	11.15846	15.51319	3.938678
HW-HL	18	43.3526	42.70835	43.99685	40.63116	45.36082	4.729661	1.678396	1.295529
HL-SL	18	33.98644	33.38855	34.58434	31.78808	36.06299	4.274913	1.445542	1.202307
BD-SL	18	39.50807	38.42028	40.59587	35.66176	42.23301	6.571245	4.784973	2.187458
DFB-SL	18	55.87433	55.11647	56.6322	52.55474	58.73786	6.18312	2.322563	1.523996
AFB-SL	18	19.81669	18.86164	20.77173	17.64706	25.92593	8.278867	3.688329	1.920502
PRD-SL	18	37.42133	36.69615	38.14652	35.09934	40.55118	5.451843	2.126556	1.458271
PRP-SL	18	41.76166	40.97634	42.54698	38.74172	44.09449	5.352766	2.493873	1.5792
PRV-SL	18	34.88877	34.13389	35.64365	32.45033	39.07563	6.625299	2.304317	1.517998
PRA-SL	18	70.82925	70.06	71.5985	68.18182	74.01575	5.83393	2.392865	1.546889
CPL-SL	18	16.37112	15.58963	17.1526	14.17625	20.22792	6.051675	2.469604	1.571497
CPD-SL	18	14.80802	14.39726	15.21877	13.60544	16.14173	2.53629	0.682249	0.825984
CPD-CPL	18	91.37808	85.66054	97.09563	74.64789	110.8108	36.16292	132.1912	11.49744

Table 61. *Sargochromis carlottae* **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	13	136.3846	125.3537	147.4155	103	185	82	333.2147	18.25417
HL	13	46.45385	43.18743	49.72026	35.6	60	24.4	29.21769	5.405339
UJT	13	47.38462	43.39491	51.37432	36	58	22	43.58974	6.602253
LJT	13	36	33.79343	38.20657	30	44	14	13.33333	3.651484
UJIR	13	1.692308	1.402014	1.982601	1	2	1	0.230769	0.480384
LJIR	13	1.615385	1.309388	1.921381	1	2	1	0.25641	0.50637
CERATO	13	10.69231	10.17573	11.20889	9	12	3	0.730769	0.85485
EPI	13	3.615385	3.089819	4.14095	2	5	3	0.75641	0.869718
DSPIN	13	14.92308	14.75548	15.09068	14	15	1	0.076923	0.27735
DSOFT	13	11.61538	11.15132	12.07945	10	13	3	0.589744	0.767948
ASOFT	13	8.923077	8.464083	9.382071	8	10	2	0.576923	0.759555
P	13	12.30769	12.0174	12.59799	12	13	1	0.230769	0.480384
ULL	13	21.69231	21.23844	22.14617	21	23	2	0.564103	0.751068
LLL	13	13.38462	12.92055	13.84868	12	14	2	0.589744	0.767948
LOL	13	33.46154	33.06257	33.86051	33	35	2	0.435897	0.660225
DLLA	13	6.230769	5.965769	6.49577	6	7	1	0.192308	0.438529
ALLA	13	7	6.753298	7.246702	6	8	2	0.166667	0.408248
PV	13	4.076923	3.778675	4.375171	3	5	2	0.24359	0.493548
CP	13	16			16	16	0	0	0
CK	13	3.538462	3.224909	3.852014	3	4	1	0.269231	0.518875

Table 62. ***Sargochromis codringtonii*** **percentage data**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	22	19.6722	18.50482	20.83958	13.72549	23.20755	9.482057	6.932327	2.632931
SNL-HL	22	33.55663	32.14341	34.96986	26.9962	37.73234	10.73614	10.15962	3.187416
LJL-HL	22	35.2152	34.22856	36.20184	31.96544	40.43956	8.474118	4.951949	2.225298
PPL-HL	22	30.40272	28.90363	31.9018	24.31373	42.20532	17.8916	11.43164	3.381071
CHD-HL	22	27.23058	25.82397	28.6372	20.39216	32.26415	11.87199	10.06486	3.172517
ED-HL	22	28.77737	26.41508	31.13966	22.01139	41.02564	19.01426	28.38725	5.327969
IOW-HL	22	24.50668	22.91049	26.10287	18.43137	29.86111	11.42974	12.96067	3.600093
IOW-HW	22	60.8993	57.04385	64.75474	52.68817	93.47826	40.79009	75.61471	8.695672
HW-HL	22	40.42105	38.36414	42.47795	31.94444	46.47059	14.52614	21.5221	4.639192
HL-SL	22	35.64715	34.92332	36.37097	33.05085	39.32836	6.277511	2.665165	1.632533
BD-SL	22	39.02194	37.55896	40.48492	33.83459	45.33333	11.49875	10.88765	3.299643
DFB-SL	22	55.77972	54.50299	57.05645	50.4065	62.33333	11.92683	8.29191	2.879568
AFB-SL	22	18.73075	18.09186	19.36964	16.55172	21.6	5.048276	2.076383	1.440966
PRD-SL	22	38.93377	38.30687	39.56066	36.22047	42.53731	6.316841	1.999128	1.413905
PRP-SL	22	42.55548	41.82249	43.28847	40.07353	48.20144	8.127909	2.733074	1.653201
PRV-SL	22	37.27944	36.2173	38.34159	33.85214	44.3609	10.50876	5.738842	2.395588
PRA-SL	22	72.24992	71.14292	73.35692	67.66917	75.6	7.930827	6.233811	2.49676
CPL-SL	22	14.34353	13.52418	15.16288	11.33333	17.32283	5.989501	3.415032	1.847981
CPD-SL	22	14.77939	13.89359	15.66518	12.19512	21.25984	9.064721	3.991386	1.997845
CPD-CPL	22	104.7939	96.26044	113.3274	73.91304	135.2941	61.38107	370.4318	19.24661

Table 63. ***Sargochromis codringtonii*** **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	8	137.8125	107.6528	167.9722	92	209	117	1301.424	36.07526
HL	8	47.4875	37.22019	57.75481	31.5	71.5	40	150.827	12.28116
UJT	8	40.75	35.77886	45.72114	34	48	14	35.35714	5.946187
LJT	8	34.75	31.07178	38.42822	30	44	14	19.35714	4.399675
UJIR	8	1.625	1.192318	2.057682	1	2	1	0.267857	0.517549
LJIR	8	1.25	0.508947	1.991053	0	2	2	0.785714	0.886405
CERATO	8	10.125	9.589219	10.66078	9	11	2	0.410714	0.64087
EPI	8	3.625	3.192318	4.057682	3	4	1	0.267857	0.517549
DSPIN	8	15			15	15	0	0	0
DSOFT	8	13.125	12.58922	13.66078	12	14	2	0.410714	0.64087
ASOFT	8	8.5	8.053128	8.946872	8	9	1	0.285714	0.534522
P	8	12.75	11.88464	13.61536	11	14	3	1.071429	1.035098
ULL	8	21.625	20.73827	22.51173	20	23	3	1.125	1.06066
LLL	8	13.25	12.27607	14.22393	12	15	3	1.357143	1.164965
LOL	8	33.625	33.00298	34.24702	33	35	2	0.553571	0.744024
DLLA	8	6.625	5.738266	7.511734	6	9	3	1.125	1.06066
ALLA	8	7.125	6.829422	7.420578	7	8	1	0.125	0.353553
PV	8	4.375	3.942318	4.807682	4	5	1	0.267857	0.517549
CP	8	15.5	14.726	16.274	14	16	2	0.857143	0.92582
CK	8	3.375	2.752981	3.997019	3	5	2	0.553571	0.744024

Table 64. *Sargochromis coulteri* percentage data

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	3	21.75041	20.33312	23.1677	21.2766	22.38372	1.107125	0.325512	0.570536
SNL-HL	3	35.99171	29.49897	42.48444	34.375	39.00709	4.632092	6.831303	2.613676
LJL-HL	3	35.10123	26.23474	43.96772	31.25	38.29787	7.047872	12.73949	3.569242
PPL-HL	3	30.8741	27.75093	33.99727	29.82955	32.2695	2.439958	1.580668	1.257246
CHD-HL	3	27.32967	24.98643	29.67291	26.24113	27.90698	1.665842	0.889779	0.943281
ED-HL	3	25.0613	24.30502	25.81759	24.71591	25.2907	0.574789	0.092688	0.304446
IOW-HL	3	24.64292	20.90724	28.37861	23.25581	26.24113	2.985321	2.261459	1.503815
IOW-HW	3	55.50402	47.27425	63.73379	51.94805	58.5034	6.555349	10.97549	3.312928
HW-HL	3	44.44577	38.13879	50.75276	41.76136	46.80851	5.047147	6.446027	2.538903
HL-SL	3	32.1952	31.03155	33.35886	31.68539	32.60664	0.921242	0.21943	0.468434
BD-SL	3	35.58284	33.51698	37.64871	34.86239	36.49289	1.630506	0.691594	0.831622
DFB-SL	3	53.73047	47.17787	60.28308	51.1236	56.3981	5.274509	6.957879	2.637779
AFB-SL	3	18.3884	16.0811	20.6957	17.41573	19.26606	1.850325	0.862696	0.928814
PRD-SL	3	37.59458	36.05949	39.12967	36.96682	38.20225	1.235423	0.38187	0.617956
PRP-SL	3	38.59088	36.83358	40.34818	37.91469	39.32584	1.411151	0.500427	0.707409
PRV-SL	3	31.61655	24.67014	38.56297	28.44037	33.70787	5.267498	7.819342	2.796309
PRA-SL	3	66.26192	64.9692	67.55464	65.87678	66.85393	0.977155	0.270805	0.52039
CPL-SL	3	19.26615	18.85608	19.67623	19.10112	19.43128	0.330156	0.027251	0.165078
CPD-SL	3	13.31258	11.35385	15.27131	12.79621	14.22018	1.423975	0.621723	0.788494
CPD-CPL	3	69.10341	58.73688	79.46994	65.85366	73.80952	7.955865	17.41468	4.173089

Table 65. *Sargochromis* 'sp longsnout kafue' morphometrics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD	7	9.1	8.387609	9.812391	8.2	10.5	2.3	0.593333	0.770281
SNL	7	14.44286	13.56408	15.32163	13.5	15.8	2.3	0.902857	0.950188
LJL	7	13.98571	13.17693	14.7945	12.8	15.3	2.5	0.764762	0.874507
PPL	7	12.95714	12.22335	13.69094	11.5	13.9	2.4	0.629524	0.793425
CHD	7	11.31429	10.23253	12.39604	9.6	12.6	3	1.368095	1.169656
ED	7	10.47143	9.965674	10.97718	9.7	11.3	1.6	0.299048	0.546852
IOW	7	9.428571	8.621048	10.2361	7.7	10.2	2.5	0.762381	0.873144
HW	7	15.18571	14.49274	15.87869	14	16	2	0.561429	0.749285
HL	7	39.31429	37.38579	41.24278	36.3	42	5.7	4.348095	2.085209
SL	7	111.5714	107.2136	115.9292	104	118	14	22.20238	4.71194
BD	7	38.42857	35.24234	41.6148	34	44	10	11.86905	3.445148
DFB	7	60.14286	57.20955	63.07617	56	64.5	8.5	10.05952	3.171675
AFB	7	17.92857	16.03266	19.82448	14.5	20.5	6	4.202381	2.049971
PRD	7	42	39.84754	44.15246	38.5	45.5	7	5.416667	2.327373
PRP	7	45.5	43.03857	47.96143	42	49.5	7.5	7.083333	2.661453
PRV	7	39.21429	37.40635	41.02222	36	42	6	3.821429	1.954847
PRA	7	78.85714	75.17985	82.53444	73	83.5	10.5	15.80952	3.976119
CPL	7	19.5	18.90301	20.09699	19	20.5	1.5	0.416667	0.645497
CPD	7	15.07143	14.16887	15.97399	13	16	3	0.952381	0.9759

Table 66. *Sargochromis* 'sp longsnout kafue' log-transformed data

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LOGLACRD	7	2.205291	2.128657	2.281925	2.104134	2.351375	0.247241	0.006866	0.082861
LOGSNL	7	2.668385	2.608523	2.728247	2.60269	2.76001	0.15732	0.00419	0.064726
LOGLJL	7	2.636363	2.578599	2.694128	2.549445	2.727853	0.178408	0.003901	0.062458
LOGPPL	7	2.559988	2.501959	2.618016	2.442347	2.631889	0.189542	0.003937	0.062744
LOGCHD	7	2.421332	2.323319	2.519345	2.261763	2.533697	0.271934	0.011231	0.105978
LOGED	7	2.347485	2.29929	2.395681	2.272126	2.424803	0.152677	0.002716	0.052112
LOGIOW	7	2.239777	2.149045	2.330509	2.04122	2.322388	0.281167	0.009625	0.098105
LOGHW	7	2.719299	2.673237	2.765361	2.639057	2.772589	0.133531	0.002481	0.049805
LOGHL	7	3.67037	3.620938	3.719802	3.591818	3.73767	0.145852	0.002857	0.053449
LOGSL	7	4.713895	4.674616	4.753174	4.644391	4.770685	0.126294	0.001804	0.042471
LOGBD	7	3.645385	3.562968	3.727803	3.526361	3.78419	0.257829	0.007942	0.089115
LOGDFB	7	4.09554	4.047053	4.144027	4.025352	4.166665	0.141314	0.002749	0.052427
LOGAFB	7	2.880539	2.771169	2.989908	2.674149	3.020425	0.346276	0.013985	0.118257
LOGPRD	7	3.736351	3.685031	3.787672	3.650658	3.817712	0.167054	0.003079	0.055491
LOGPRP	7	3.816262	3.762592	3.869931	3.73767	3.901973	0.164303	0.003368	0.058031
LOGPRV	7	3.667967	3.62157	3.714365	3.583519	3.73767	0.154151	0.002517	0.050168
LOGPRA	7	4.366542	4.319713	4.413371	4.290459	4.424847	0.134387	0.002564	0.050634
LOGCPL	7	2.969949	2.939555	3.000344	2.944439	3.020425	0.075986	0.00108	0.032864
LOGCPD	7	2.71088	2.647913	2.773847	2.564949	2.772589	0.207639	0.004635	0.068084

Table 67. *Sargochromis* 'sp longsnout kafue' percentage data

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	7	23.13122	22.03813	24.22432	21.5736	25.42373	3.850125	1.396939	1.181922
SNL-HL	7	36.73677	35.48322	37.99033	34.69388	38.01453	3.32065	1.83716	1.355419
LJL-HL	7	35.57734	34.4101	36.74457	33.5	37.05584	3.555838	1.592865	1.262087
PPL-HL	7	32.98266	31.37398	34.59134	30.47619	35.45918	4.982993	3.025541	1.739408
CHD-HL	7	28.75435	26.70264	30.80606	25	31.12245	6.122449	4.921463	2.218437
ED-HL	7	26.65164	25.75941	27.54387	25	28.10811	3.108108	0.930721	0.964739
IOW-HL	7	24.00336	21.94672	26.06001	21.21212	27.56757	6.355446	4.945162	2.223772
IOW-HW	7	62.12254	56.92895	67.31614	55	69.86301	14.86301	31.53536	5.615635
HW-HL	7	38.63747	38.03198	39.24295	37.56345	39.45946	1.896008	0.428613	0.654686
HL-SL	7	35.22449	34.73798	35.711	34.25926	35.65611	1.396849	0.276725	0.526046
BD-SL	7	34.389	32.78664	35.99137	32.40741	37.28814	4.880728	3.001815	1.732575
DFB-SL	7	53.89564	52.73369	55.05759	52	55.60345	3.603448	1.578474	1.256373
AFB-SL	7	16.03018	14.877	17.18336	13.94231	17.67241	3.730106	1.55474	1.246892
PRD-SL	7	37.62985	36.93398	38.32572	36.60714	38.66667	2.059524	0.566131	0.752417
PRP-SL	7	40.76178	39.93003	41.59354	39.55556	41.94915	2.393597	0.808822	0.899345
PRV-SL	7	35.13818	34.80286	35.4735	34.61538	35.59322	0.977836	0.131458	0.362571
PRA-SL	7	70.66081	69.80254	71.51908	69.68326	71.98276	2.299501	0.861211	0.928015
CPL-SL	7	17.50456	16.62997	18.37915	16.37931	18.98148	2.602171	0.894273	0.94566
CPD-SL	7	13.50293	12.98296	14.02291	12.5	14.35185	1.851852	0.3161	0.562228
CPD-CPL	7	77.30515	72.94095	81.66936	68.42105	81.57895	13.15789	22.26751	4.718846

Table 68. *Sargochromis* 'sp longsnout kafue' meristics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	5	110.5	104.0781	116.9219	104	118	14	26.75	5.17204
HL	5	38.84	36.02413	41.65587	36.3	42	5.7	5.143	2.267818
UJT	5	45.2	42.36857	48.03143	42	48	6	5.2	2.280351
LJT	5	36.8	35.43983	38.16017	36	38	2	1.2	1.095445
UJIR	5	1.2	0.644711	1.755289	1	2	1	0.2	0.447214
LJIR	5	1.2	0.644711	1.755289	1	2	1	0.2	0.447214
CERATO	5	10	8.244022	11.75598	8	11	3	2	1.414214
EPI	5	3.4	2.719913	4.080087	3	4	1	0.3	0.547723
DSPIN	5	14.8	14.24471	15.35529	14	15	1	0.2	0.447214
DSOFT	5	13	12.12201	13.87799	12	14	2	0.5	0.707107
ASOFT	5	8.2	7.644711	8.755289	8	9	1	0.2	0.447214
P	5	13.6	12.91991	14.28009	13	14	1	0.3	0.547723
ULL	5	21.2	20.16115	22.23885	20	22	2	0.7	0.83666
LLL	5	13.6	12.91991	14.28009	13	14	1	0.3	0.547723
LOL	5	33.8	32.18107	35.41893	32	35	3	1.7	1.30384
DLLA	5	6.2	5.644711	6.755289	6	7	1	0.2	0.447214
ALLA	5	7.2	6.644711	7.755289	7	8	1	0.2	0.447214
PV	5	4.4	3.719913	5.080087	4	5	1	0.3	0.547723
CP	5	16			16	16	0	0	0
CK	5	3.8	3.244711	4.355289	3	4	1	0.2	0.447214

Table 69. *Sargochromis* 'sp longsnout zambezi' percentages

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	3	24.67141	20.8585	28.48432	23.44214	26.39175	2.949616	2.355927	1.534903
SNL-HL	3	39.13275	36.72356	41.54194	38.31967	40.20619	1.886513	0.94057	0.96983
LJL-HL	3	35.86521	33.22596	38.50445	35.2459	37.09199	1.846086	1.128778	1.06244
PPL-HL	3	55.84481	-44.2557	155.9453	32.37705	102.3739	69.99684	1623.757	40.29587
CHD-HL	3	29.26664	26.93902	31.59427	28.18991	29.89691	1.706996	0.877961	0.936996
ED-HL	3	24.32121	18.11236	30.53005	21.72131	26.70623	4.98492	6.246985	2.499397
IOW-HL	3	26.98312	26.16082	27.80541	26.63934	27.2997	0.660359	0.109573	0.331018
IOW-HW	3	65.51796	57.00858	74.02734	62.38095	69.17293	6.79198	11.73396	3.425487
HW-HL	3	41.24948	36.45428	46.04469	39.46588	43.29897	3.833094	3.72617	1.930329
HL-SL	3	35.41048	34.37064	36.45031	35.01805	35.85106	0.833013	0.175217	0.41859
BD-SL	3	38.02596	37.19048	38.86145	37.76596	38.4058	0.63984	0.113118	0.336329
DFB-SL	3	54.37236	53.63436	55.11037	54.15162	54.71014	0.55852	0.088261	0.297087
AFB-SL	3	16.89155	14.24715	19.53595	15.95745	18.05054	2.093095	1.133191	1.064515
PRD-SL	3	39.6204	32.97867	46.26214	37.31884	42.55319	5.234351	7.148447	2.673658
PRP-SL	3	41.97584	41.76354	42.18814	41.87726	42.02899	0.151729	0.007304	0.085462
PRV-SL	3	36.64355	34.66955	38.61754	35.74007	37.23404	1.49397	0.631452	0.79464
PRA-SL	3	71.37829	70.57774	72.17884	71.11913	71.73913	0.619997	0.103855	0.322265
CPL-SL	3	16.41791	12.8425	19.99333	14.89362	17.75362	2.860006	2.071582	1.439299
CPD-SL	3	14.37466	13.14135	15.60798	13.82979	14.80144	0.971657	0.246489	0.496476
CPD-CPL	3	87.87341	73.67197	102.0749	81.63265	92.85714	11.22449	32.68238	5.71685

Table 70. ***Sargochromis*** **'sp longsnout zambezi' meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	2	116	-163.537	395.5365	94	138	44	968	31.1127
HL	2	41.05	-52.3406	134.4406	33.7	48.4	14.7	108.045	10.39447
UJT	2	48	-2.82482	98.82482	44	52	8	32	5.656854
LJT	2	37	24.2938	49.7062	36	38	2	2	1.414214
UJIR	2	1.5	-4.8531	7.853102	1	2	1	0.5	0.707107
CERATO	2	11.5	5.146898	17.8531	11	12	1	0.5	0.707107
EPI	2	4			4	4	0	0	0
DSPIN	2	15.5	9.146898	21.8531	15	16	1	0.5	0.707107
DSOFT	2	12.5	6.146898	18.8531	12	13	1	0.5	0.707107
ASOFT	2	9			9	9	0	0	0
P	2	13			13	13	0	0	0
ULL	2	22.5	16.1469	28.8531	22	23	1	0.5	0.707107
LLL	2	13	0.293795	25.7062	12	14	2	2	1.414214
LOL	2	33			33	33	0	0	0
DLLA	2	6.5	0.146898	12.8531	6	7	1	0.5	0.707107
ALLA	2	7.5	1.146898	13.8531	7	8	1	0.5	0.707107
PV	2	5			5	5	0	0	0
CP	2	16			16	16	0	0	0
CK	2	5			5	5	0	0	0

Table 71. ***Sargochromis*** **'sp zambia' percentages**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	4	17.18379	13.92846	20.43911	15.29412	20	4.705882	4.185294	2.045799
SNL-HL	4	35.9197	29.3431	42.49631	30.19608	40.07353	9.877451	17.0821	4.13305
LJL-HL	4	31.24459	25.06045	37.42874	27.84314	35.01684	7.173698	15.10418	3.88641
PPL-HL	4	28.93535	27.83388	30.03683	28.23529	29.87342	1.638124	0.479168	0.69222
CHD-HL	4	23.8046	20.4746	27.1346	21.56863	26.58228	5.013651	4.379511	2.092728
ED-HL	4	30.27453	25.79138	34.75769	26.32911	32.94118	6.612063	7.937896	2.817427
IOW-HL	4	20.39467	15.80308	24.98626	16.49832	23.29114	6.792823	8.326528	2.885572
IOW-HW	4	58.03147	44.01206	72.05087	46.66667	67.64706	20.98039	77.62419	8.810459
HW-HL	4	35.18495	34.34442	36.02547	34.43038	35.66176	1.231385	0.279022	0.528226
HL-SL	4	36.4652	35.12156	37.80884	35.58559	37.59494	2.009351	0.713019	0.844405
BD-SL	4	35.80398	27.16413	44.44382	27.8481	39.71631	11.86821	29.48151	5.429688
DFB-SL	4	51.86878	47.46986	56.2677	48.10127	54.5045	6.403239	7.642407	2.76449
AFB-SL	4	16.56506	14.99103	18.1391	15.82278	18.01802	2.195233	0.978513	0.989198
PRD-SL	4	39.99432	38.493	41.49565	38.73874	40.9396	2.200859	0.890198	0.943503
PRP-SL	4	42.62575	39.62146	45.63005	40.54054	44.68085	4.140311	3.564699	1.888041
PRV-SL	4	37.7056	35.35213	40.05907	35.58559	39.00709	3.421507	2.187542	1.479034
PRA-SL	4	69.09593	67.05875	71.13311	68.01802	70.92199	2.903968	1.639065	1.28026
CPL-SL	4	17.783	15.05464	20.51136	16.31206	20.25316	3.941108	2.939967	1.714633
CPD-SL	4	12.54116	10.79277	14.28955	11.4094	13.96396	2.554568	1.207296	1.09877
CPD-CPL	4	71.14986	54.43021	87.86951	59.375	81.57895	22.20395	110.4059	10.50742

Table 72. ***Sargochromis*** **'sp zambia' meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	4	95.5	50.68604	140.314	70.5	127	56.5	793.1667	28.16321
HL	4	34.375	19.41447	49.33553	25.5	45	19.5	88.39583	9.401906
UJT	4	38	34.32523	41.67477	36	40	4	5.333333	2.309401
LJT	4	36	31.49934	40.50066	34	40	6	8	2.828427
UJIR	4	2			2	2	0	0	0
LJIR	4	2			2	2	0	0	0
CERATO	4	10.75	9.954388	11.54561	10	11	1	0.25	0.5
EPI	4	3.25	2.454388	4.045612	3	4	1	0.25	0.5
DSPIN	4	15			15	15	0	0	0
DSOFT	4	13	11.70077	14.29923	12	14	2	0.666667	0.816497
ASOFT	4	8.25	7.454388	9.045612	8	9	1	0.25	0.5
P	4	12.5	10.90878	14.09122	11	13	2	1	1
ULL	4	21.25	18.53247	23.96753	19	23	4	2.916667	1.707825
LLL	4	12.5	11.58131	13.41869	12	13	1	0.333333	0.57735
LOL	4	33.75	30.73786	36.76214	31	35	4	3.583333	1.892969
DLLA	4	6.25	5.454388	7.045612	6	7	1	0.25	0.5
ALLA	4	7	5.700772	8.299228	6	8	2	0.666667	0.816497
PV	4	5.25	3.72652	6.77348	4	6	2	0.916667	0.957427
CP	4	16			16	16	0	0	0
CK	4	3.5	2.581307	4.418693	3	4	1	0.333333	0.57735

Table 73. ***'Pharyngochromis- Sargochromis '*** **morphometrics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD	3	8.066667	6.69851	9.434823	7.5	8.6	1.1	0.303333	0.550757
SNL	3	12.3	8.795693	15.80431	10.8	13.6	2.8	1.99	1.410674
LJL	3	11.43333	9.56885	13.29782	10.7	12.2	1.5	0.563333	0.750555
PPL	3	10.73333	9.079313	12.38735	10.3	11.5	1.2	0.443333	0.665833
CHD	3	9.5	6.678562	12.32144	8.2	10.3	2.1	1.29	1.135782
ED	3	8.466667	7.216345	9.716989	8	9	1	0.253333	0.503322
IOW	3	8.033333	6.01012	10.05655	7.1	8.6	1.5	0.663333	0.814453
HW	3	13.53333	11.78853	15.27813	12.8	14.2	1.4	0.493333	0.702377
HL	3	32.63333	26.22573	39.04093	30.5	35.5	5	6.653333	2.579406
SL	3	92.83333	76.67052	108.9961	86.5	99.5	13	42.33333	6.506407
BD	3	32.66667	23.94266	41.39067	29	36	7	12.33333	3.511885
DFB	3	50.83333	37.09551	64.57116	45	56	11	30.58333	5.53022
AFB	3	17	14.84867	19.15133	16.5	18	1.5	0.75	0.866025
PRD	3	35.5	26.12259	44.87741	32	39.5	7.5	14.25	3.774917
PRP	3	38	27.83323	48.16677	34.5	42.5	8	16.75	4.092676
PRV	3	33	26.08445	39.91555	30.5	36	5.5	7.75	2.783882
PRA	3	64	55.30552	72.69448	60.5	67.5	7	12.25	3.5
CPL	3	15.5	14.25793	16.74207	15	16	1	0.25	0.5
CPD	3	12.83333	8.471331	17.19534	11	14.5	3.5	3.083333	1.755942

Table 74. *'Pharyngochromis-Sargochromis '* log-transformed data

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LOGLACRD	3	2.086176	1.915748	2.256605	2.014903	2.151762	0.136859	0.004707	0.068607
LOGSNL	3	2.505115	2.215375	2.794855	2.379546	2.61007	0.230524	0.013604	0.116636
LOGLJL	3	2.435098	2.272117	2.598079	2.370244	2.501436	0.131192	0.004305	0.065609
LOGPPL	3	2.372099	2.220497	2.523701	2.332144	2.442347	0.110203	0.003724	0.061028
LOGCHD	3	2.246288	1.938273	2.554302	2.104134	2.332144	0.22801	0.015374	0.123993
LOGED	3	2.134966	1.987956	2.281976	2.079442	2.197225	0.117783	0.003502	0.05918
LOGIOW	3	2.08003	1.820361	2.339698	1.960095	2.151762	0.191667	0.010927	0.104531
LOGHW	3	2.604252	2.474724	2.733781	2.549445	2.653242	0.103797	0.002719	0.052142
LOGHL	3	3.483288	3.289556	3.677021	3.417727	3.569533	0.151806	0.006082	0.077988
LOGSL	3	4.52917	4.355213	4.703128	4.460144	4.600158	0.140013	0.004904	0.070027
LOGBD	3	3.482441	3.212177	3.752704	3.367296	3.583519	0.216223	0.011837	0.108796
LOGDFB	3	3.924532	3.65044	4.198624	3.806662	4.025352	0.218689	0.012174	0.110337
LOGAFB	3	2.832364	2.707571	2.957157	2.80336	2.890372	0.087011	0.002524	0.050236
LOGPRD	3	3.565795	3.303295	3.828295	3.465736	3.676301	0.210565	0.011166	0.10567
LOGPRP	3	3.633794	3.370133	3.897454	3.540959	3.749504	0.208545	0.011265	0.106138
LOGPRV	3	3.494162	3.286369	3.701955	3.417727	3.583519	0.165792	0.006997	0.083648
LOGPRA	3	4.157885	4.021881	4.293889	4.102643	4.212128	0.109484	0.002997	0.054749
LOGCPL	3	2.740493	2.660328	2.820658	2.70805	2.772589	0.064539	0.001041	0.032271
LOGCPD	3	2.545664	2.20004	2.891289	2.397895	2.674149	0.276253	0.019358	0.139133

Table 75. *'Pharyngochromis-Sargochromis '* percentages

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	3	24.73579	23.25343	26.21814	24.22535	25.39185	1.166497	0.356084	0.596728
SNL-HL	3	37.63488	32.72623	42.54354	35.40984	39.18495	3.775117	3.904572	1.975999
LJL-HL	3	35.06161	33.35882	36.76441	34.3662	35.73668	1.37048	0.469865	0.685467
PPL-HL	3	32.92704	30.40372	35.45036	32.2884	34.09836	1.809959	1.031796	1.015774
CHD-HL	3	29.08243	23.53748	34.62738	26.88525	31.34796	4.462716	4.982463	2.232143
ED-HL	3	25.99049	22.63758	29.34339	25.07837	27.54098	2.462614	1.82176	1.349726
IOW-HL	3	24.6333	19.60684	29.65976	23.27869	26.95925	3.680559	4.094242	2.023423
IOW-HW	3	59.28632	49.6356	68.93705	55.46875	63.23529	7.766544	15.09275	3.884939
HW-HL	3	41.53348	38.13233	44.93463	40	42.63323	2.633229	1.874566	1.369148
HL-SL	3	35.14166	33.63946	36.64386	34.48649	35.67839	1.191905	0.365683	0.604717
BD-SL	3	35.12753	31.62546	38.6296	33.52601	36.1809	2.654893	1.987461	1.409774
DFB-SL	3	54.66007	48.93746	60.38267	52.02312	56.28141	4.258286	5.306843	2.303659
AFB-SL	3	18.33448	16.71046	19.95849	17.83784	19.07514	1.237307	0.427393	0.653753
PRD-SL	3	38.17685	34.73969	41.61401	36.99422	39.69849	2.704273	1.91447	1.383644
PRP-SL	3	40.86599	36.88864	44.84333	39.88439	42.71357	2.829175	2.563508	1.601096
PRV-SL	3	35.52539	34.10663	36.94414	35.13514	36.1809	1.045769	0.326184	0.571125
PRA-SL	3	68.99019	66.34327	71.63711	67.8392	69.9422	2.103001	1.135352	1.065529
CPL-SL	3	16.72607	15.15888	18.29326	16.0804	17.34104	1.260638	0.398009	0.630879
CPD-SL	3	13.78123	11.40228	16.16018	12.71676	14.57286	1.856101	0.917104	0.957655
CPD-CPL	3	82.60977	60.96162	104.2579	73.33333	90.625	17.29167	75.9434	8.714551

Table 76. ***'Pharyngochromis-Sargochromis '*** **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	3	92.83333	76.67052	108.9961	86.5	99.5	13	42.33333	6.506407
HL	3	32.63333	26.22573	39.04093	30.5	35.5	5	6.653333	2.579406
UJT	3	40			40	40	0	0	0
LJT	3	32.66667	20.16345	45.16989	28	38	10	25.33333	5.033223
UJIR	3	1			1	1	0	0	0
LJIR	3	1.333333	-0.10088	2.767551	1	2	1	0.333333	0.57735
CERATO	3	10	7.515862	12.48414	9	11	2	1	1
EPI	3	3.333333	1.899116	4.767551	3	4	1	0.333333	0.57735
DSPIN	3	15			15	15	0	0	0
DSOFT	3	11			11	11	0	0	0
ASOFT	3	8.666667	7.232449	10.10088	8	9	1	0.333333	0.57735
P	3	12.33333	9.464898	15.20177	11	13	2	1.333333	1.154701
ULL	3	21.66667	20.23245	23.10088	21	22	1	0.333333	0.57735
LLL	3	12.66667	9.798232	15.5351	12	14	2	1.333333	1.154701
LOL	3	34.33333	32.89912	35.76755	34	35	1	0.333333	0.57735
DLLA	3	6.333333	4.899116	7.767551	6	7	1	0.333333	0.57735
ALLA	3	7.333333	5.899116	8.767551	7	8	1	0.333333	0.57735
PV	3	4.333333	2.899116	5.767551	4	5	1	0.333333	0.57735
CP	3	14.66667	11.79823	17.5351	14	16	2	1.333333	1.154701
CK	3	3.666667	2.232449	5.100884	3	4	1	0.333333	0.57735

Table 77. ***Sargochromis*** **'sp double striped 1' morphometrics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD	6	7.916667	6.016734	9.816599	6	10.3	4.3	3.277667	1.810433
SNL	6	13.45	10.34839	16.55161	11.1	17.9	6.8	8.735	2.955503
LJL	6	14.61667	11.74082	17.49252	12.3	19.4	7.1	7.509667	2.740377
PPL	6	12.46667	10.2329	14.70043	9.4	15.5	6.1	4.530667	2.128536
CHD	6	10.8	7.70817	13.89183	7.5	15.9	8.4	8.68	2.946184
ED	6	10.23333	8.514479	11.95219	8	12.7	4.7	2.682667	1.637885
IOW	6	9.816667	7.898275	11.73506	7.5	13	5.5	3.341667	1.828023
HW	6	16.45	13.1236	19.7764	12.5	21.5	9	10.047	3.1697
HL	6	38.63333	31.63	45.63667	30.3	49	18.7	44.53467	6.67343
SL	6	116.3333	95.31927	137.3474	91	149	58	400.9667	20.02415
BD	6	40.75	32.04063	49.45937	32	54.5	22.5	68.875	8.299096
DFB	6	64.83333	54.0969	75.56977	51.5	80	28.5	104.6667	10.23067
AFB	6	19.58333	16.01808	23.14858	13.5	23	9.5	11.54167	3.397303
PRD	6	42.66667	35.01466	50.31868	34.5	54	19.5	53.16667	7.291548
PRP	6	45.91667	36.69347	55.13987	37	61	24	77.24167	8.788724
PRV	6	38.91667	31.7881	46.04524	31.5	50.5	19	46.14167	6.792766
PRA	6	79.66667	64.87868	94.45465	63.5	104.5	41	198.5667	14.09137
CPL	6	20.16667	15.86953	24.4638	14.5	26.5	12	16.76667	4.094712
CPD	6	15.66667	13.19065	18.14268	13	19	6	5.566667	2.359378

Table 78. ***Sargochromis*** **'sp double striped 1' log-transformed data**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LOGLACRD	6	2.047879	1.813775	2.281984	1.791759	2.332144	0.540384	0.049763	0.223076
LOGSNL	6	2.580277	2.362226	2.798329	2.406945	2.884801	0.477856	0.043172	0.20778
LOGLJL	6	2.668659	2.48352	2.853798	2.509599	2.965273	0.455674	0.031123	0.176418
LOGPPL	6	2.510687	2.328761	2.692614	2.24071	2.74084	0.50013	0.030053	0.173357
LOGCHD	6	2.350644	2.078396	2.622892	2.014903	2.766319	0.751416	0.0673	0.259423
LOGED	6	2.314931	2.14625	2.483613	2.079442	2.541602	0.46216	0.025836	0.160735
LOGIOW	6	2.270244	2.080635	2.459854	2.014903	2.564949	0.550046	0.032644	0.180677
LOGHW	6	2.785284	2.587027	2.983541	2.525729	3.068053	0.542324	0.03569	0.188918
LOGHL	6	3.641978	3.463771	3.820184	3.411148	3.89182	0.480673	0.028836	0.169812
LOGSL	6	4.744458	4.567369	4.921547	4.51086	5.003946	0.493087	0.028475	0.168747
LOGBD	6	3.691164	3.486571	3.895756	3.465736	3.998201	0.532465	0.038007	0.194954
LOGDFB	6	4.161466	3.995994	4.326937	3.941582	4.382027	0.440445	0.024862	0.157676
LOGAFB	6	2.960259	2.757967	3.162551	2.60269	3.135494	0.532805	0.037157	0.192763
LOGPRD	6	3.741751	3.56794	3.915562	3.540959	3.988984	0.448025	0.027431	0.165623
LOGPRP	6	3.812636	3.622377	4.002895	3.610918	4.110874	0.499956	0.032868	0.181297
LOGPRV	6	3.649457	3.474103	3.82481	3.449988	3.921973	0.471986	0.02792	0.167093
LOGPRA	6	4.365599	4.188184	4.543013	4.15104	4.649187	0.498147	0.02858	0.169057
LOGCPL	6	2.986579	2.770465	3.202693	2.674149	3.277145	0.602996	0.042408	0.205933
LOGCPD	6	2.742301	2.586967	2.897635	2.564949	2.944439	0.37949	0.021909	0.148017

Table 79. ***Sargochromis*** **'sp double striped 1' percentage data**

Variables	Valid N	Mean	-95.000%	Maximum	Range	Variance	Std.Dev.
LACRD-HL	6	20.42707	18.02181	22.83105	6.745259	5.253072	2.291958
SNL-HL	6	34.73197	30.99855	40.86758	9.768384	12.65619	3.557554
LJL-HL	6	38.00853	33.04322	46.86469	12.28024	22.38631	4.731417
PPL-HL	6	32.27817	31.08885	33.70474	2.681633	1.284351	1.133292
CHD-HL	6	27.60053	24.70215	32.44898	7.696504	7.627782	2.761844
ED-HL	6	26.54136	25.48874	28.41823	2.847454	1.006066	1.003029
IOW-HL	6	25.38518	24.2772	26.53061	2.78632	1.114677	1.055783
IOW-HW	6	59.7872	57.31099	62.91391	7.298934	5.567574	2.359571
HW-HL	6	42.47578	41.00366	44.01114	3.528568	1.967758	1.402768
HL-SL	6	33.21342	32.34082	34.0856	2.315692	0.691392	0.8315
BD-SL	6	34.90349	33.3964	36.57718	3.713331	2.062372	1.436096
DFB-SL	6	55.84667	53.95006	58.84956	5.158282	3.266211	1.807266
AFB-SL	6	16.91854	14.59783	19.09091	5.33252	4.890232	2.211387
PRD-SL	6	36.70466	35.45166	38.1323	2.734066	1.425572	1.193973
PRP-SL	6	39.40558	37.89888	40.9396	3.771456	2.061303	1.435724
PRV-SL	6	33.46202	32.61567	34.61538	2.3145	0.650421	0.806487
PRA-SL	6	68.47796	66.9031	70.13423	3.597263	2.252024	1.500674
CPL-SL	6	17.2699	16.11164	19.09091	3.156843	1.218152	1.103699
CPD-SL	6	13.51489	12.90158	14.28571	1.534036	0.341547	0.58442
CPD-CPL	6	78.61771	70.84618	89.65517	20.60755	54.84055	7.405441

Table 80. *Sargochromis* 'sp double striped 1' meristics'

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	6	115.1667	94.13427	136.1991	91	148	57	401.6667	20.04162
HL	6	39.28333	31.99254	46.57413	30.3	50.3	20	48.26567	6.94735
UJT	6	47	42.26008	51.73992	42	52	10	20.4	4.516636
LJT	6	35	29.10072	40.89928	30	42	12	31.6	5.621388
UJIR	6	2.166667	1.37668	2.956653	1	3	2	0.566667	0.752773
LJIR	6	1.833333	1.043347	2.62332	1	3	2	0.566667	0.752773
CERATO	6	10	9.336279	10.66372	9	11	2	0.4	0.632456
EPI	6	3.666667	3.12474	4.208593	3	4	1	0.266667	0.516398
DSPIN	6	14.83333	14.4049	15.26176	14	15	1	0.166667	0.408248
DSOFT	6	11	10.06136	11.93864	10	12	2	0.8	0.894427
ASOFT	6	8.166667	7.738236	8.595097	8	9	1	0.166667	0.408248
P	6	12.66667	11.80981	13.52353	12	14	2	0.666667	0.816497
ULL	6	20.83333	20.04335	21.62332	20	22	2	0.566667	0.752773
LLL	6	13.16667	12.13487	14.19846	12	14	2	0.966667	0.983192
LOL	6	33.33333	32.24948	34.41719	32	35	3	1.066667	1.032796
DLLA	6	6.666667	6.12474	7.208593	6	7	1	0.266667	0.516398
ALLA	6	7.333333	6.791407	7.87526	7	8	1	0.266667	0.516398
PV	6	4.166667	3.738236	4.595097	4	5	1	0.166667	0.408248
CP	6	16			16	16	0	0	0
CK	6	4			4	4	0	0	0

Table 81. *Sargochromis* 'sp codringtonii-small' morphometrics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD	10	7.26	6.852254	7.667746	6.5	8.2	1.7	0.324889	0.56999
SNL	10	12.39	11.47735	13.30265	10.1	14	3.9	1.627667	1.2758
LJL	10	13.37	12.33552	14.40448	10.4	15.1	4.7	2.091222	1.446106
PPL	10	11.77	10.98416	12.55584	10.1	13.9	3.8	1.206778	1.098534
CHD	10	9.63	9.107523	10.15248	8.2	10.6	2.4	0.533444	0.730373
ED	10	10.4	9.905535	10.89447	8.8	11.3	2.5	0.477778	0.691215
IOW	10	9.56	8.92534	10.19466	7.7	10.8	3.1	0.787111	0.887193
HW	10	14.56	13.31812	15.80188	12	16.9	4.9	3.013778	1.736024
HL	10	37.69	35.60073	39.77927	32	41.5	9.5	8.529889	2.920597
SL	10	112.85	106.1499	119.5501	94	120.5	26.5	87.725	9.366163
BD	10	38.35	36.23025	40.46975	32.5	42.5	10	8.780556	2.9632
DFB	10	61.45	57.4726	65.4274	50	68.5	18.5	30.91389	5.560026
AFB	10	20	18.30548	21.69452	15	23	8	5.611111	2.368778
PRD	10	41.3	38.73622	43.86378	35	45.5	10.5	12.84444	3.583915
PRP	10	44.75	41.8923	47.6077	38	50	12	15.95833	3.994788
PRV	10	38.75	36.40606	41.09394	32	42.5	10.5	10.73611	3.276601
PRA	10	77.5	72.02338	82.97662	64	87.5	23.5	58.61111	7.655789
CPL	10	19.85	18.24997	21.45003	15.5	23	7.5	5.002778	2.236689
CPD	10	15.05	13.97763	16.12237	12.5	17	4.5	2.247222	1.499074

Table 82. *Sargochromis* **'sp codringtonii-small' log-transformed data**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LOGLACRD	10	1.979628	1.923797	2.035459	1.871802	2.104134	0.232332	0.006091	0.078046
LOGSNL	10	2.511931	2.436071	2.58779	2.312535	2.639057	0.326522	0.011245	0.106044
LOGLJL	10	2.587391	2.506038	2.668744	2.341806	2.714695	0.372889	0.012933	0.113724
LOGPPL	10	2.461716	2.395961	2.527471	2.312535	2.631889	0.319353	0.008449	0.091919
LOGCHD	10	2.262173	2.206	2.318346	2.104134	2.360854	0.25672	0.006166	0.078525
LOGED	10	2.339703	2.290095	2.389312	2.174752	2.424803	0.250051	0.004809	0.069348
LOGIOW	10	2.253538	2.184861	2.322216	2.04122	2.379546	0.338326	0.009217	0.096004
LOGHW	10	2.671695	2.584544	2.758847	2.484907	2.827314	0.342407	0.014842	0.121829
LOGHL	10	3.626559	3.569066	3.684051	3.465736	3.725693	0.259958	0.006459	0.080369
LOGSL	10	4.72273	4.660081	4.785378	4.543295	4.79165	0.248355	0.00767	0.087577
LOGBD	10	3.643951	3.586856	3.701045	3.48124	3.749504	0.268264	0.00637	0.079812
LOGDFB	10	4.114318	4.046663	4.181973	3.912023	4.226834	0.314811	0.008944	0.094575
LOGAFB	10	2.988947	2.899387	3.078507	2.70805	3.135494	0.427444	0.015674	0.125196
LOGPRD	10	3.717378	3.653968	3.780787	3.555348	3.817712	0.262364	0.007857	0.088641
LOGPRP	10	3.797391	3.731991	3.862791	3.637586	3.912023	0.274437	0.008358	0.091423
LOGPRV	10	3.653756	3.591034	3.716478	3.465736	3.749504	0.283768	0.007688	0.087679
LOGPRA	10	4.345597	4.271443	4.419751	4.158883	4.471639	0.312756	0.010745	0.10366
LOGCPL	10	2.982172	2.898151	3.066192	2.74084	3.135494	0.394654	0.013795	0.117452
LOGCPD	10	2.706732	2.633297	2.780166	2.525729	2.833213	0.307485	0.010538	0.102655

Table 83. *Sargochromis* **'sp codringtonii-small' percentage data**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	10	19.31299	18.26261	20.36337	17.08543	22.5	5.414573	2.155997	1.468332
SNL-HL	10	32.82455	31.93677	33.71234	31.45161	34.87179	3.420182	1.540176	1.241038
LJL-HL	10	35.43808	33.85349	37.02267	31.72043	38.80597	7.08554	4.906688	2.215105
PPL-HL	10	31.24468	29.93588	32.55347	28.95442	34.375	5.420576	3.347315	1.829567
CHD-HL	10	25.5814	24.67882	26.48397	24.06015	27.61394	3.553791	1.591925	1.261715
ED-HL	10	27.68661	26.15938	29.21384	24.81203	31.9403	7.128268	4.557905	2.134925
IOW-HL	10	25.35191	24.63015	26.07367	24.0625	27.06767	3.005169	1.017993	1.008956
IOW-HW	10	66.82534	57.7093	75.94137	55	90	35	162.3926	12.74333
HW-HL	10	38.91382	34.74545	43.08219	30.07519	44.12533	14.05014	33.95367	5.826977
HL-SL	10	33.42462	32.81722	34.03202	31.91667	34.58333	2.666667	0.720949	0.849087
BD-SL	10	34.01543	33.27071	34.76014	32.46753	35.41667	2.949134	1.083754	1.041035
DFB-SL	10	54.45186	53.07373	55.82999	51.94805	57.64192	5.693869	3.711373	1.926492
AFB-SL	10	17.7066	16.76173	18.65147	15.76763	19.21397	3.446339	1.744593	1.32083
PRD-SL	10	36.62135	35.51579	37.72692	33.76623	38.69565	4.929418	2.388489	1.545474
PRP-SL	10	39.663	38.64474	40.68126	37.22944	41.66667	4.437229	2.026142	1.423426
PRV-SL	10	34.35786	33.43936	35.27636	32.46753	36.22449	3.756957	1.648588	1.283973
PRA-SL	10	68.61041	67.12975	70.09106	65.30612	72.91667	7.610544	4.284125	2.069813
CPL-SL	10	17.57573	16.75514	18.39631	16.15721	19.19643	3.039223	1.315842	1.147102
CPD-SL	10	13.32945	12.92758	13.73132	12.5	14.16667	1.666667	0.315591	0.561775
CPD-CPL	10	76.21329	71.23467	81.19191	65.11628	86.48649	21.37021	48.43639	6.959626

Table 84. *Sargochromis* 'sp codringtonii-small' meristics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	2	105	16.05657	193.9434	98	112	14	98	9.899495
HL	2	35.4	11.25821	59.54179	33.5	37.3	3.8	7.22	2.687006
UJT	2	43	30.2938	55.7062	42	44	2	2	1.414214
LJT	2	34	8.58759	59.41241	32	36	4	8	2.828427
UJIR	2	1.5	-4.8531	7.853102	1	2	1	0.5	0.707107
CERATO	2	10.5	4.146898	16.8531	10	11	1	0.5	0.707107
EPI	2	4.5	-1.8531	10.8531	4	5	1	0.5	0.707107
DSPIN	2	15			15	15	0	0	0
DSOFT	2	11			11	11	0	0	0
ASOFT	2	9			9	9	0	0	0
P	2	13			13	13	0	0	0
ULL	2	21.5	15.1469	27.8531	21	22	1	0.5	0.707107
LLL	2	13.5	7.146898	19.8531	13	14	1	0.5	0.707107
LOL	2	35	22.2938	47.7062	34	36	2	2	1.414214
DLLA	2	6.5	0.146898	12.8531	6	7	1	0.5	0.707107
ALLA	2	7			7	7	0	0	0
PV	2	4.5	-1.8531	10.8531	4	5	1	0.5	0.707107
CP	2	16			16	16	0	0	0
CK	2	4.5	-1.8531	10.8531	4	5	1	0.5	0.707107

Table 85. *Sargochromis* 'sp codringtonii-big' percentage data

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	2	19.90889	10.94919	28.8686	19.20375	20.61404	1.410288	0.994456	0.997224
SNL-HL	2	34.50044	18.67903	50.32186	33.25527	35.74561	2.490345	3.100908	1.76094
LJL-HL	2	36.64335	17.39924	55.88746	35.12881	38.15789	3.029089	4.58769	2.141889
PPL-HL	2	32.91323	16.42946	49.39699	31.61593	34.21053	2.594601	3.365978	1.83466
CHD-HL	2	28.93402	6.472761	51.39527	27.16628	30.70175	3.535478	6.249802	2.49996
ED-HL	2	24.99949	13.84717	36.15181	24.12178	25.87719	1.755413	1.540738	1.241265
IOW-HL	2	26.85813	19.96705	33.74921	26.31579	27.40047	1.084679	0.588264	0.766984
IOW-HW	2	60.71895	1.709032	119.7289	56.07477	65.36313	9.288362	43.13684	6.567864
HW-HL	2	44.4251	12.59955	76.25065	41.92037	46.92982	5.00945	12.54729	3.542216
HL-SL	2	33.625	8.742016	58.50798	31.66667	35.58333	3.916667	7.670139	2.769502
BD-SL	2	38.50694	30.12438	46.88951	37.84722	39.16667	1.319444	0.870467	0.932988
DFB-SL	2	56.38889	49.32989	63.44789	55.83333	56.94444	1.111111	0.617284	0.785674
AFB-SL	2	18.40278	-3.65661	40.46216	16.66667	20.13889	3.472222	6.028164	2.455232
PRD-SL	2	36.14583	32.17514	40.11652	35.83333	36.45833	0.625	0.195313	0.441942
PRP-SL	2	39.375	15.55087	63.19913	37.5	41.25	3.75	7.03125	2.65165
PRV-SL	2	33.26389	16.49876	50.02902	31.94444	34.58333	2.638889	3.481867	1.865976
PRA-SL	2	70.06944	44.48056	95.65833	68.05556	72.08333	4.027778	8.111497	2.848069
CPL-SL	2	17.25694	14.16863	20.34526	17.01389	17.5	0.486111	0.118152	0.343732
CPD-SL	2	14.23611	9.824234	18.64799	13.88889	14.58333	0.694444	0.241127	0.491046
CPD-CPL	2	82.48299	71.6784	93.28759	81.63265	83.33333	1.70068	1.446157	1.202563

Table 86. *Sargochromis* 'sp codringtonii-big' meristics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	2	131	3.937952	258.062	121	141	20	200	14.14214
HL	2	44.7	12.93449	76.46551	42.2	47.2	5	12.5	3.535534
UJT	2	42	-8.82482	92.82482	38	46	8	32	5.656854
LJT	2	31	-7.11861	69.11861	28	34	6	18	4.242641
UJIR	2	2.5	-3.8531	8.853102	2	3	1	0.5	0.707107
LJIR	2	1.5	-4.8531	7.853102	1	2	1	0.5	0.707107
CERATO	2	10			10	10	0	0	0
EPI	2	3.5	-2.8531	9.853102	3	4	1	0.5	0.707107
DSPIN	2	15			15	15	0	0	0
DSOFT	2	11			11	11	0	0	0
ASOFT	2	8.5	2.146898	14.8531	8	9	1	0.5	0.707107
P	2	12.5	6.146898	18.8531	12	13	1	0.5	0.707107
ULL	2	22			22	22	0	0	0
LLL	2	13	0.293795	25.7062	12	14	2	2	1.414214
LOL	2	33.5	27.1469	39.8531	33	34	1	0.5	0.707107
DLLA	2	5.5	-0.8531	11.8531	5	6	1	0.5	0.707107
ALLA	2	6.5	0.146898	12.8531	6	7	1	0.5	0.707107
PV	2	4			4	4	0	0	0
CP	2	16			16	16	0	0	0
CK	2	3.5	-2.8531	9.853102	3	4	1	0.5	0.707107

Table 87. *Sargochromis* 'sp small' morphometrics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD	4	3.525	2.076055	4.973945	2.7	4.8	2.1	0.829167	0.910586
SNL	4	6.125	4.304341	7.945659	5.3	7.8	2.5	1.309167	1.144188
LJL	4	6.6	5.320409	7.879591	6.1	7.8	1.7	0.646667	0.804156
PPL	4	6.05	4.488222	7.611778	5.4	7.5	2.1	0.963333	0.981495
CHD	4	4.1	2.800772	5.399228	3.5	5.3	1.8	0.666667	0.816497
ED	4	6.225	4.835524	7.614476	5	6.9	1.9	0.7625	0.873212
IOW	4	4.75	3.527758	5.972242	4.3	5.9	1.6	0.59	0.768115
HW	4	8.55	5.71393	11.38607	7.5	11.2	3.7	3.176667	1.782321
HL	4	20.7	15.89637	25.50363	18.5	25	6.5	9.113333	3.01883
SL	4	60	45.44516	74.55484	53.5	73.5	20	83.66667	9.146948
BD	4	19.375	15.40358	23.34642	17.5	23	5.5	6.229167	2.49583
DFB	4	32.375	23.15654	41.59346	28.5	41	12.5	33.5625	5.793315
AFB	4	9.25	6.611255	11.88875	8	11.5	3.5	2.75	1.658312
PRD	4	21.625	15.76495	27.48505	19	27	8	13.5625	3.68273
PRP	4	24.625	18.72906	30.52094	21.5	30	8.5	13.72917	3.705289
PRV	4	21	16.05269	25.94731	18.5	25.5	7	9.666667	3.109126
PRA	4	41.875	31.5346	52.2154	37.5	51.5	14	42.22917	6.498397
CPL	4	11.125	9.766235	12.48377	10	12	2	0.729167	0.853913
CPD	4	7.625	6.118932	9.131068	7	9	2	0.895833	0.946485

Table 88. *Sargochromis* 'sp small' log-transformed data

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LOGLACRD	4	1.236508	0.845895	1.627121	0.993252	1.568616	0.575364	0.06026	0.24548
LOGSNL	4	1.800383	1.522063	2.078703	1.667707	2.054124	0.386417	0.030593	0.17491
LOGLJL	4	1.881878	1.697959	2.065797	1.808289	2.054124	0.245835	0.01336	0.115583
LOGPPL	4	1.790977	1.548589	2.033365	1.686399	2.014903	0.328504	0.023204	0.152328
LOGCHD	4	1.397445	1.102252	1.692637	1.252763	1.667707	0.414944	0.034415	0.185513
LOGED	4	1.820608	1.584258	2.056958	1.609438	1.931521	0.322083	0.022062	0.148534
LOGIOW	4	1.549194	1.309086	1.789302	1.458615	1.774952	0.316337	0.022769	0.150895
LOGHW	4	2.13129	1.825501	2.43708	2.014903	2.415914	0.401011	0.03693	0.192173
LOGHL	4	3.022615	2.800658	3.244572	2.917771	3.218876	0.301105	0.019457	0.139488
LOGSL	4	4.086284	3.857601	4.314966	3.979682	4.297285	0.317604	0.020654	0.143715
LOGBD	4	2.958126	2.762294	3.153959	2.862201	3.135494	0.273293	0.015146	0.123071
LOGDFB	4	3.466468	3.201527	3.731408	3.349904	3.713572	0.363668	0.027723	0.166501
LOGAFB	4	2.21313	1.937918	2.488343	2.079442	2.442347	0.362905	0.029914	0.172957
LOGPRD	4	3.063803	2.808577	3.319029	2.944439	3.295837	0.351398	0.025727	0.160396
LOGPRP	4	3.195813	2.967951	3.423675	3.068053	3.401197	0.333144	0.020506	0.143199
LOGPRV	4	3.036822	2.812544	3.2611	2.917771	3.238678	0.320908	0.019866	0.140947
LOGPRA	4	3.726365	3.494199	3.958531	3.624341	3.941582	0.317241	0.021288	0.145904
LOGCPL	4	2.406934	2.282641	2.531226	2.302585	2.484907	0.182322	0.006101	0.078111
LOGCPD	4	2.025987	1.837107	2.214867	1.94591	2.197225	0.251314	0.01409	0.118701

Table 89. *Sargochromis* 'sp small' percentages

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	4	16.90149	12.91253	20.89045	14.4385	19.2	4.761497	6.284295	2.50685
SNL-HL	4	29.4753	27.55736	31.39323	28.64078	31.2	2.559223	1.452803	1.205323
LJL-HL	4	32.0052	28.83638	35.17402	29.61165	34.05405	4.442404	3.965818	1.991436
PPL-HL	4	29.24418	25.77935	32.709	26.21359	31.35135	5.137759	4.741327	2.177459
CHD-HL	4	19.70926	18.00116	21.41737	18.91892	21.2	2.281081	1.152307	1.073456
ED-HL	4	30.30563	22.9617	37.64956	27.02703	36.8984	9.871369	21.30074	4.615273
IOW-HL	4	22.93297	21.24557	24.62037	21.35922	23.6	2.240777	1.12454	1.060443
IOW-HW	4	55.91964	51.72021	60.11908	52.67857	58.66667	5.988095	6.964983	2.639125
HW-HL	4	41.07061	36.95018	45.19104	38.83495	44.8	5.965049	6.705377	2.589474
HL-SL	4	34.52821	33.03315	36.02326	33.69369	35.82609	2.132393	0.882781	0.939564
BD-SL	4	32.3781	30.55395	34.20225	31.29252	33.64486	2.352343	1.314192	1.146382
DFB-SL	4	53.84559	49.97661	57.71457	51.35135	56.07477	4.723415	5.911951	2.43145
AFB-SL	4	15.38392	13.93458	16.83326	14.41441	16.52174	2.107325	0.829618	0.910834
PRD-SL	4	35.98482	34.11776	37.85187	34.23423	36.73469	2.50046	1.376745	1.173348
PRP-SL	4	41.05379	39.60058	42.507	40.18692	42.34234	2.155426	0.834055	0.913266
PRV-SL	4	35.01516	34.23928	35.79103	34.57944	35.65217	1.072735	0.237752	0.487598
PRA-SL	4	69.79086	66.91676	72.66496	67.56757	71.96262	4.395049	3.262431	1.80622
CPL-SL	4	18.71732	15.8266	21.60804	16.32653	20.72072	4.39419	3.300271	1.816665
CPD-SL	4	12.75411	11.71411	13.79411	12.17391	13.51351	1.3396	0.427174	0.653585
CPD-CPL	4	68.46344	60.30179	76.62509	63.63636	75	11.36364	26.30838	5.129169

Table 90. *Sargochromis* 'sp small' meristics

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
SL	4	60	45.44516	74.55484	53.5	73.5	20	83.66667	9.146948
HL	4	20.7	15.89637	25.50363	18.5	25	6.5	9.113333	3.01883
UJT	4	34			34	34	0	0	0
LJT	4	32.5	29.45304	35.54696	30	34	4	3.666667	1.914854
UJIR	4	1			1	1	0	0	0
LJIR	4	1			1	1	0	0	0
CERATO	4	10.5	9.581307	11.41869	10	11	1	0.333333	0.57735
EPI	4	3			3	3	0	0	0
DSPIN	4	14.75	13.95439	15.54561	14	15	1	0.25	0.5
DSOFT	4	11			11	11	0	0	0
ASOFT	4	8.5	7.581307	9.418693	8	9	1	0.333333	0.57735
P	4	12.25	11.45439	13.04561	12	13	1	0.25	0.5
ULL	4	21.5	20.58131	22.41869	21	22	1	0.333333	0.57735
LLL	4	11.5	10.58131	12.41869	11	12	1	0.333333	0.57735
LOL	4	33			33	33	0	0	0
DLLA	4	6.5	5.581307	7.418693	6	7	1	0.333333	0.57735
ALLA	4	7.5	6.581307	8.418693	7	8	1	0.333333	0.57735
PV	4	4			4	4	0	0	0
CP	4	16			16	16	0	0	0
CK	4	3			3	3	0	0	0

Table 91. *Sargochromis mellandi* percentage data

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
LACRD-HL	12	21.67054	20.56711	22.77396	18.51852	25.29412	6.775599	3.016016	1.736668
SNL-HL	12	34.31516	33.4616	35.16872	32.2314	36.48148	4.250077	1.804741	1.343407
LJL-HL	12	36.98286	35.45373	38.51199	34.17085	41.56863	7.397773	5.792089	2.406676
PPL-HL	12	31.05174	30.63634	31.46713	30	32.1608	2.160804	0.427429	0.65378
CHD-HL	12	31.50446	29.88173	33.12718	28.1407	37.2549	9.114198	6.522825	2.553982
ED-HL	12	25.03842	23.8128	26.26405	21.50943	28.37838	6.868944	3.721019	1.928994
IOW-HL	12	22.9779	22.10951	23.84628	20.59553	25.18519	4.589652	1.867982	1.366741
IOW-HW	12	57.01367	54.76257	59.26478	51.5528	62.96296	11.41017	12.55273	3.542983
HW-HL	12	40.3331	39.37751	41.2887	38.22785	43.96226	5.734416	2.262012	1.503999
HL-SL	12	33.63031	32.58942	34.6712	30.0885	35.84071	5.752212	2.683847	1.638245
BD-SL	12	35.49137	34.42621	36.55654	32.56881	37.77778	5.20897	2.810462	1.676443
DFB-SL	12	54.29914	52.9243	55.67398	50.66079	57.05882	6.398031	4.68222	2.163844
AFB-SL	12	17.52269	16.73899	18.3064	15.9292	19.42675	3.497548	1.521424	1.23346
PRD-SL	12	37.18477	35.95696	38.41258	33.03835	39.38053	6.342183	3.734291	1.932431
PRP-SL	12	40.72193	39.68654	41.75732	37.75811	43.36283	5.60472	2.65554	1.629583
PRV-SL	12	34.37044	33.06509	35.67578	30.38348	38.49558	8.112094	4.220838	2.054468
PRA-SL	12	71.62759	70.57403	72.68115	68.73156	74.60317	5.871611	2.749588	1.658188
CPL-SL	12	16.09666	15.18751	17.0058	14.15929	18.94273	4.783439	2.047457	1.430894
CPD-SL	12	14.06007	13.36932	14.75082	11.50442	15.59322	4.088796	1.181919	1.087161
CPD-CPL	12	87.94024	81.56079	94.3197	69.76744	104.2553	34.48788	100.8125	10.04054

Table 92. ***Sargochromis mellandi*** **meristics**

Variables	Valid N	Mean	-95.000%	95.000	Minimum	Maximum	Range	Variance	Std.Dev.
UJT	18	42.22222	38.11596	46.32848	30	60	30	68.18301	8.2573
LJT	18	31.33333	29.52821	33.13846	26	40	14	13.17647	3.629941
UJIR	18	1.555556	1.205071	1.90604	1	3	2	0.496732	0.704792
LJIR	18	1.611111	1.264102	1.95812	1	3	2	0.486928	0.697802
CERATO	18	9.888889	9.511748	10.26603	9	11	2	0.575163	0.758395
ARTIC	18	1			1	1	0	0	0
EPI	18	3.555556	3.205071	3.90604	2	5	3	0.496732	0.704792
DSPIN	18	14.83333	14.57748	15.08919	14	16	2	0.264706	0.514496
DSOFT	18	12.44444	12.09396	12.79493	11	13	2	0.496732	0.704792
ASPIN	18	3			3	3	0	0	0
ASOFT	18	8.444444	8.190176	8.698713	8	9	1	0.261438	0.51131
P	18	12.88889	12.47497	13.30281	11	14	3	0.69281	0.832352
ULL	18	21.38889	20.96628	21.8115	20	23	3	0.722222	0.849837
LLL	18	13.61111	13.22445	13.99777	12	15	3	0.604575	0.777544
LOL	18	34.27778	33.80124	34.75432	33	36	3	0.918301	0.95828
DLLA	18	6.222222	5.900595	6.543849	5	8	3	0.418301	0.646762
ALLA	18	7.222222	6.94955	7.494895	6	8	2	0.300654	0.548319
PV	18	4.611111	4.308916	4.913306	4	6	2	0.369281	0.607685
CP	18	15.33333	14.85089	15.81577	14	16	2	0.941176	0.970143
CK	18	3.388889	3.086694	3.691084	3	5	2	0.369281	0.607685

E. Appendix 5. Fish pictures.

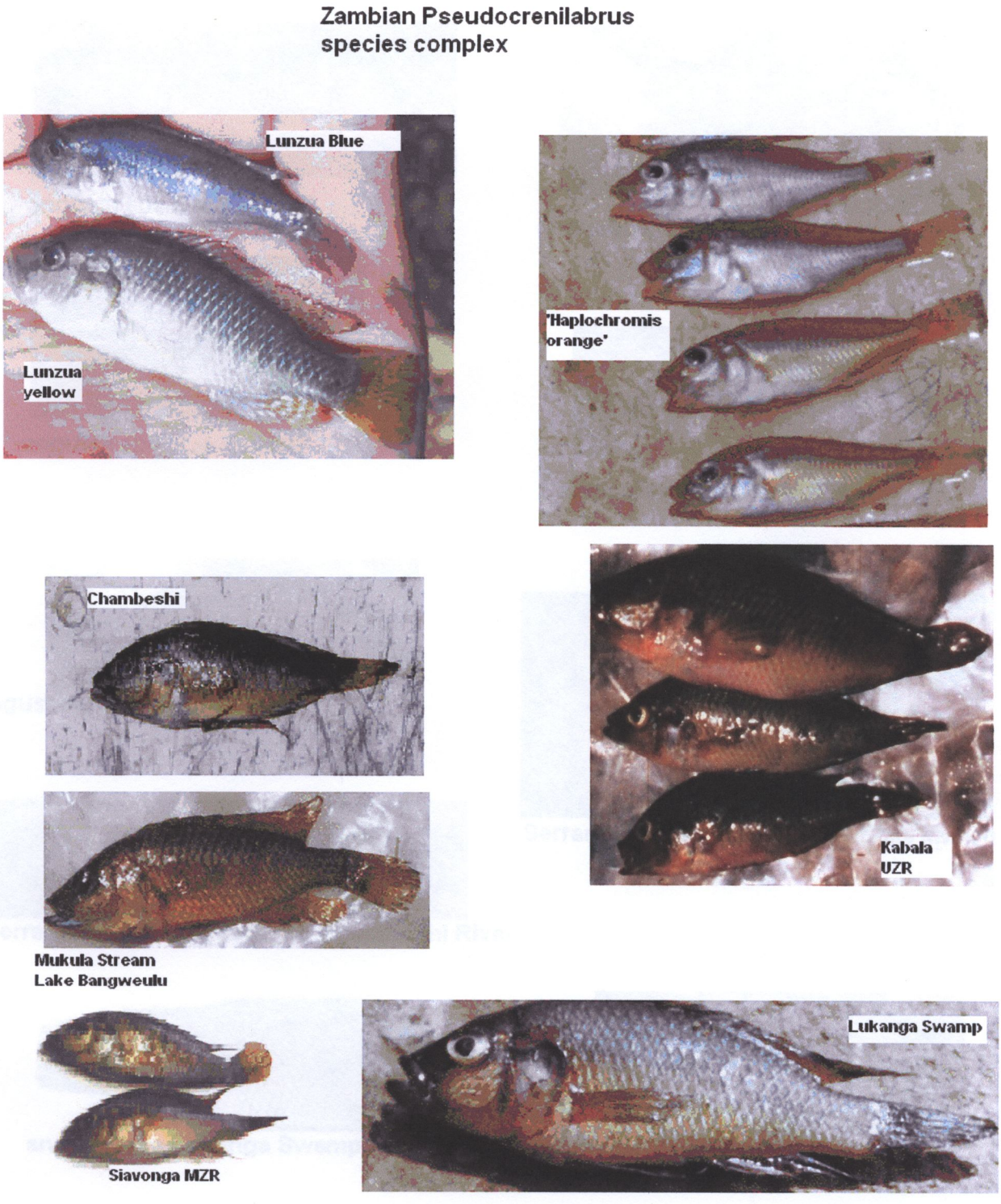


Plate 1. ***Pseudocrenilabrus*** **species complex from various localities of Zambia.**

Serranochromis angusticeps

angusticeps Barotse UZR

angusticeps Barotse UZR

angusticeps Kabala UZR

angusticeps Kabala UZR

angusticeps Kabala UZR

Serranochromis angusticeps Lake Mweru

Serranochromis angusticeps Chambeshi River

angusticeps Lukanga Swamp Kafue R

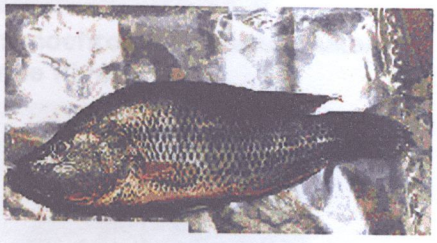
angusticeps Lake Bangweulu

Plate 2. ***Serranochromis angusticeps*** **from both the Zambezi and the Luapula systems.**

Serranochromis altus

Serranochromis altus Livingstone UZR

Serranochromis altus
Barotse UZR



Serranochromis altus Kabala UZR

Serranochromis altus Barotse UZR

Plate 3. ***Serranochromis altus*** **from the Upper Zambezi.**

Serranochromis robustus and S. thumbergi

Serranochromis robustus Barotse UZR

Serranochromis robustus Barotse UZR

Serranochromisrobustus Lukanga Kafue River

Serranochromis robustus Kabala UZR

Serranochromis robustus Mazabuka Kafue R

Serranochromis robustus Chanyanya Kafue R

Serranochromis robustus Lake Bangweulu

Serranochromis thumbergi Lake Bangweulu

Plate 4. ***Serranochromis robustus*** **and** ***Serranochromis thumbergi*** **from both the Zambezi and Luapula systems.**

Serranochromis macrocephalus

macrocephalus Lake Kariba MZR

Serranochromis macrocephalus Kabala UZR

Serranochromis macrocephalus Kabala UZR

Macrocephalus Livingstone UZR

Serranochromis macrocephalus Barotse UZR

Serranochromis macrocephalus Lake Mweru

Serranochromis macrocephalus Chanyanya Lagoon Kafue River

Serranochromis macrocephalus Lukanga Kafue River

Plate 5. *Serranochromis macrocephalus* from various localities of Zambia.

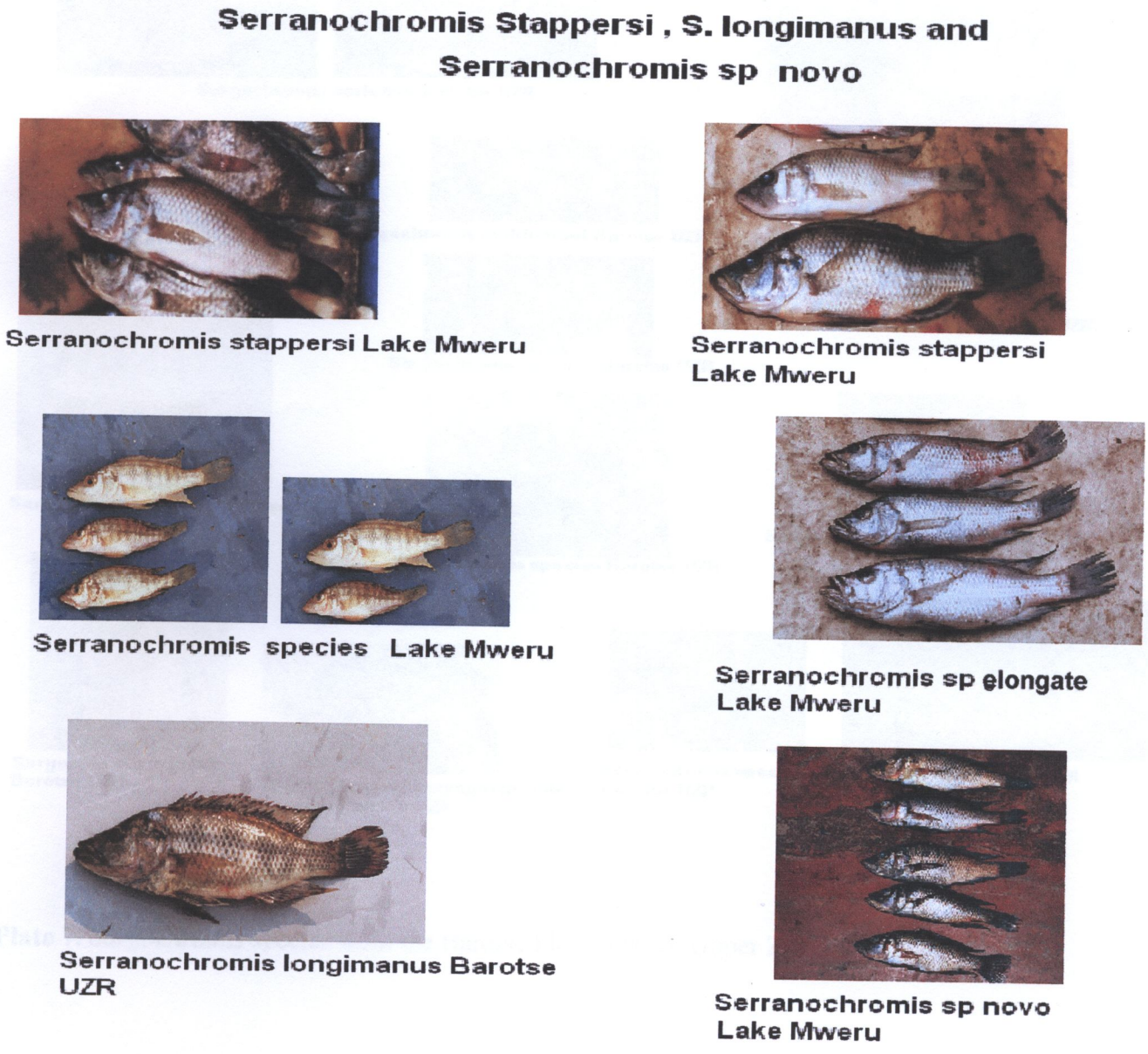


Plate 6. *Serranochromis longimanus, Serranochromis stappersi* and *Serranochromis* 'sp elongate' from various localities of Zambia.

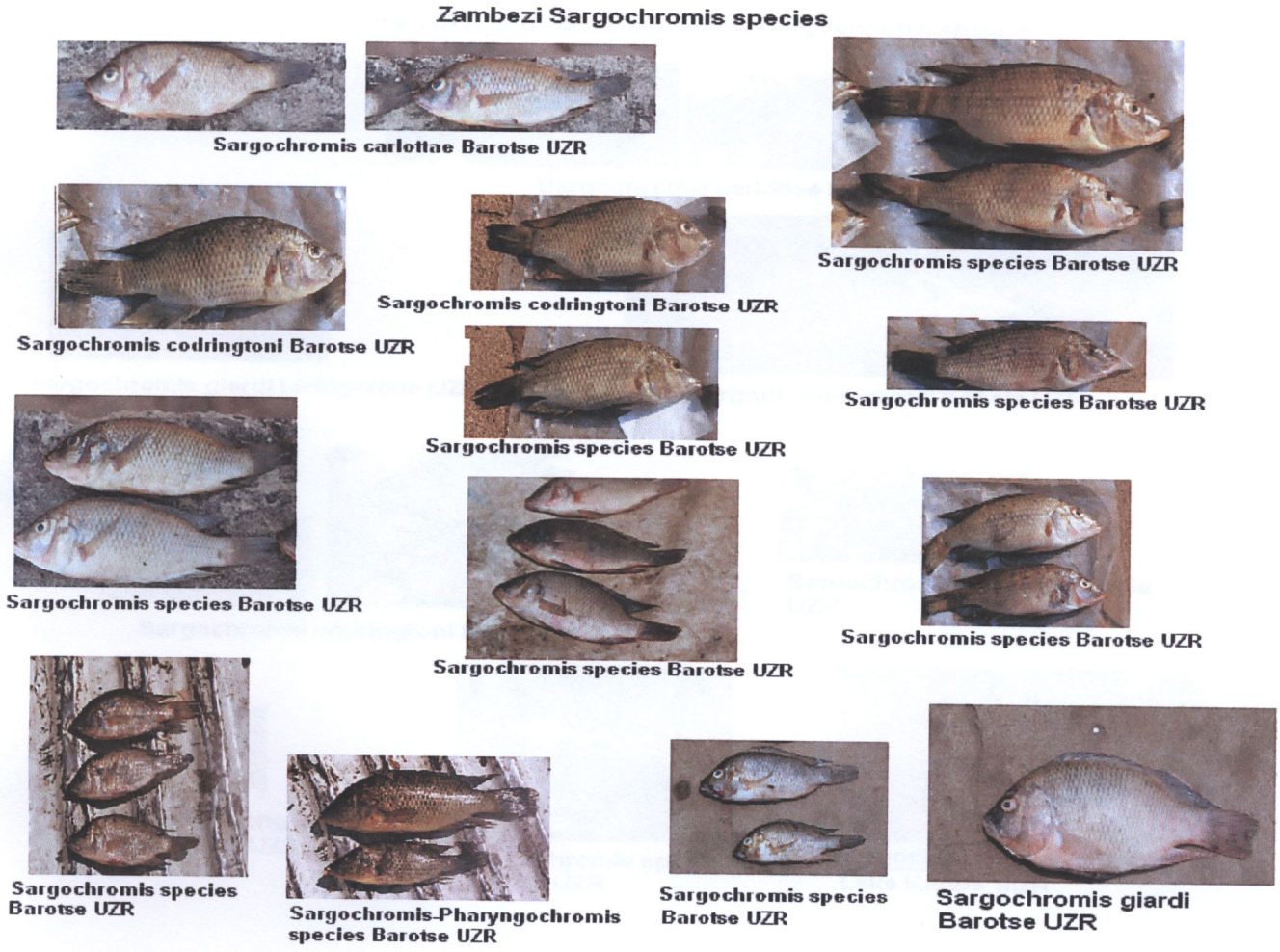


Plate 7. *Sargochromis* species from the Barotse Flood Plains, Upper Zambezi system.

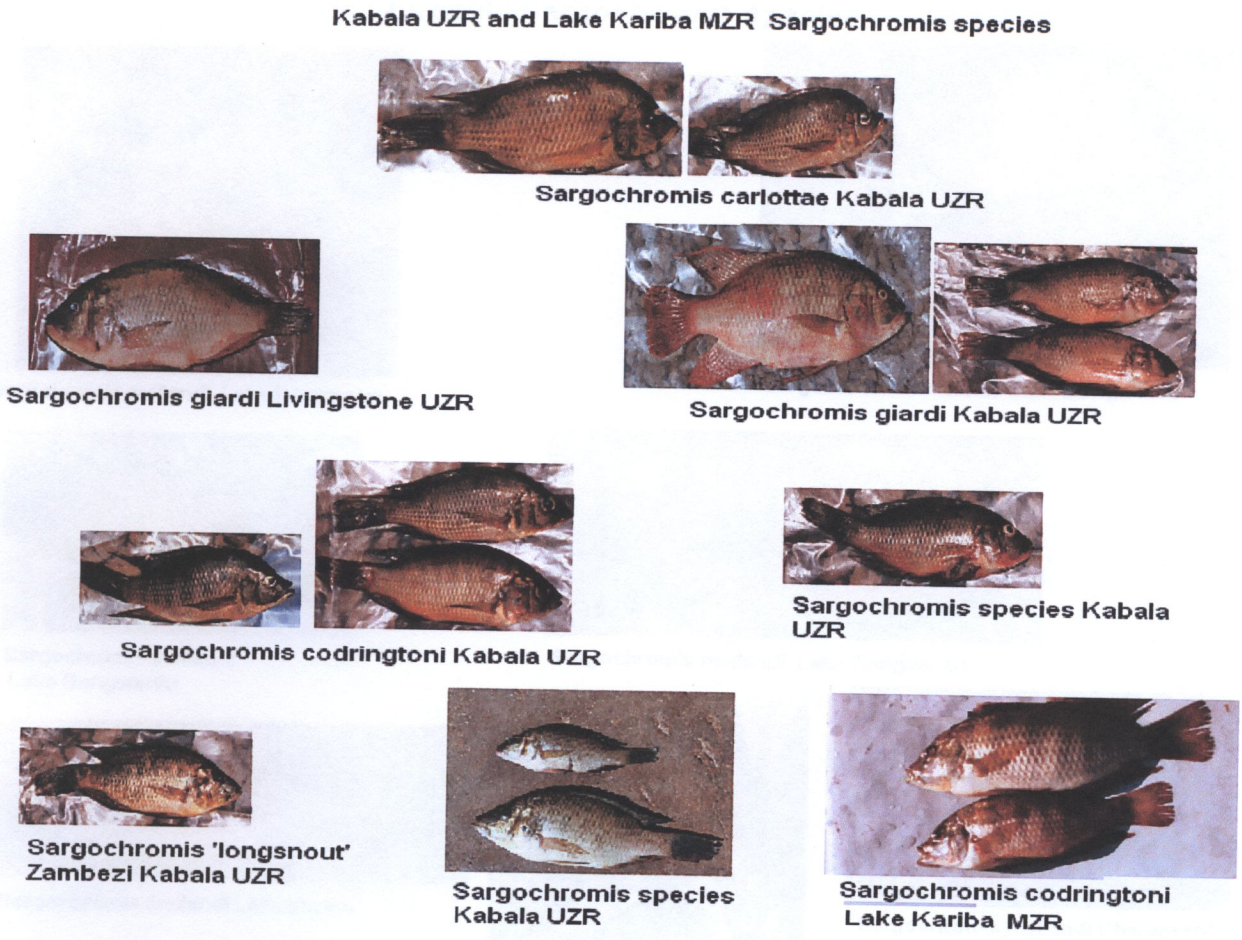


Plate 8. *Sargochromis* species from Lake Kariba, Middle Zambezi and Kabala, Upper Zambezi.

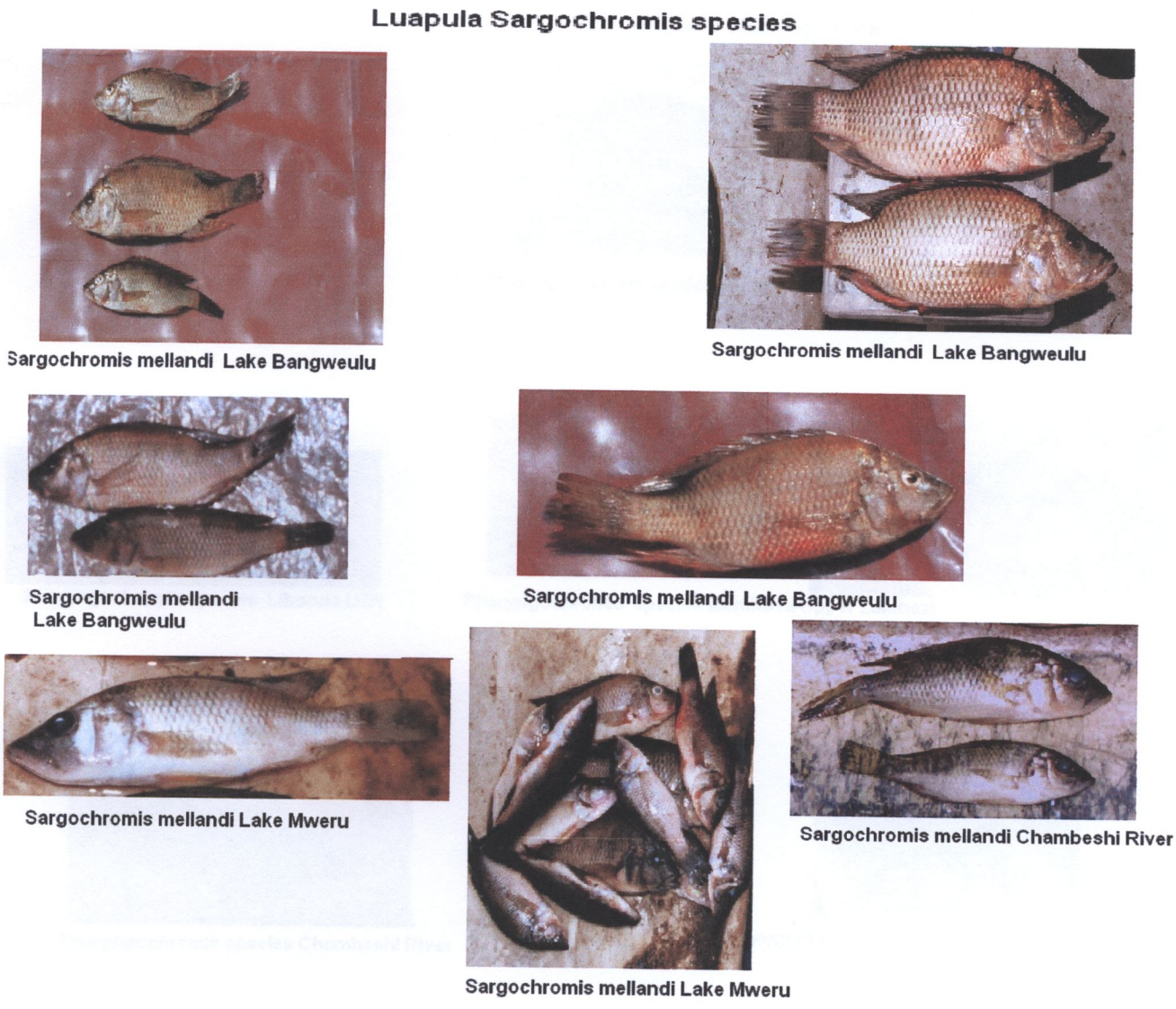


Plate 9. *Sargochromis* species from the Luapula system.

Pharyngochromis species

Pharyngochromis acuticeps Lake Kariba MZR

Pharyngochromis species Libonda UZR

Pharyngochromis species Mambova Upper Zambezi

Pharyngochromis species Chambeshi River

Pharygochroims species Barotse UZR

Plate10. *Pharyngochromis* species from various localities of Zambia.

F. Appendix 6. Publications from this study

1. Ancient Divergence in Bathypelagic Lake Tanganyika Deepwater Cichlids: Mitochondrial Phylogeny of the Tribe Bathybatini

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Abstract

The cichlid species flock of Lake Tanganyika represents a polyphyletic assemblage of eight ancestral lineages, which colonized the emerging lake independently. Our study is focused on one of these lineages, the Bathybatini, a tribe of specialized piscivorous cichlids of the deep pelagic zone. By analyzing three mtDNA gene segments of all eight species of the tribe and two species of the closely related Trematocarini, we propose on the basis of a linearized tree analysis that the Bathybatini comprise two distinct lineages, the genera *Hemibates* and *Bathybates* that seeded the primary lacustrine Tanganyika radiation independently. The genus *Hemibates* is likely to represent a distinct lineage that emerged simultaneously with the tribe Trematocarini and the genus *Bathybates* and should be therefore treated as a distinct tribe. Within the genus *Bathybates*, *B. minor* clearly represents the most ancestral split and is likely to have diverged from the remaining species in the course of the "primary lacustrine Tanganyika radiation" during which also the radiations of the Lamprologini and the H-lineage took place. The remaining "large" *Bathybates* species also diversified almost simultaneously and in step with the diversification of other Tanganyikan lineages – the Limnochromini and Cyprichromini -, with *B. graueri* occupying the most ancestral branch, suggesting that these were induced by the same environmental changes. The lack of geographic color morphs suggests that competition and resource partitioning, rather than allopatric speciation, promoted speciation within the genus *Bathybates*.

Key words: adaptive radiation, mtDNA sequences, control region, cytochrome *b*, NADH dehydrogenase subunit 2, resource partitioning.

Journal of Molecular Evolution. 60: 297-314.

2. An extant cichlid fish radiation emerged in an extinct Pleistocene lake

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The haplochromine cichlid fish of the East African Great Lakes represent some of the fastest and most species-rich adaptive radiations known[1], yet rivers in most of Africa accommodate only a few morphologically similar species. This has been explained by the wealth of ecological opportunity in large lakes compared to rivers. It is therefore surprising that the rivers of southern Africa harbour many, ecologically diverse haplochromines. We present genetic, morphological and biogeographical evidence suggesting these riverine cichlids are products of a recent adaptive radiation in a large lake that dried up in the Holocene. Haplochromine species richness peaks steeply in an area for which geological data reveal the historical existence of Lake palaeo-Makgadikgadi. The centre of this extinct lake is now a saltpan north of the Kalahari Desert, but it once hosted a rapidly evolving fish species radiation comparable in morphological diversity to those in the extant African Great Lakes. Importantly, it seeded all major river systems of southern Africa with ecologically diverse cichlids. This discovery reveals how local evolutionary processes operating during a short window of ecological opportunity can have a major and lasting impact on biodiversity on a continental scale.

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3. Phylogeography and speciation in the *Pseudocrenilabrus philander* species Complex in Zambian Rivers

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Abstract

Haplochromine cichlids form the most species-rich lineage of cichlid fishes that both colonized almost all river systems in Africa and radiated to species flocks in several East African lakes. The enormous diversity of lakes is contrasted by a relatively poor albeit biogeographically clearly structured species diversity in rivers. The present study analyzed the genetic structure and phylogeographic history of species and populations of the genus Pseudocrenilabrus in Zambian rivers that span two major African drainage systems, the Congo- and the Zambezi-system. The mtDNA phylogeny identi.es four major lineages, three of which occur in the Congo-system and one in the Zambezi system. Two of the Congo-clades (Lake Mweru and Lunzua River) comprise distinct albeit yet undescribed species, while the fish of the third Congo-drainage clade (Chambeshi River and Bangweulu swamps), together with the fish of the Zambezi clade (Zambezi and Kafue River) are assigned to Pseudocrenilabrus philander. Concerning the intraspeci.c genetic diversity observed in the sampled rivers, most populations are highly uniform in comparison to lacustrine haplochromines, suggesting severe founder e.ects and/or bottlenecking during their history. Two bursts of diversification are reflected in the structure of the linearized tree. The first locates at about 3.9% mean sequence divergence and points to an almost simultaneous colonization of the sampled river systems. Subsequent regional diversification (with about 1% mean sequence divergence) occurred contemporaneously within the Kafue River and the Zambezi River. The clear-cut genetic biogeographic structure points to the dominance of geographic speciation in this lineage of riverine cichlid fishes, contrasting the importance of in situ diversification observed in lake cichlids.

Key words: mtDNA sequences, geographic speciation, phylogeography

Hydrobiologia. 542: 1–13.