INTRA-STRAIN INHERITANCE OF GROWTH AND SURVIVAL IN RAINBOW TROUT, *Salmo gairdneri* RICHARDSON, REARED IN TWO HATCHERY AND TWO PRAIRIE WINTERKILL LAKE ENVIRONMENTS

by

JOHN KENNETH BAILEY

a thesis
submitted to the Faculty of Graduate Studies
in partial fulfillment of the requirements for the
degree of Master of Science

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ABSTRACT

Intra-strain inheritance of growth and survival in rainbow trout (*Salmo gairdneri*), reared for 8-10 months in 2 hatchery and 2 prairie winterkill lake environments, was studied by means of a hierarchal mating design. Statistical determinations were made on both individual values and full sib family means. The implications for the genetic improvement of rainbow trout for extensive aquacultural purposes are discussed.

Individual heritability values for fork length and weight were respectively, 0.09 and 0.06 in the non-competitive hatchery environment, 0.27 and 0.23 in the competitive hatchery environment, 0.09 and 0.00 in lake 971 and 0.27 and 0.04 in lake 506. Fork length and weight heritability estimates determined from full sib family means were much larger in all environments and were respectively, 0.58 and 0.42 in the non-competitive hatchery environment, 0.99 and 0.94 in the competitive hatchery environment, 1.08 and 0.50 in lake 971, and 0.78 and 0.74 in lake 506. In lakes 971 and 506 heritability estimates for individual survival were 0.18 and 0.02 respectively and for full sib family means they were 1.07 and 0.53 respectively.

Inter-family competition caused a magnification of genetic differences between hatchery environments and was unimportant in the lake environments. Family selection is expected to produce a more rapid response in growth and survival than individual or mass selection.

Genotype-environment interactions were important in all environments. Artificial selection would be more effective in the intended environment than in the hatchery. Additive genetic, environmental, and phenotypic correlations between fork length and weight were large and positive in all environments. Simultaneous selection for these traits would be effective.

INTRODUCTION

In most domestic populations, the choice of individuals which are to become the breeding stock is made by man. This is artificial selection or selective breeding as opposed to natural selection, which acts on wild populations. Improvement of the domestic stock is the goal of selective breeding and is generally attempted by selecting the most desirable individuals as parents for the next generation. This practice follows naturally from the simple concept that like begets like and undoubtedly preceded our earliest knowledge of genetics. In the past half century, numerous theoretical and applied studies have firmly established the basic genetic principles of artificial selection (for a general discussion, see Falconer 1964 or Kempthorne 1969).

Fish culture, the controlled rearing of fish species of commercial and nutritional value, has a long history, particularly in Egypt and eastern Asia, dating back approximately 4,000 years (Bardach et al. 1972, Calaprice 1976). Culture techniques for many fish species have been evolving throughout this period and selective breeding has undoubtedly been practiced to some extent, whether inadvertantly or by design. Despite this long history, systematic genetic selection of fish stocks is relatively uncommon and still in a primitive state (Ayles 1972).

In domestic populations, traits of economic importance, such as growth rate, disease resistance and yield capacity, show some degree of variability. In large populations, such variability is continuous over the range of measurement and the frequency distribution is approximately normal. Traits which show continuous normal distribution are described as metric, quantitative or multifactorial, and because of these properties, are subject to analysis by statistical techniques.

The phenotype (the observed character which can be seen and measured) of an individual is influenced by its genotype (genetic content) and by its environment. Similarly, the phenotypic variability (V_P) of a population is a function of the genotypic variability, (V_G), and the environmental variability, (V_E), found within the population and the interaction between genotype and environment, (V_{GE}) (Falconer 1964). Symbolically: $V_P = V_G + V_E + V_{GE}$. Improvement by selective breeding

is made by increasing the frequency of favourable genes in a population. If genetic variability is absent, all of the phenotypic variability is caused by environmental deviations and genetic selection will be ineffective. The presence of genotype-environment interactions may mean that genotypes best suited to one environment are not equally suited to a different environment and has an important bearing on breeding policy.

Knowledge of the genetic and environmental components of variation for a given trait allows one to predict its expected response to genetic selection by means of the following equation:

$$R = i\, s_p h^2$$

where: i = the selection intensity
s_p = the population phenotypic standard deviation
h^2 = the heritability of the trait

Selection intensity, i, is a measure of the difference between the mean of the selected individuals and the mean of the total population, expressed in standard deviations. If normality is assumed, selection intensity is determined by, and is inversely proportional to, the percentage of the population which is selected.

Population phenotypic standard deviation, s_p, is the square root of the phenotypic variability ($\sqrt{V_p}$) and is a measure of the dispersion of individual values around the mean value of the total population. The product of the selection intensity and the phenotypic standard deviation is known as the selection differential (Falconer 1964) and is a measure of the difference between the mean of the selected individuals and the mean of the total population expressed in the units of measurement used for the trait undergoing selection.

Heritability, h^2, means that which is heritable. In the broad sense, it is defined as the ratio of genetic variability to total variability, ($h^2_B = V_G/V_P$), and is a measure of that portion of the total variance which is due to genetic sources. Genetic variance can be further partitioned and is a function of additive genetic variance, (V_A), dominance genetic variance, (V_D), and epistatic

genetic variance, (V_I). Symbolically: $V_G = V_A + V_D + V_I$ (for a discussion of the different types of genetic variances see Falconer 1964 or Pirchner 1969). Dominance and epistatic effects are caused by specific gene combinations and since these combinations are disrupted at each segregation and recombination, they are difficult to interpret. When dominance and epistatic effects are large, heritability in the broad sense is of little predictive value. When the expression of a trait is influenced by the contributions of a large number of genes, each of which makes a small contribution to the total, the effect is genetically additive. Additive effects are not disrupted during segregation and recombination.

Heritability in the narrow sense is defined as the ratio of additive genetic variance to the total variance, ($h^2_N = V_A/V_P$), and is a more reliable measure of that portion of the total variability which is heritable in a predictable fashion. Throughout this thesis heritability in the narrow sense will be used and the subscript "N" will be understood.

An increase in any one of i, s_p and h^2 will produce an increase in the expected response to genetic selection. The most obvious way to increase the expected response is to increase the selection intensity by selecting fewer outstanding individuals. However, there is an upper limit to selection intensity since sufficient broodstock must be retained to renew the next generation and to maintain sufficient genetic variability to prevent inbreeding depression. Because heritability and phenotypic standard deviation are statistics determined from the population, they cannot be altered without adding additional sources of genetic variation or decreasing the environmental variation.

When the relationships of individuals in a population are known, the same statistics can be determined for family group means and one then has the option of basing selection decisions on the performance of individuals, relatives, or a combination of both. The salient features of six different selection methods are summarized below. Although the list is not exhaustive, most other procedures are variations of these schemes which have been adapted for the conditions peculiar to the

organism undergoing selection. A thorough discussion of the different types of selection procedures and their relative merit can be found elsewhere (see for example Osborne 1957, Falconer 1964, Johansson and Rendel 1967, Lerner and Donald 1966, Pirchner 1969).

Individual or Mass Selection

Selection decisions are based on individual merit without regard for the performance of relatives. This is the most common and simplest method and, in many circumstances, yields the most rapid results. Individual selection is most effective when heritability is high.

Family Selection

Selection decisions are made on the basis of family means and entire families are selected without regard for individual performance. The efficacy of family selection rests on the fact that environmental deviations acting on individuals tend to cancel each other in the mean value of the family. Thus, mean phenotypic value approaches mean genotypic value. This method is most effective when environmental deviations constitute a large portion of the total variability or in other words, when heritability is low. In addition, the larger the family, the better is the correspondence between mean phenotypic value and mean genotypic value. The conditions which favour family selection are low heritability, little variability due to the common environment, and large families.

Sib Selection

Selection decisions are based on the performance of sibs. Many traits cannot be measured on living individuals and relative performance can only be assessed from a sacrificed sample. Because sibs of the superior individuals in the sample possess more genes in common (by descent) than unrelated individuals, they are chosen for genetic selection. This is a variation of family selection in which those individuals selected do not contribute to the mean value of the family.

Progeny Testing

Selection decisions are made on the mean value of an individual's progeny. This method is most often used in animal breeding and gives an

accurate measure of an individual's breeding value. One serious drawback to this method is that of a much lengthened generation interval since selection cannot proceed until the progeny are old enough to be measured. Often, by this time, the progeny themselves are capable of breeding. This, too, can be considered a form of family selection in which the selected families are increased in size by allowing the parents to continue breeding.

Within-Family Selection

Selection decisions are made on the basis of individual merit within families without regard for either the population or family mean. This can be considered a type of individual selection in which each family represents a distinct population. Within-family selection is most effective when the environmental variance common to members of a family is large. This situation may occur when entire families are reared in a common environment and environments differ for each family.

Index or Combination Selection

Selection decisions are made on the basis of an index with particular weights assigned to all sources of information concerning an individual, including his own merit, his family's performance and his ancestral record. This is the most complex selection method and, providing that the weighting system realistically represents the relative importance of each source of information, can be the most effective procedure.

In 1925, increased disease (furunculosis) resistance and growth rate was reported for the selective breeding of brook trout (*Salvelinus fontinalis*) (Hayford and Embody 1930). More recently, quite exceptional results for similar traits have been reported in rainbow trout (*Salmo gairdneri*) and chinook salmon (*Oncorhynchus tshawytscha*) (Donaldson 1970). However, an important consideration absent from both of the above studies (and other similar studies) is that of an unselected control line. Without appropriate controls, it is not possible to determine to what extent these gains were due to changes in gene frequencies or to improved culture techniques (Purdom 1976).

In the past ten years, a number of studies have been directed towards the estimation of heritabilities of several economically important quantitative traits in many commercially cultured fish species. The predictive importance of such information can be inferred from the preceding discussion and has also been reviewed by Simon (1970). The results of a number of such studies are presented in Table 1. All studies to date have been made in laboratory or hatchery environments and comparable information is not available for natural or semi-natural environments.

In 1968, experiments were initiated at the Freshwater Institute, Winnipeg, Manitoba to study the feasibility of commercial rainbow trout farming in small, shallow, highly eutrophic, winterkill lakes in central Canada. Presently, a small, cottage-type, extensive aquaculture industry has developed as a result of this on-going study. The geography of the area (Sunde and Barica 1975), limnology of the lakes (Barica 1975a) general aquacultural techniques (Johnson et al. 1970; Lawler et al. 1974) and feeding biology of the trout in this system (Holmstrom 1972, Bernard and Holmstrom 1977) have been described previously.

Two of the major biological problems which have impeded the further development of this industry have been variable growth and survival of fish among lakes and among years (Ayles et al. 1976). In 1972, investigations were begun into the genetics of rainbow trout. The aim is to develop, by selective breeding, a strain, or strains, of trout which would show improved growth and survival in prairie pothole lakes than are currently possible with available strains (Ayles 1975).

These lakes provide an unique opportunity to study the inheritance of quantitative traits in rainbow trout in a semi-natural environment. The purpose of this study was to determine and compare the relative influences of genotype and environment on growth and survival within a domestic strain of rainbow trout reared in prairie pothole lakes and in a hatchery. The results and their implications for selective breeding are discussed in light of the considerations presented earlier.

Table 1. Estimates of Heritability

Species	Character	Heritability	Reference
Rainbow Trout (*Salmo gairdneri*)	Mort. of eyed eggs	0.15 - 0.20	Kanis et al.(1976)
	Mort. of fry	0.06 - 0.14	Kanis et al.(1976)
	Weight 150 days	0.09	Aulstad et al.(1972)
	280 days	0.29	
	Length 150 days	0.16	Aulstad et al.(1972)
	280 days	0.37	
	Weight 100 days	0.18	Chevassus (1976)
	200 days	0.05	
	300 days	0.13	
	400 days	0.15	
	Length 100 days	0.33	Chevassus (1976)
	200 days	0.25	
	300 days	0.22	
	400 days	0.24	
	Length 4 mo.	0.02	Calaprice (1967)
	11 mo.	0.00	
	Growth	0.00 - 0.30	Moller et al.(1976)
Atlantic Salmon (*Salmo salar*)	Mort. of eyed eggs	0.05 - 0.11	Kanis et al.(1976)
	Mort. of fry	0.01 - 0.04	Kanis et al.(1976)
	Smoltification (%)	0.16	Refstie et al.(1977)
	Resistance to vibrio disease	0.07 - 0.12	Gjedrem and Aulstad (1974)
	Weight of parr	0.60 - 0.70	Lindroth (1972)
Brown Trout (*Salmo trutta*)	Length 8 mo.	0.22 - 0.57	Calaprice (1967)
	Resistance to acid water	0.09 - 0.27	Gjedrem (1976a)

Table 1. continued

Cutthroat trout (*Salmo clarki*)	Length	5 mo.	0.39	Calaprice (1967)
		11 mo.	0.0 - 0.45	
Golden Trout[a] (*Salmo aguabonita*)	Length	9 mo.	0.24	Calaprice (1967)
Splake (*Salvelinus namaycush* x *S. fontinalis*)	Survival of			
	Uneyed egg stage		0.06	Ayles (1974)
	Eyed egg stage		0.09	Ayles (1974)
	Alevin stage		0.41	Ayles (1974)
	Resistance to blue-sac disease		0.76	Ayles (1974)
	Resistance to deformities		0.03	Ayles (1974)
Channel catfish (*Ictalurus punctatus*)	Length	5 mo.	0.12	Reagan et al.(1976)
		15 mo.	0.67	
	Weight	5 mo.	0.61	Reagan et al.(1976)
		15 mo.	0.75	
Carp (*Cyprinus carpio*)	Rays in dorsal fin		0.36	Nenashev (1966)
	Scales in lateral series		0.54 - 0.71	Nenashev (1966)
	Vertebrae number		0.90	Nenashev (1966)
	Weight		0.20 - 0.30	Kirpichnikov (1966)
	Growth		0.00	Moav (1976)

[a]Golden trout is not recognized as a distinct species by some authors (e.g. McPhail and Lindsey 1970, Scott and Crossman 1973).

MATERIALS AND METHODS

Experimental Procedure

Three-year old domestic rainbow trout of one strain, which originated from a private hatchery in Idaho, were used as the parental generation in this study. Potential broodstock were received as eyed eggs in the fall of 1971 and hatched at the Rockwood Experimental Fish Hatchery, Gunton, Manitoba. The fry were reared at the hatchery until fingerling size (3-6 grams). In the spring of 1972, the fingerlings were transported to the Experimental Aquaculture Station near Erickson, Manitoba, where they were released into a number of pothole lakes. In the fall of 1972, a sample of the surviving fish were captured and returned to the Rockwood Hatchery to be used as broodstock.

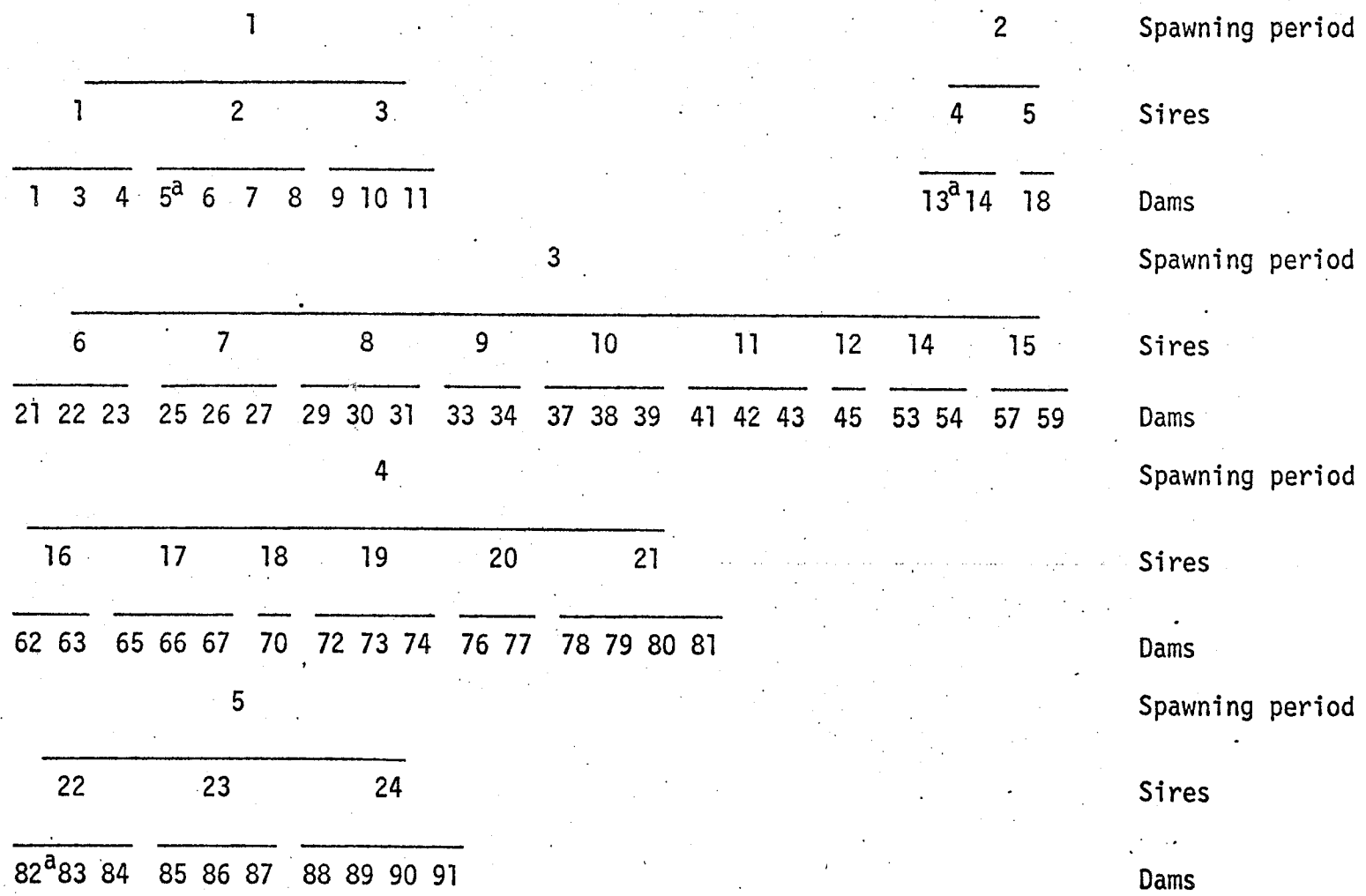
Artificial spawning was carried out at five time intervals from November 13, 1974 to January 2, 1975. During each spawning period, several groups of from 2 to 4 females were mated with one male. A total of 24 half sib families (common male parent) and 60 full sib families (common male and female parents) were produced. For each cross, a mid-ovarian sample of approximately 200 ml of eggs (1,000-1,500 eggs) was combined with a mid-testicular sample of approximately 1 ml of milt. The dry method of fertilization was used (Leitritz, 1959).

The eggs of each sire x dam cross (lot) were incubated in the dark in small incubation chambers, each with a separate inflow and outflow. Incubation temperatures ranged from 7.0°C to 15.0°C and were controlled so that all lots would hatch at approximately the same time. Unfertilized and dead eggs were removed 3-4 times weekly. Upon hatch, dead, deformed and diseased (blue-sac) fish were removed as necessary.

Following yolk-sac resorption, each lot was assigned, at random, to an individual rearing tank (capacity, 60 litres; flow rate, 2.3 litres per minute). The water temperatures in the small tanks varied from 11.0°C to 14.5°C but they were the same for each tank. Once the fry were large enough to be handled, each lot was thinned to a maximum density of 10 fish per litre. The fish remained in these tanks until they reached an average size of 2-6 grams.

The marking technique described by Jefferts et al. (1963) was used. Individuals within each lot were anaesthetized with 2-phenoxy-ethanol and a colour-coded, stainless steel, wire tag, 1.0 mm long x 0.25 mm diameter, was injected into the cartilaginous tissue between the nasal capsules. Each lot received an unique colour code. Following this treatment, each fish was passed through a strong magnetic field to magnetize the tag. Tag presence was verified with a magnetic field detector and any fish which were not tagged were again subjected to the entire procedure. At the conclusion of the study, the head of each fish was removed, numbered and frozen for later tag removal and identification. Tags were recovered by bisecting the preserved heads medially along the dorsal-ventral plane and searching through the tissues around the nasal capsules. Colour codes were read at 16x magnification, by attaching the magnetic tags to a metal probe fixed in the focal plane of a stereo microscope. Codes were then matched with individuals. A sample of up to 25 fish per lot, to be used as the initial measurements, were removed at the time of tagging.

The relationships of the surviving lots are shown in Figure 1. Each tagged lot was subdivided and, where numbers permitted, fish from each lot were reared in two different hatchery environments and in two different pothole lake environments. In the hatchery, a sample of 50 fish from each lot (3,000 total) was returned to the individual small tanks and a second sample of 25 fish from each lot (1,500 total) was combined in a single large tank (capacity, 1425 litres; flow rate, 91 litres per minute). In the pothole lakes area, a sample of 75 fish from each lot (4,275 total) was stocked into lake 971 and a similar sample (4,275 total) was stocked into lake 506 (see Appendix A for a description of lakes 971 and 506). Prior to release in the lake environments, the fish were acclimatized for one week in floating cages ($1.82 m^3$) which were anchored in the centre of the lake (Ayles et al. 1976). All samples remained in these environments until the completion of the study. Additionally, in order to monitor survival, three floating cages were placed in each lake and 10 fish from each lot were placed into each cage (570 fish per cage).



a - stocked into hatchery environments only.

Figure 1: Relationships of the lots which were stocked into the various environments

In the fall, prior to freeze-up, each lake was harvested with an experimental series of gill nets. The series consisted of six 45.7 m x 1.8 m (150 ft. x 6 ft.) nets, each of different mesh size. The six mesh sizes included one length each of 38 mm (1.50 in.), 51 mm (2.00 in.), 64 mm (2.50 in.), 70 mm (2.75 in.), 76 mm (3.00 in.) and 83 mm (3.25 in.) (stretched measure). Each length was set perpendicular to the shoreline with one end secured to shore. Fishing effort was approximately constant throughout the harvest period. Nets were set in late afternoon and retrieved early the next morning. In lake 506 the experimental series was abandoned after the third day, when it became apparent that survival was low. In order to recover sufficient fish in this lake for analyses, the larger mesh sizes were discarded and smaller, more efficient mesh sizes substituted. The complete harvest in lake 971 was made with the experimental series. Harvest was interrupted from October 29 to December 10 during ice formation. During this period, the experiments in the hatchery were terminated. When ice conditions became safe, harvest in the lakes was completed under the ice. At this time, the experimental series was joined in random order and set in the central area of the lake basin. Less than 10% of the total catch was harvested under ice. The harvest in each lake was terminated when the average catch fell below one fish per net per night. Because almost all fish in each lake were captured, harvest is equal to survival, and not catchability.

Measurements of fork length (± 0.5 mm) and weight (± 0.05 gm in the hatchery; ± 0.5 gm in the lakes) were made on all fish at the completion of the growing season. In the individual lot tanks, a random sample of up to 25 tagged fish per lot were weighed and photographed. Measurements of fork length were later taken from the photographs. All fish which lost tags during the course of the study were excluded from the analyses.

Growth (fork length and weight at harvest) and percent survival (% harvested) were analysed separately for each environment. Because weight increases geometrically, the standard error varies directly as the mean (coefficient of variation is constant) and a $\log_{10}$ transformation was used to stabilize the variance (Snedecor and Cochran 1967). The

proportion of individuals surviving within a given time period is binomially distributed and the angular transformation ($g(x) = \text{arcsine } \sqrt{x}$) was used to approximate a normal distribution (Bartlett 1947). In addition, percent survival was corrected for tag loss (see Appendix B).

STATISTICAL MODELS

Individuals

a. Growth

The analyses are the same for each environment. The effect of progeny (error) is determined from a subset of female parents; the effect of females (full sibs) is determined from a subset of male parents; and the effect of males (half sibs) from a subset of spawning times. Thus, the data follows a unique order of classification criteria, and each criterion is applicable within all categories of that preceding. Such a design is nested or hierarchal (Steele and Torrie 1960).

The model for the analysis of fork length and weight (transformed) is:

$$Y_{ijkl} = \mu + h_i + s_{ij} + d_{ijk} + e_{ijkl}$$

WHERE: Y_{ijkl} = The observed value of the l^{th} progeny resulting from the mating of the k^{th} dam to the j^{th} sire during the l^{th} spawning period.

μ = Overall mean.

h_i = The effect of spawning periods, random effect with variance component, σ^2_H.

s_{ij} = The effect of sires within spawning periods, random effect with variance component, σ^2_S.

d_{ijk} = The effect of dams mated to sires within spawning periods, random effect with variance component, σ^2_D.

e_{ijkl} = The effect of progeny resulting from dams mated to sires within spawning periods, random effect with variance component, σ^2_W.

The expected mean squares (Snedecor and Cochran 1967) for the analysis are shown in Table 2.

Table 2

Analysis of variance table for nested analysis.

Source of Variation	df	SS	MS	Expected Mean Square
Times	T-1	SS_H	MS_H	$\sigma_W^2 + k_4\sigma_D^2 + k_5\sigma_S^2 + k_6\sigma_H^2$
Sires	S-T	SS_S	MS_S	$\sigma_W^2 + k_2\sigma_D^2 + k_3\sigma_S^2$
Dams	D-S	SS_D	MS_D	$\sigma_W^2 + k_1\sigma_D^2$
Progeny	N..-D	SS_W	MS_W	σ_W^2

Where: T = number of spawning periods
S = number of sires
D = number of dams
N.. = total number of progeny

With equal number of progeny per dam, dams per sire, and sires per spawning period:

$k_1 = k_2 = k_4$ = number of progeny per dam

$k_3 = k_5$ = number of progeny per sire

k_6 = number of progeny per spawning period

With unbalanced data, the coefficients k_1 - k_6 are computed separately and represent the weighted mean number of progeny per effect (Becker 1967).

Because the design was unbalanced synthetic mean squares and degrees of freedom were also calculated using Satterthwaite's approximation (Gaylor and Hopper 1969) in order to calculate F ratios. Estimates of negative variance were taken as evidence that the true value of the corresponding component is zero (Searle 1971).

b. Survival

The analysis of survival data is identical to that of growth with the exception that the progeny (error) component is determined from the standardized binomial variance (Bogyo and Becker 1965). The model for the analysis of percent survival (transformed) is:

$$Y_{ijk} = P_{ijk} + b_{ijk}$$
$$= P + h_i + s_{ij} + d_{ijk} + b_{ijk}$$

Where: Y_{ijk} = the percentage record of individual progeny resulting from the mating of the k^{th} dam to the j^{th} sire within the i^{th} spawning period.

P = population probability of surviving

h_i = effect of spawning periods, random effect with variance component, σ^2_H.

s_{ij} = effect of sires within spawning periods, random effect with variance component, σ^2_S.

d_{ijk} = effect of dams mated to sires within spawning periods, random effect with variance component, σ^2_D.

b_{ijk} = the binomial effect measured as a deviation from the sub class mean, P_{ijk}, random effect with variance component, σ^2_B.

The expected mean squares are shown in Table 3.

Table 3

Analysis of variance table for survival data.

Source of Variation	df	SS	MS	Expected Mean Square[a]
Spawning Times	T-1	SS_H	MS_H	$\sigma^2_B + \sigma^2_D + k_2\sigma^2_S + k_3\sigma^2_H$
Sires	S-T	SS_S	MS_S	$\sigma^2_B + \sigma^2_D + k_1\sigma^2_S$
Dams	D-S	SS_D	MS_D	$\sigma^2_B + \sigma^2_D$
Progeny				821

The expectation of σ^2_B is $821/\tau_{ijk}$

Where τ_{ijk} = the total number of offspring for the k^{th} dam mated to the j^{th} sire within the i^{th} spawning period.

[a] Coefficients are not required for σ^2_D (see Bogyo and Becker 1965).

Family Means

The analysis of family means follows a nested classification similar to that of individuals. The last (progeny) level of the hierarchy is removed in the calculation of mean family values. The analyses are identical for mean growth and mean survival.

The model for the analysis is:

$$Y_{ijk} = \mu + h_i + s_{ij} + d_{ijk}$$

Where: Y_{ijk} = the mean value of the k^{th} dam group mated to the j^{th} sire during the i^{th} spawning period.

μ = general mean

h_i = effect of spawning period, random effect with variance component, σ^2_H.

s_{ij} = effect of males, within spawning periods, random effect with variance component, σ^2_S.

d_{ijk} = effect of dam group means, mated to sires, within spawning periods, random effect with variance component, σ^2_D.

The expected mean squares for the analysis are shown in Table 4.

Table 4

Analysis of variance table for nested analyses based on family means.

Source of Variation	df	SS	MS	Expected Mean Squares
Times	T-1	SS_H	MS_H	$\sigma_D^2 + k_2\sigma_S^2 + k_3\sigma_H^2$
Sires	S-T	SS_S	MS_S	$\sigma_D^2 + k_1\sigma_S^2$
Dam means	D-S	SS_D	MS_D	σ_D^2

WHERE: T = number of spawning periods

S = number of sires

D = number of dams

With balanced data

k_1 = k_2= number of dams per sire

k_3 = number of dams per time

With unbalanced data, the coefficients k_1, k_2 and k_3 are computed separately and represent the weighted number of dams per effect.

Genetic Interpretation

Variance components obtained by analyses of variance can be defined in terms of the covariances of relatives (Kempthorne 1969). Using the general formula for the covariance of half sib and full sib relations (Cockerham 1963), the genetic meaning of a term can be interpreted (see Becker 1967). The formula states:

$$COV_{(relation)} = \alpha V_A + \delta V_D + \alpha^2 V_{AA} + \alpha\delta V_{AD} + \delta^2 V_{DD} + \alpha^3 V_{AAA} + \ldots \text{ etc.}$$

WHERE: V_A = additive genetic variance

V_D = dominance genetic variance

V_{AA} = additive x additive genetic variance

etc.

$\alpha = (\phi+\phi'/2)$

$\delta = (\phi x \phi')$

(Kempthorne 1969)

ϕ = the probability that the sire genes are identical by descent.

ϕ' = the probability that the dam genes are identical by descent.

The interpretation of the covariances of relatives is based on the following assumptions:

1. The parents represent a random sample of the population under examination.
2. Regular diploid and solely mendelian inheritance.
3. There is no linkage except sex linkage.
4. No epistasis.
5. No inbreeding.

The estimation of genetic components will be incorrect if these assumptions are not met. The direction and magnitude of the error will depend upon the condition, and the extent to which it is violated.

The time of spawning does not make a genetic contribution to the progeny. Since this effect is removed by statistical analysis, the component, σ^2_H, is not considered in any of the genetic models.

Individuals

i. Growth

The sire component, σ^2_S, which is due to differences among sire groups (paternal half sibs) estimates the covariance of half sibs ($\sigma^2_S = Cov_{HS}$). These groups have half of their sire genes in common and none of their dam genes in common, by descent. Therefore, the co-

efficients, α and δ, for the covariance of half sibs, are $\frac{1}{4}$ and 0 respectively. Substituting these values into the general formula:

$$Cov_{HS} = 1/4V_A + 1/16V_{AA} + 1/64V_{AAA} + \ldots\text{etc.}$$

Similarly, the dam component, σ^2_D, which is due to differences among dam groups (full sibs), estimates the covariance of full sibs, minus, the covariance of half sibs which is contributed by the sire component ($\sigma^2_D = Cov_{FS} - Cov_{HS}$). These groups have half of their sire genes and half of their dam genes in common, by descent. Therefore, the coefficients α and δ for the covariance of full sibs are $\frac{1}{2}$ and $\frac{1}{4}$ respectively. Substituting these values into the general formula:

$$Cov_{FS} = \tfrac{1}{2}V_A + \tfrac{1}{4}V_D + \tfrac{1}{4}V_{AA} + 1/8V_{AD} = 1/16V_{DD} + 1/8V_{AAA} + \ldots\text{etc.}$$

The dam component also contains the variance attributed to the early maternal environment (V_M) and the tank effect.

The progeny (error) component, σ^2_W, estimates the non-genetic, environmental variance (V_E), plus the remainder of the genetic variance ($\sigma^2_W = \sigma^2_{Total} - Cov_{FS}$).

The genetic and environmental interpretation of the model is summarized in Table 5. The interaction terms (V_{AA}, V_{AD}, V_{DD}, etc.), are generally considered to be of minor importance and have been omitted.

Table 5

Genetic interpretation of nested model.

COMPONENT	COVARIANCES	V_A	V_D	V_M	V_E
σ^2_S	Cov_{HS}	$\frac{1}{4}$	0	0	0
σ^2_D	$Cov_{FS} - Cov_{HS}$	$\frac{1}{4}$	$\frac{1}{4}$	1	0
σ^2_W	$\sigma^2_{Total} - Cov_{FS}$	$\frac{1}{2}$	$\frac{3}{4}$	0	1

ii. Survival

The genetic interpretation of survival is similar to that presented for individual growth measurements. The genetic and environmental interpretation of the model is summarized in Table 6.

Table 6

Genetic interpretation for survival data.

COMPONENT	COVARIANCES	V_A	V_D	V_M	V_E
σ^2_S	Cov_{HS}	$\frac{1}{4}$	0	0	0
σ^2_D	$Cov_{FS} - Cov_{HS}$	$\frac{1}{4}$	$\frac{1}{4}$	1	0
σ^2_B	$\sigma^2_{Total} - Cov_{FS}$	$\frac{1}{2}$	$\frac{3}{4}$	0	1

Family Means

The genetic interpretation of the model is again, based upon the covariance of relatives. The same assumptions as for the previous models are made.

The sire component, σ^2_S, which is due to differences among sire groups, estimates the covariance of half sibs ($\sigma^2_S = Cov_{HS}$). The dam component, σ^2_D, estimates the remainder of the genetic variance plus the maternal variance and the environmental variance ($\sigma^2_D = \sigma^2_{Total} - Cov_{HS}$).

The genetic and environmental interpretation of the model is summarized in Table 7.

Table 7

Genetic interpretation of nested model based on family means

COMPONENT	COVARIANCE	V_A	V_D	V_M	V_E
σ^2_S	Cov_{HS}	$\frac{1}{4}$	0	0	0
σ^2_D	$\sigma^2_{Total} - Cov_{HS}$	$\frac{3}{4}$	1	1	1

Heritability

Partitioning of the additive genetic effects from the total variance (genetic and environmental) permits the estimation of heritability (h^2), which is defined as the ratio of additive genetic variance to total variance ($h^2 = V_A/(V_A + V_D + V_M + V_E)$ (Falconer 1964).

The equations used to determine heritabilities for the different analyses are summarized in Table 8.

Genotype- Environment Interactions

At the completion of the study half sib (sire) means in one environment were plotted against half sib means in a second environment for all environmental combinations for each trait. Such plots allow one to visualize relative mean performance between environments and give some indication of the genotype-environment interactions. Half sib means were chosen because these values are free of dominance genetic and early maternal environmental deviations. Correlation coefficients were determined for each of the above comparisons and for the comparisons of full sib means between each environment. In order to remove the effects due to differences among spawning times and rearing tanks, initial mean performance at the time of stocking was held constant by determining the partial (residual) correlations (Snedecor and Cochran 1967) for each comparison. Genotype-environment interactions were examined by this method because the experimental design was not balanced. Satisfactory methods of statistical analyses for such complex, unbalanced, crossed and nested experimental designs have not yet been developed.

Correlations

Within an environment, analysis of covariance between two traits, x and y and covariance component analysis can be made by methods similar to those outlined previously for the analysis of variance. Similarly, the genetic and environmental interpretation (in terms of covariance between traits x and y) can be determined for the components of covariance (Mode and Robinson 1959). Noting the genetic and environmental meaning of the components of variance and covariance, the appropriate terms are substituted into the general formula for estimating correlations ($r = Cov_{xy}/ (\sigma_x^2)(\sigma_y^2)$) in order to determine the genetic, environmental

Table 8. Equations used to determine heritabilities for the different analyses.

Analysis	Equation	Genetic and Environmental Interpretation
Individual growth	$h^2 = \frac{4(\sigma_S^2)}{\sigma_S^2 + \sigma_D^2 + \sigma_W^2}$	$h^2 = \frac{4(\frac{1}{4}V_A)}{(\frac{1}{4}V_A) + (\frac{1}{4}V_A+\frac{1}{4}V_D+V_M) + (\frac{1}{2}V_A+\frac{3}{4}V_D+V_E)} = \frac{V_A}{V_A + V_D + V_M + V_E}$
Individual survival	$h^2 = \frac{4(\sigma_S^2)}{\sigma_S^2 + \sigma_D^2 + 821}$ [a]	$h^2 = \frac{4(\frac{1}{4}V_A)}{(\frac{1}{4}V_A) + (\frac{1}{4}V_A+\frac{1}{4}V_D+V_M) + (\frac{1}{2}V_A+\frac{3}{4}V_D+V_E)} = \frac{V_A}{V_A + V_D + V_M + V_E}$
Family Means (growth and survival)	$h^2 = \frac{4(\sigma_S^2)}{\sigma_S^2 + \sigma_D^2}$	$h^2 = \frac{4(\frac{1}{4}V_A)}{(\frac{1}{4}V_A) + (\frac{3}{4}V_A+V_D+V_M+V_E)} = \frac{V_A}{V_A + V_D + V_M + V_E}$

a. - See Bogyo and Becker (1965)

and phenotypic correlations between traits x and y (see Becker 1967). Additive genetic, environmental and phenotypic correlations between fork length and $\log_{10}$ weight were determined for each environment.

Statistical Model

The analyses of variance and variance component determinations for each trait x and y separately are the same as was given previously. The analysis of covariance and expected mean cross products between traits x and y are outlined in Table 9.

Table 9

Analysis of covariance of nested analysis.

Source of Variation	df	SCP	MCP	Expected Mean Cross Product
Times	T-1	SCP_H	MCP_H	$Cov_W + k_4Cov_D + k_5Cov_S + k_6Cov_H$
Sires	S-T	SCP_S	MCP_S	$Cov_W + k_2Cov_D + k_3Cov_S$
Dams	D-S	SCP_D	MCP_D	$Cov_W + k_1Cov_D$
Progeny	N..-D	SCP_W	MCP_W	Cov_W

The values of T, S. D. N.. and k_1 - k_6 are the same as for the analysis of variance.

Genetic Model

The genetic and environmental interpretation of the model is similar to that outlined for the analysis of variance and is summarized in Table 10. The interaction terms (Cov_{AA}, Cov_{AD}, etc.) cannot be removed by analysis and have been omitted.

Table 10

Genetic and environmental interpretation of components of covariance for nested model.

COMPONENT OF COVARIANCE	COV_A	COV_D	COV_M	COV_E
COV_S	$\frac{1}{4}$	0	0	0
COV_D	$\frac{1}{4}$	$\frac{1}{4}$	1	0
COV_W	$\frac{1}{2}$	$\frac{3}{4}$	0	1

The equations used to determine the additive genetic, environmental and phenotypic correlations between traits x and y are given in Table 11.

Table 11. Equations used to determine the additive genetic, environmental and phenotypic correlations between log weight and fork length.

Correlation	Equation	Genetic and Environmental Interpretation
Additive genetic	$r_A = \frac{4\ Cov_S}{\sqrt{4(\sigma^2_{S(x)}\ \sigma^2_{S(y)})}}$	$r_A = \frac{Cov_A}{\sqrt{V_{A(x)}\ V_{A(y)}}}$
Environmental	$r_E = \frac{Cov_W+Cov_S-3(Cov_D)}{\sqrt{\sigma^2_{W(x)}+\sigma^2_{S(x)}-3(\sigma^2_{D(x)})}\ \sqrt{\sigma^2_{W(y)}+\sigma^2_{S(y)}-3(\sigma^2_{D(y)})}}$	$r_E = \frac{Cov_E-3(Cov_M)}{\sqrt{V_{E(x)}-3(V_{M(x)})}\sqrt{V_{E(y)}-3(V_{M(y)})}}$
Phenotypic	$r_P = \frac{Cov_W+Cov_D+Cov_S}{\sqrt{\sigma^2_{W(x)}+\sigma^2_{D(x)}+\sigma^2_{S(x)}}\ \sqrt{\sigma^2_{W(y)}+\sigma^2_{D(y)}+\sigma^2_{S(y)}}}$	$r_P = \frac{Cov_A+Cov_D+Cov_M+Cov_E}{\sqrt{V_{A(x)}+V_{D(x)}+V_{M(x)}+V_{E(x)}}\ \sqrt{V_{A(y)}+V_{D(y)}+V_{M(y)}+V_{E(y)}}}$

RESULTS

Growth

At the time of stocking, there were no significant ($p > 0.05$) differences among lot means for either fork length or weight, which ranged from 54.8 mm to 87.2 mm and from 2.7 gm to 10.6 gm respectively. At the completion of the study, fish reared in the lake environments were much larger than fish raised in the hatchery environments. In the individual tanks, lot mean fork lengths ranged from 123.2 mm to 159.2 mm and mean weights ranged from 26.6 gm to 50.6 gm. Mean lengths ranged from 106.4 mm to 149.4 mm and mean weights from 15.9 gm to 41.3 gm in the mixed tank. In the lake environments, the range of mean fork lengths and weights were 203.9 mm to 253.0 mm and 171.9 gm to 294.7 gm respectively in lake 971 and in lake 506 from 175.0 mm to 239.3 mm and 107.5 gm to 245.0 gm respectively. Total mean fork lengths and weights for the initial measurements and the final performance in each environment are summarized in Table 12. Analyses of variance of growth measurements for individuals are given in Table 13(a,b), and for family means are given in Table 14 (a,b). Variance components and their percent contributions for each analysis are outlined in Table 15, and heritability estimates are summarized in Table 16. Standard errors were determined following the method described by Becker (1967).

Survival

Mortality in the hatchery was negligible and analyses were carried out on the results of the lake environments only. Total recovery in lakes 506 and 971 were 12% and 66% respectively. In lake 506, mean lot recovery ranged from 0% to 54% and from 0% to 100%, in lake 971. Because the progeny component of individual survival was estimated from the stabilized binomial variance constant, the heritabilities of both individual and family mean percent survival (transformed) were determined from the same analysis of variance (Bogyo and Becker 1965). The analyses of variance, variance components, and heritabilities of individual and family mean survival in the lake environments are given in Table 17.

Table 12. Mean fork length and weight for initial measurements and final harvest in each environment.

Environment	Age[a.] (Mo.)	Sample[b.] Size	Fork Length (mm) $\bar{x}$	Fork Length (mm) s	Weight (gm) $\bar{x}$	Weight (gm) s
Individual Tanks (Initial)	3.5	1,454	66.0	7.6	4.1	1.9
Individual Tanks (Final)	9.5	1,445	142.8	17.9	37.6	12.0
Mixed Tank	9.5	1,126	129.4	16.0	28.7	9.9
Lake 971	8-10.5	1,851	236.6	24.1	251.0	65.8
Lake 506	8-10.5	352	212.3	19.2	164.8	38.4

a. - approximate age only

b. - does not include fish that lost tags

Table 13a. Analyses of variance of fork length made on individual rainbow trout reared in different environments.

	Source	df[a]	Mean Square[a]	F	Probability
Individual Tanks (Initial Measurements)	Times	4	1,949.8	9.93	1.02×10^{-3}
	Sires	18	226.00		
		(11.5)	(196.36)	0.41	0.95
	Dams	37	537.66		
		(36.9)	(548.55)	13.49	$<1.0 \times 10^{-6}$
	Progeny	1,394	39.84		
	$k_1 = 24.0$, $k_2 = 24.6$, $k_3 = 62.0$, $k_4 = 24.4$, $k_5 = 66.8$, $k_6 = 270.6$				
Individual Tanks (Final Measurements)	Times	4	4,071.78	2.94	0.05
	Sires	18	1,340.76		
		(16.1)	(1,383.44)	1.44	0.19
	Dams	37	927.14		
		(36.8)	933.56)	3.31	$<1.0 \times 10^{-6}$
	Progeny	1,385	279.96		
	$k_1 = 24.0$, $k_2 = 24.2$, $k_3 = 61.5$, $k_4 = 24.5$, $k_5 = 67.0$, $k_6 = 268.7$				
Mixed Tank	Times	4	4,944.79	2.43	0.09
	Sires	18	1,805.22		
		(16.1)	(2,038.73)	1.76	0.08
	Dams	36	912.91		
		(34.0)	(1,028.52)	4.78	$<1.0 \times 10^{-6}$
	Progeny	1,067	190.96		
	$k_1 = 17.8$, $k_2 = 20.6$, $k_3 = 46.8$, $k_4 = 22.7$, $k_5 = 55.8$, $k_6 = 212.4$				
Lake 971	Times	4	8,505.48	2.44	0.09
	Sires	18	3,195.32		
		(17.8)	(3,490.42)	1.43	0.20
	Dams	34	1,908.38		
		(30.6)	(2,239.23)	3.70	$<1.0 \times 10^{-6}$
	Progeny	1,794	516.42		
	$k_1 = 29.3$, $k_2 = 36.3$, $k_3 = 78.5$, $k_4 = 40.5$, $k_5 = 86.3$, $k_6 = 342.5$				
Lake 506	Times	4	542.84	0.52	0.72
	Sires	17	928.87		
		(14.9)	(1,034.72)	1.72	0.16
	Dams	29	494.24		
		(21.6)	(539.81)	1.54	0.06
	Progeny	301	321.58		
	$k_1 = 6.1$, $k_2 = 7.7$, $k_3 = 15.3$, $k_4 = 8.9$, $k_5 = 18.1$, $k_6 = 67.0$				

a.- Synthetic mean squares and degrees of freedom (Satterthwaite's approximation) are given in parentheses.

Table 13b. Analyses of variance for measurements of $\log_{10}$ weight made on individual rainbow trout reared in different environments.

	Source	df[a]	Mean Square[a]	F	Probability
Individual Tanks (Initial Measurements)	Times	4	0.5091	5.00	0.13
	Sires	18	0.1131		
		(12.4)	(0.1019)	0.49	0.92
	Dams	37	0.2277		
		(36.9)	(0.2323)	13.81	$<1.0 \times 10^{-6}$
	Progeny	1,394	0.0165		
	$k_1 = 24.0$, $k_2 = 24.6$, $k_3 = 62.0$, $k_4 = 24.4$, $k_5 = 66.8$, $k_6 = 270.6$				
Individual Tanks (Final Measurements)	Times	4	0.2128	2.16	0.12
	Sires	18	0.0961		
		(16.1)	(0.0986)	1.32	0.24
	Dams	37	0.0723		
		(36.7)	(0.0727)	2.78	$<1.0 \times 10^{-6}$
	Progeny	1,385	0.0260		
	$k_1 = 24.0$, $k_2 = 24.2$, $k_3 = 61.5$, $k_4 = 24.5$, $k_5 = 67.0$, $k_6 = 268.7$				
Mixed Tank	Times	4	0.4104	2.11	0.13
	Sires	18	0.1732		
		(16.0)	(0.1949)	1.67	0.10
	Dams	36	0.0921		
		(33.8)	(0.1035)	4.37	$<1.0 \times 10^{-6}$
	Progeny	1,067	0.0211		
	$k_1 = 17.8$, $k_2 = 20.6$, $k_3 = 46.8$, $k_4 = 22.7$, $k_5 = 55.8$, $k_6 = 212.4$				
Lake 971	Times	4	0.1743	2.55	0.08
	Sires	18	0.0629		
		(17.6)	(0.0683)	0.89	0.61
	Dams	34	0.0605		
		(30.4)	(0.0708)	3.57	$<1.0 \times 10^{-6}$
	Progeny	1,794	0.0211		
	$k_1 = 29.3$, $k_2 = 36.3$, $k_3 = 78.5$, $k_4 = 40.5$, $k_5 = 86.3$, $k_6 = 342.5$				
Lake 506	Times	4	0.0418	1.66	0.21
	Sires	17	0.0231		
		(14.4)	(0.0252)	1.09	0.46
	Dams	29	0.0186		
		(23.3)	(0.0211)	2.02	4.4×10^{-6}
	Progeny	301	0.0092		
	$k_1 = 6.1$, $k_2 = 7.7$, $k_3 = 15.3$, $k_4 = 8.9$, $k_5 = 18.1$ $k_6 = 67.0$				

a. - Synthetic mean squares and degrees of freedom (Satterthwaite's approximation) are given in parentheses.

Table 14a. Analyses of variance for measurements of fork length made on family means of rainbow trout reared in different environments.

	Source	df[a]	Mean Square[a]	F	Probability
Individual Tanks (Initial Measurements)	Times	4	78.84	8.25	0.002
	Sires	18	10.71		
		(12.4)	(9.68)	0.46	0.93
	Dam Means	37	23.21		
	$k_1 = 2.7$, $k_2 = 2.5$, $k_3 = 10.8$				
Individual Tanks (Final Measurements)	Times	4	146.02	2.40	0.09
	Sires	18	59.41		
		(16.1)	(60.90)	1.44	0.20
	Dam Means	37	41.34		
	$k_1 = 2.6$, $k_2 = 2.8$, $k_3 = 11.2$				
Mixed Tank	Times	4	219.73	2.17	0.12
	Sires	18	96.86		
		(16.3)	(101.05)	1.82)	0.07
	Dam Means	36	53.13		
	$k_1 = 2.7$, $k_2 = 2.5$, $k_3 = 11.0$				
Lake 971	Times	4	263.95	2.14	0.12
	Sires	18	122.65		
		(17.8)	(123.22)	1.91	0.05
	Dam Means	34	64.32		
	$k_1 = 2.5$, $k_2 = 2.5$, $k_3 = 10.4$				
Lake 506	Times	4	84.57	0.40	0.81
	Sires	17	208.79		
		(16.5)	(210.50)	1.50	0.19
	Dam Means	29	139.51		
	$k_1 = 2.4$, $k_2 = 2.3$, $k_3 = 9.6$				

a. - Synthetic mean squares and degrees of freedom (Satterthwaite's approximation) are given in parentheses.

Table 14b. Analyses of variance for measurements of $\log_{10}$ weight made on family means of rainbow trout reared in different environments.

	Source	df[a]	Mean Square[a]	F	Probability
Individual Tanks (Initial Measurements)	Times	4	0.0229	4.22	0.02
	Sires	18	0.0058		
		(13.3)	(0.0054)	0.58	0.87
	Dam Means	35	0.0100		
	$k_1 = 2.7$, $k_2 = 2.5$, $k_3 = 10.8$				
Individual Tanks (Final Measurements)	Times	4	0.0072	1.57	0.23
	Sires	18	0.0045		
		(16.0)	(0.0046)	1.32	0.24
	Dam Means	37	0.0034		
	$k_1 = 2.6$, $k_2 = 2.8$, $k_3 = 11.2$				
Mixed Tank	Times	4	0.0192	1.88	0.16
	Sires	18	0.0098		
		(16.2)	(0.0102)	1.77	0.08
	Dam Means	36	0.0055		
	$k_1 = 2.5$, $k_2 = 2.7$, $k_3 = 11.0$				
Lake 971	Times	4	0.0067	2.44	0.08
	Sires	18	0.0027		
		(17.7)	(0.0027)	1.32	0.24
	Dam Means	34	0.0021		
	$k_1 = 2.5$, $k_2 = 2.5$, $k_3 = 10.4$				
Lake 506	Times	4	0.0053	0.89	0.49
	Sires	17	0.0059		
		(16.3)	(0.0059)	1.21	0.35
	Dam Means	29	0.0049		
	$k_1 = 2.3$, $k_2 = 2.4$, $k_3 = 9.6$				

a. Synthetic mean squares and degrees of freedom (Satterthwaite's approximation) are given in parentheses.

Table 15. Variance components for fork length and $\log_{10}$ weight of initial measurements and final harvest in each environment.

Environment	Age[a] (Mo.)		Fork Length Individuals σ^2	Fork Length Individuals %	Fork Length Family Means σ^2	Fork Length Family Means %	$\log_{10}$ Weight Individuals σ^2	$\log_{10}$ Weight Individuals %	$\log_{10}$ Weight Family Means σ^2	$\log_{10}$ Weight Family Means %
Individual Tanks (Initial)	3.5	σ^2_H	5.19	7.9	5.06	17.9	0.0010	3.9	0.0012	10.3
		σ^2_S	0.00	0.0	0.00	0.0	0.0000	0.0	0.0000	0.0
		σ^2_D	20.74	31.5	23.21	82.1	0.0088	33.4	0.0100	89.7
		σ^2_W	39.84	60.6			0.0165	62.7		
Individual Tanks (Final)	9.5	σ^2_H	10.00	3.1	7.61	13.6	0.0004	1.5	0.0002	5.8
		σ^2_S	6.41	2.0	6.95	12.4	0.0004	1.3	0.0004	10.4
		σ^2_D	26.97	8.3	41.34	74.0	0.0019	6.7	0.0041	83.8
		σ^2_W	279.96	86.6			0.0260	90.5		
Mixed Tank	9.5	σ^2_H	13.67	5.2	10.85	13.3	0.0010	3.7	0.0008	10.2
		σ^2_S	16.65	6.4	17.49	21.5	0.0015	5.4	0.0017	21.4
		σ^2_D	40.58	15.5	53.13	65.2	0.0040	14.5	0.0055	68.4
		σ^2_W	190.62	72.9			0.0211	76.5		
Lake 971	8-10.5	σ^2_H	14.64	2.5	13.59	13.4	0.0003	1.5	0.0004	14.1
		σ^2_S	12.16	2.1	23.33	23.0	0.0000	0.0	0.0002	8.8
		σ^2_D	47.51	8.0	64.32	63.5	0.0015	8.0	0.0021	77.1
		σ^2_W	516.42	87.4			0.0169	90.5		
Lake 506	8-10.5	σ^2_H	0.00	0.0	0.00	0.0	0.0002	2.2	0.0000	0.0
		σ^2_S	25.45	6.8	30.12	17.8	0.0001	1.2	0.0004	8.1
		σ^2_D	28.30	7.5	139.51	82.2	0.0015	13.9	0.0049	91.1
		σ^2_W	321.58	85.7			0.0092	82.7		

a. - approximate age only.

Table 16. Heritabilities of fork length and $\log_{10}$ weight for initial measurements and final harvest in each environment.

		Fork Length		$\log_{10}$ Weight	
Environment	Age	Individuals	Family Means	Individuals	Family Means
Individual Tanks (Initial)	3.5 mo.	0.00 ± 0.17	0.00 ± 0.53	0.00 ± 0.17	0.00 ± 0.57
Individual Tanks (Final)	9.5 mo.	0.09 ± 0.10	0.58 ± 0.67	0.06 ± 0.08	0.42 ± 0.66
Mixed Tank	9.5 mo.	0.27 ± 0.21	0.99 ± 0.75	0.23 ± 0.19	0.94 ± 0.74
Lake 971	8 - 10.5 mo.	0.09 ± 0.10	1.08 ± 0.76	0.00 ± 0.07	0.50 ± 0.66
Lake 506	8 - 10.5 mo.	0.27 ± 0.23	0.71 ± 0.78	0.04 ± 0.22	0.37 ± 0.74

Table 17. Analyses of variance, variance components and heritabilities of individual and family mean survival (transformed) at harvest in lake 971 and 506.

Environment	Source	df	Mean Square	Variance Components Individuals σ^2	Individuals %	Family Means σ^2	Family Means %	Heritability Individuals	Heritability Family Means
			Analysis of Variance						
Lake 971	Times	4	143.82	0.00		0.00	0.0		
	Sires	17	256.36	43.95	26.6	44.07	26.7	0.18 ± 0.12	1.07 ± 0.70
	Dams	33	121.00	110.55	66.7	121.00	73.3		
	Within	-	10.95	10.95	6.7				
Lake 506	Times	4	21.16	0.00	0.0	0.00	0.0		
	Sires	17	48.71	5.10	13.3	5.10	13.3	0.02 ± 0.29	0.53 ± 0.61
	Dams	32	33.33	22.38	58.2	33.33	86.7		
	Within	-	10.95	10.90	28.5				

Genotype-Environment Interactions

Relative performance among environments is of particular interest in the selective breeding of rainbow trout for aquacultural purposes. Comparisons of sire (half sib) family mean growth performance in one environment plotted against sire family mean growth performance in a second environment are illustrated, for all environmental combinations, in Figures 2-13 inclusive. Percent survival (transformed sire means) was not correlated between lake environments and the plot is shown in Figure 14.

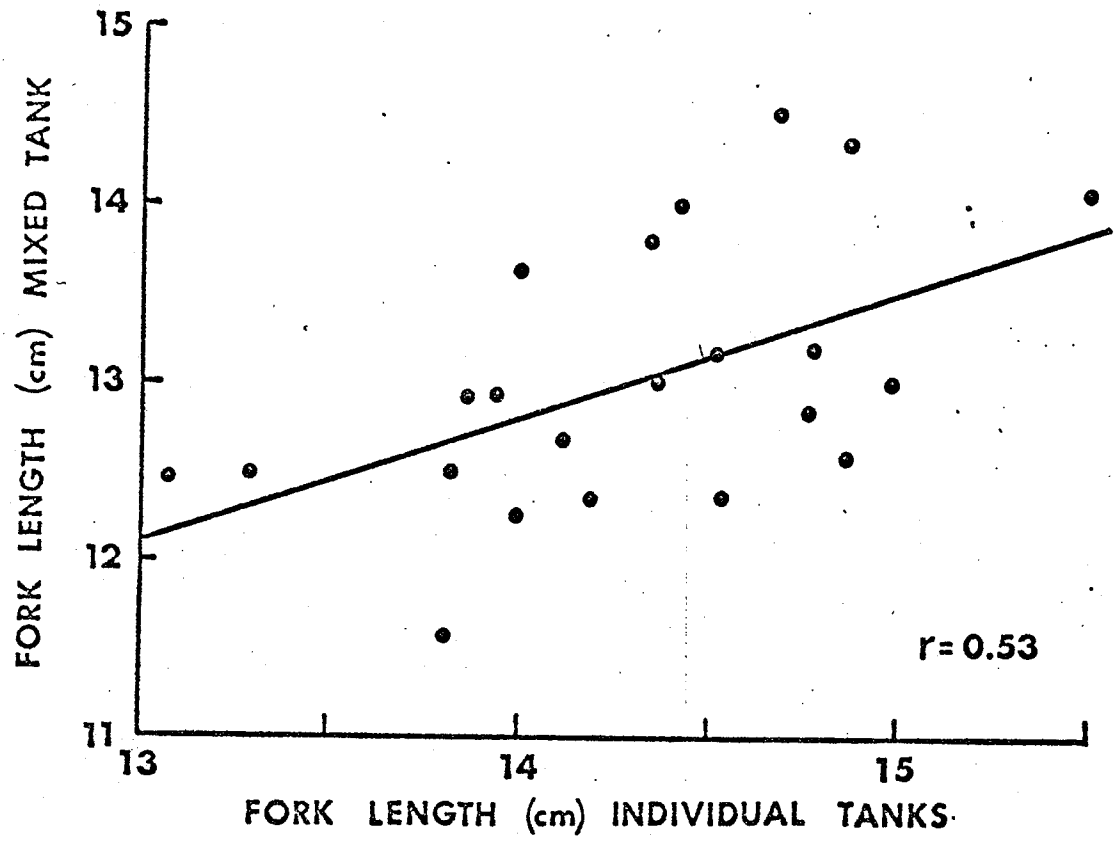
Sire mean fork lengths were significantly ($p < 0.05$) correlated between hatchery environments and between lake 971 and both hatchery environments. Sire mean weights were significantly correlated between lakes and between lake 971 and the individual tanks only. All dam (full sib) correlations for both fork length and weight were significant. Partial correlations, which held the initial mean performance constant at the time of stocking, reduced the correlations between all comparisons. Correlation (full and partial) matrices for each comparison of both sire and dam means are given in Table 18.

Correlations Between Fork Length and Log_{10} Weight

The analyses of covariance and the percent contribution of each source of covariance between fork length and log_{10} weight are given for each environment in Table 19. Additive genetic, environmental and phenotypic correlations are outlined for each environment in Table 20. The missing value indicates that one of the variance components (log_{10} weight) involved in the estimate was equal to zero.

Figure 2. Comparison of final mean fork lengths of the paternal half sib groups reared in the mixed tank and the individual tanks.

Figure 3. Comparison of final mean log weights of the paternal half sib groups reared in the mixed tank and the individual tanks.


15
14
13
12
11
FORK LENGTH (cm) MIXED TANK
r= 0.53
13
14
15
FORK LENGTH (cm) INDIVIDUAL TANKS

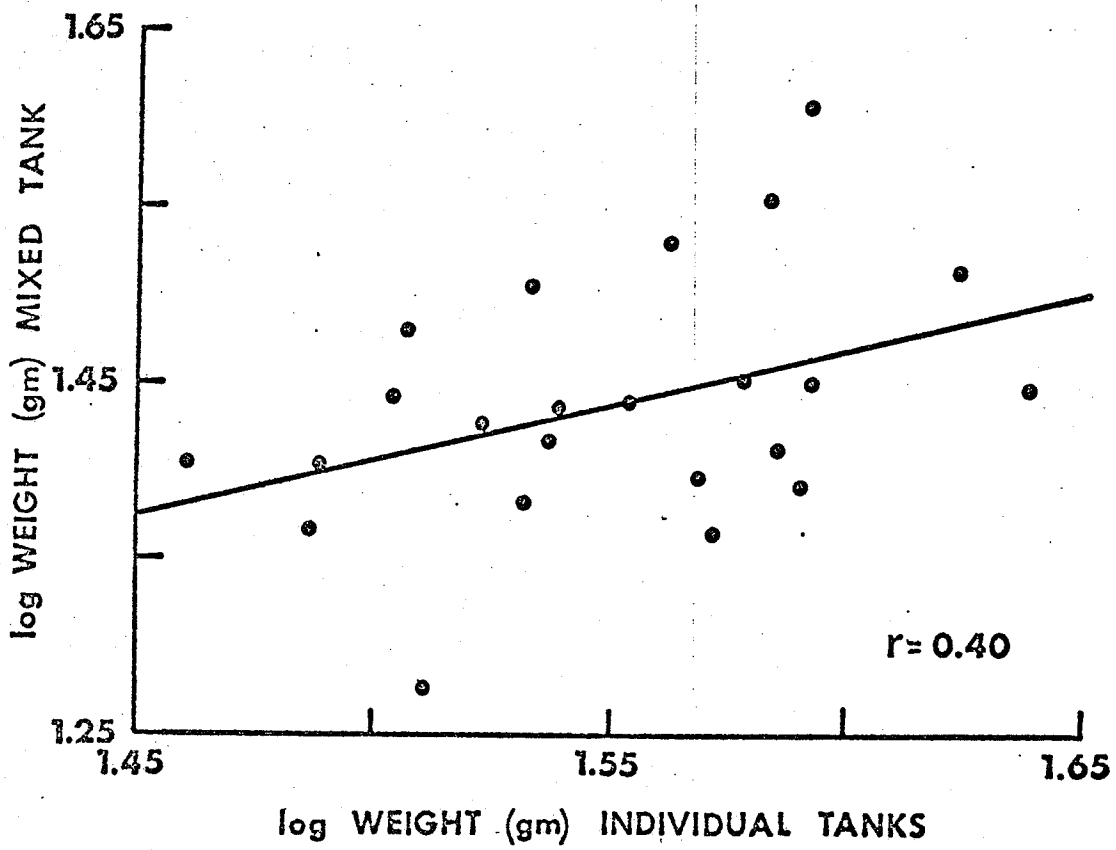
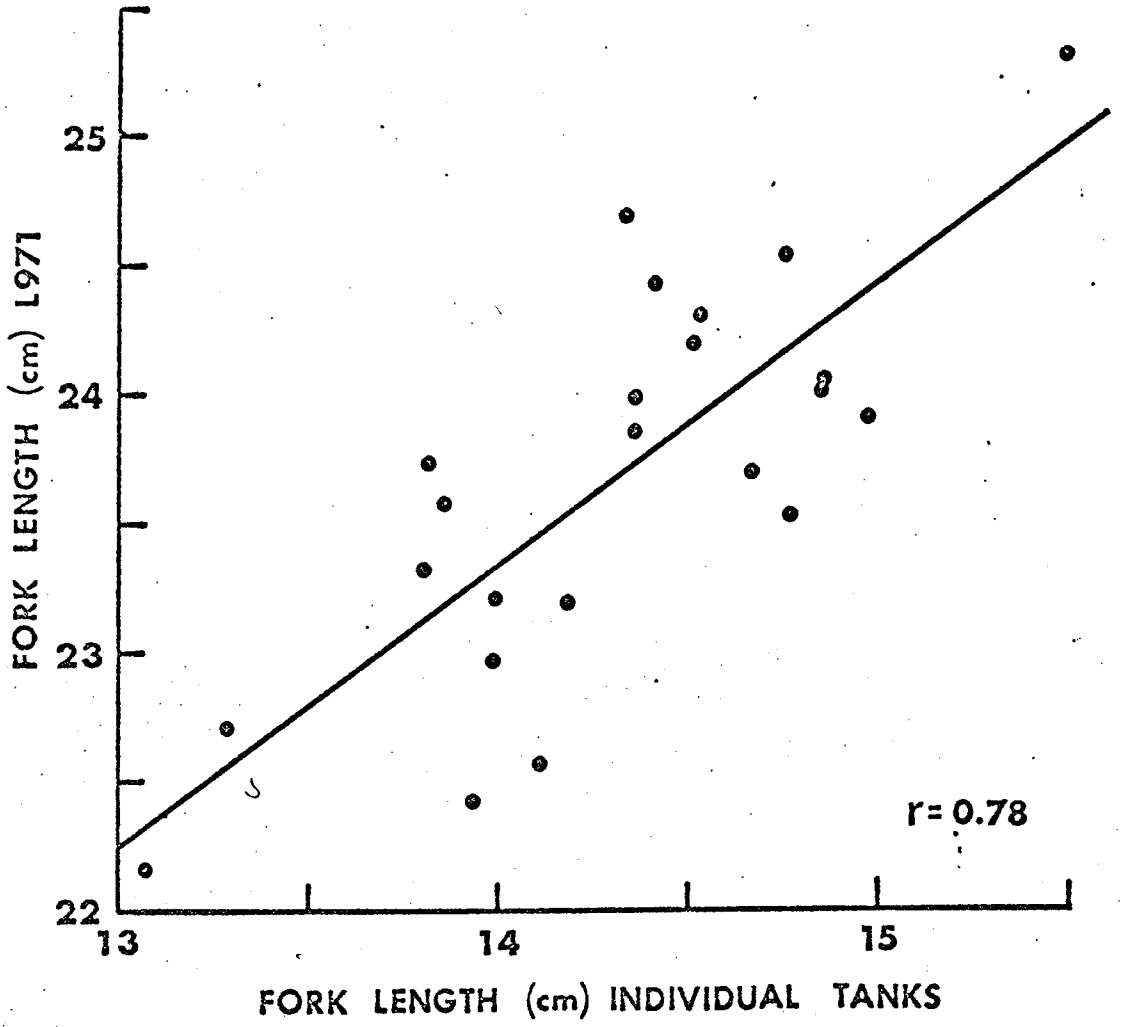

1.65
1.45
1.25
log WEIGHT (gm) MIXED TANK
r= 0.40
1.45
1.55
1.65
log WEIGHT (gm) INDIVIDUAL TANKS

Figure 4. Comparison of final mean fork lengths of the paternal half sib groups reared in lake 971 and the individual tanks.

Figure 5. Comparison of final mean log weights of the paternal half sib groups reared in lake 971 and the individual tanks.


FORK LENGTH (cm) L971
25
24
23
22
13
14
15
r= 0.78
FORK LENGTH (cm) INDIVIDUAL TANKS

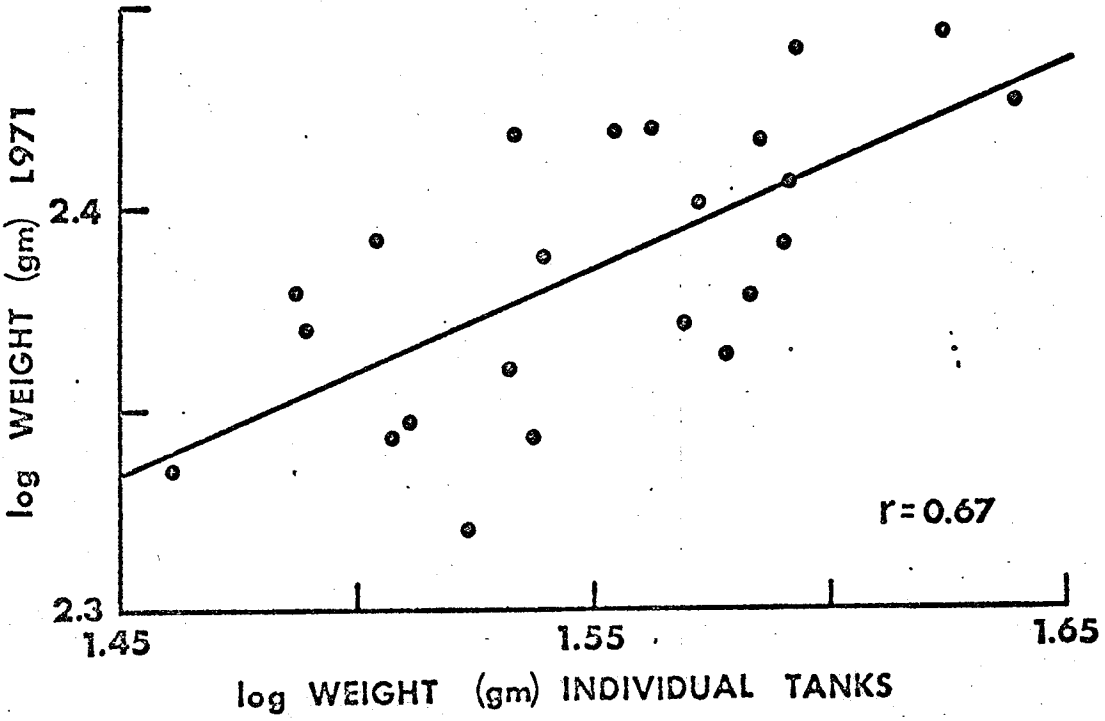
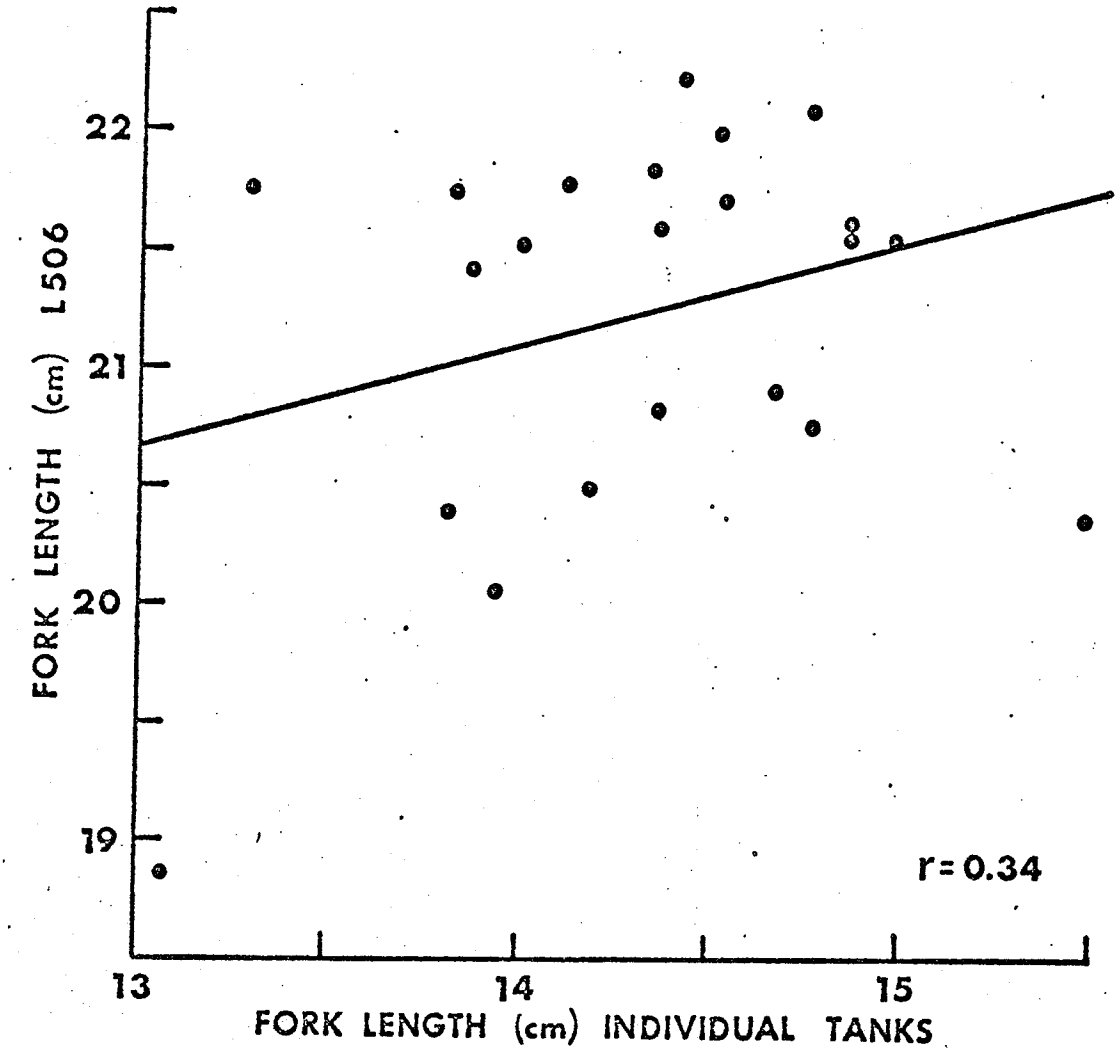

log WEIGHT (gm) L971
2.4
2.3
1.45
1.55
1.65
r= 0.67
log WEIGHT (gm) INDIVIDUAL TANKS

Figure 6. Comparison of final mean fork lengths of the paternal half sib groups reared in lake 506 and the individual tanks.

Figure 7. Comparison of final mean log weights of the paternal half sib groups reared in lake 506 and the individual tanks.


FORK LENGTH (cm) L506
22
21
20
19
r= 0.34
13
14
15
FORK LENGTH (cm) INDIVIDUAL TANKS

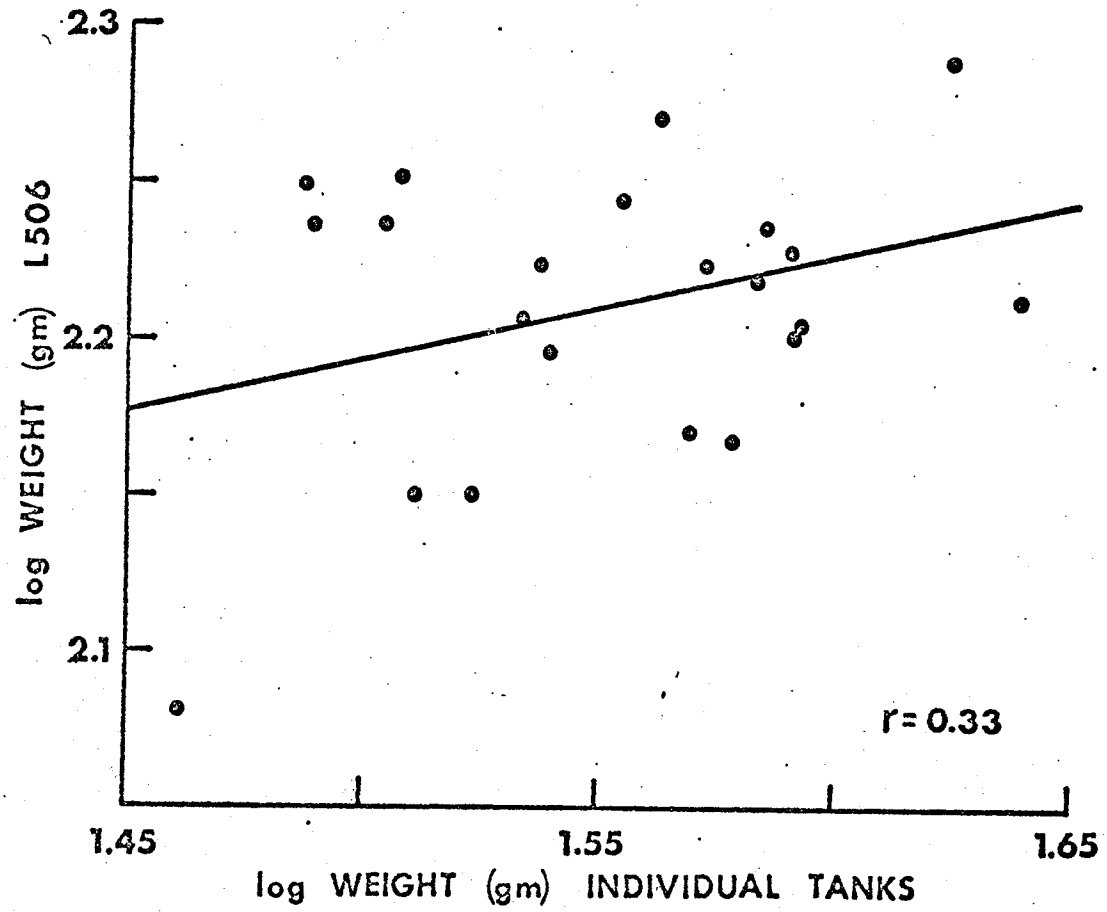
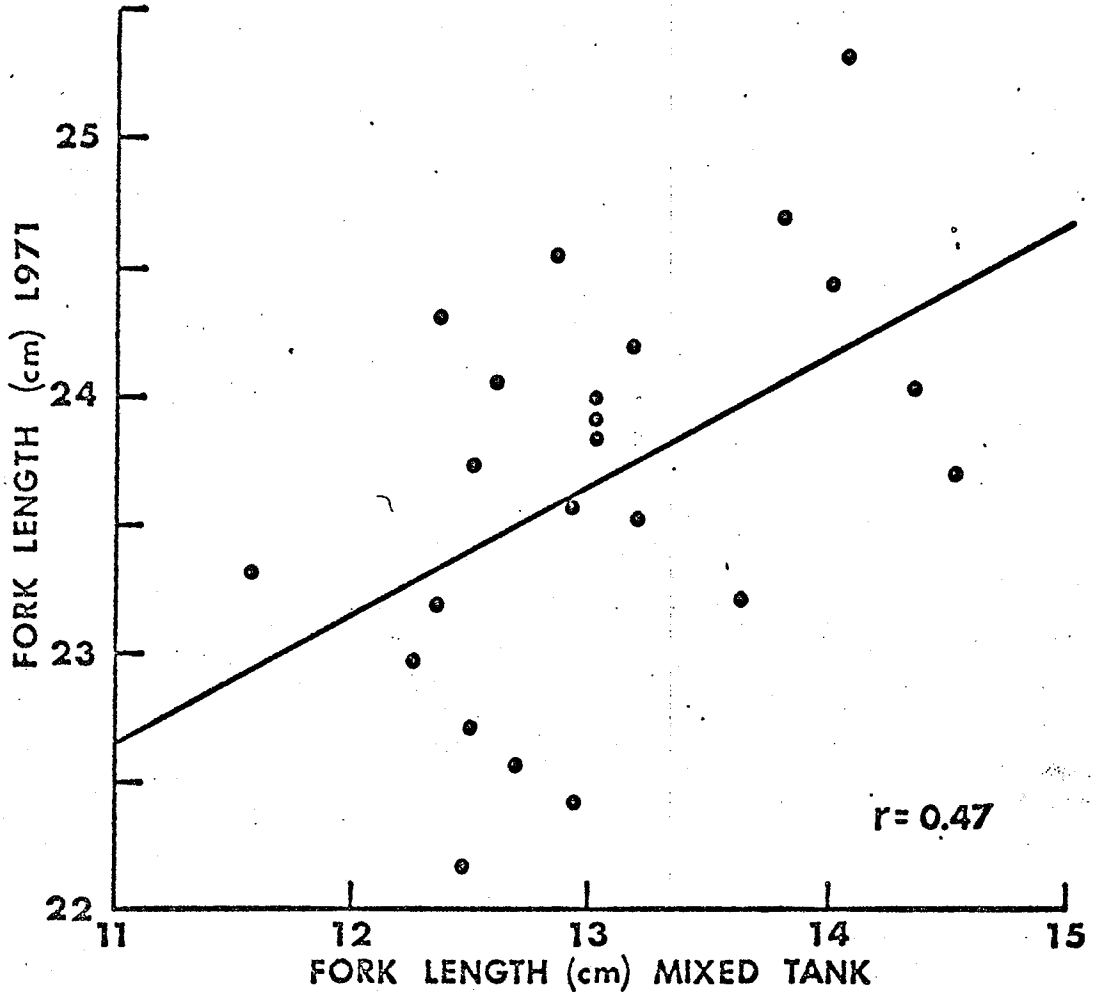

log WEIGHT (gm) L506
2.3
2.2
2.1
r= 0.33
1.45
1.55
1.65
log WEIGHT (gm) INDIVIDUAL TANKS

Figure 8. Comparison of final mean fork lengths of the paternal half sib groups reared in lake 971 and the mixed tank.

Figure 9. Comparison of the final mean log weights of the paternal half sib groups reared in lake 971 and the mixed tank.


FORK LENGTH (cm) L971
25
24
23
22
r= 0.47
11
12
13
14
15
FORK LENGTH (cm) MIXED TANK

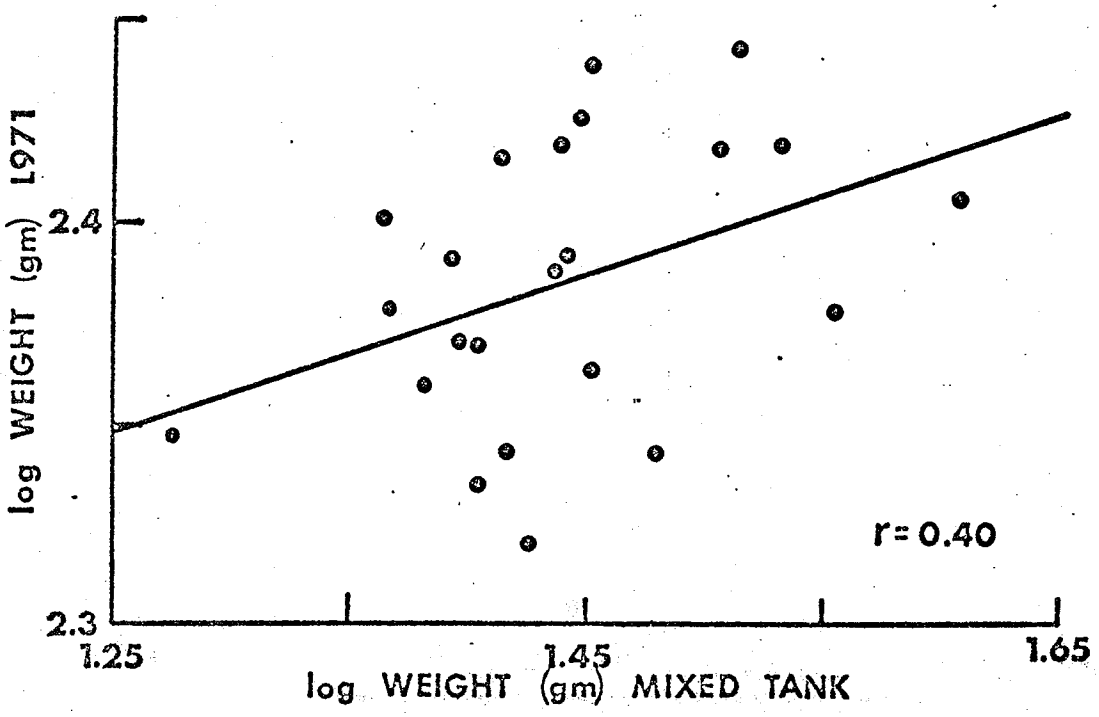
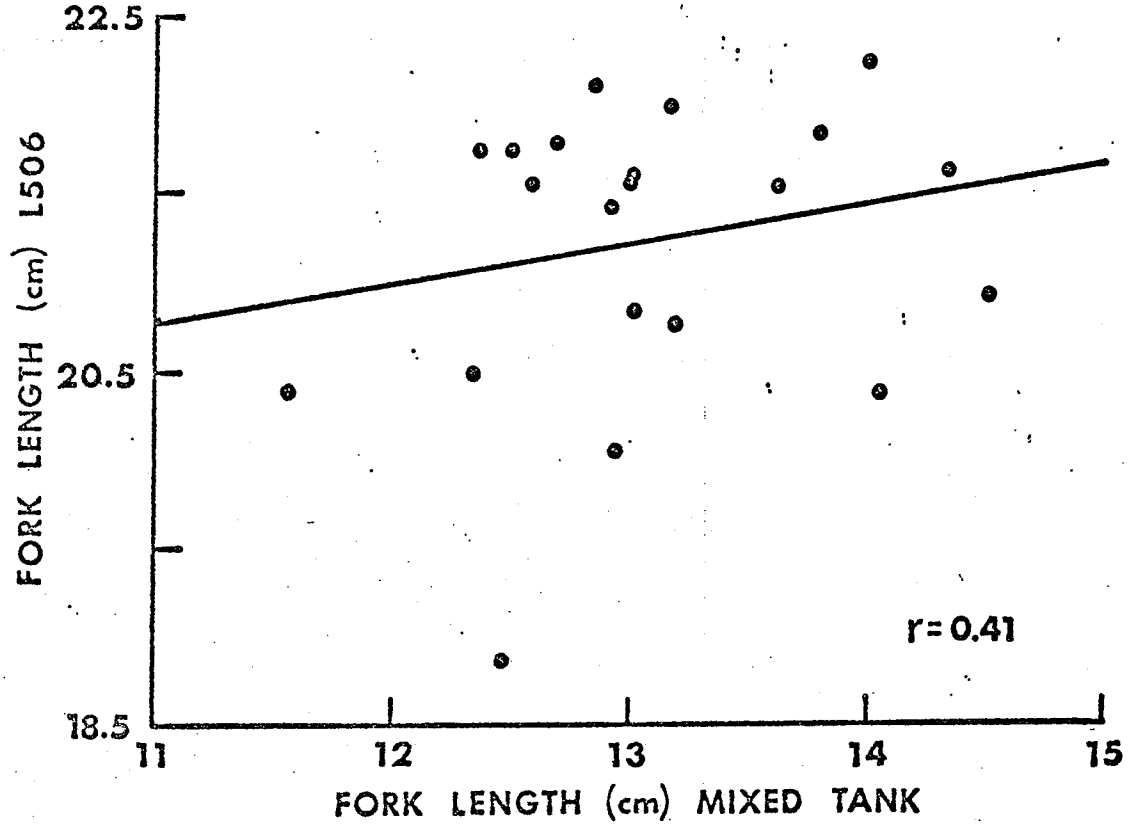

log WEIGHT (gm) L971
2.4
2.3
r= 0.40
1.25
1.45
1.65
log WEIGHT (gm) MIXED TANK

Figure 10. Comparison of final mean fork lengths of the paternal half sib groups reared in lake 506 and the mixed tank.

Figure 11. Comparison of final mean log weights of the paternal half sib groups reared in lake 506 and the mixed tank.


22.5
20.5
18.5
FORK LENGTH (cm) L506
r = 0.41
11
12
13
14
15
FORK LENGTH (cm) MIXED TANK

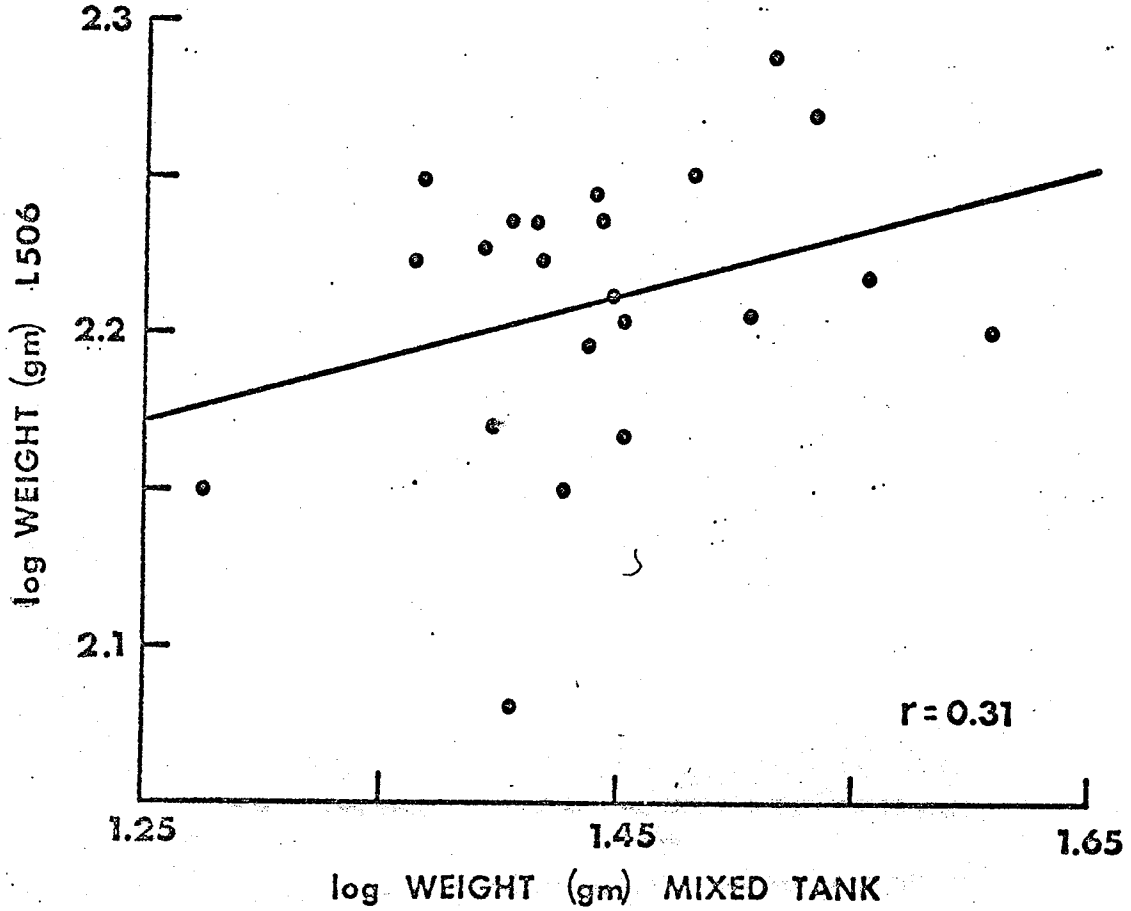
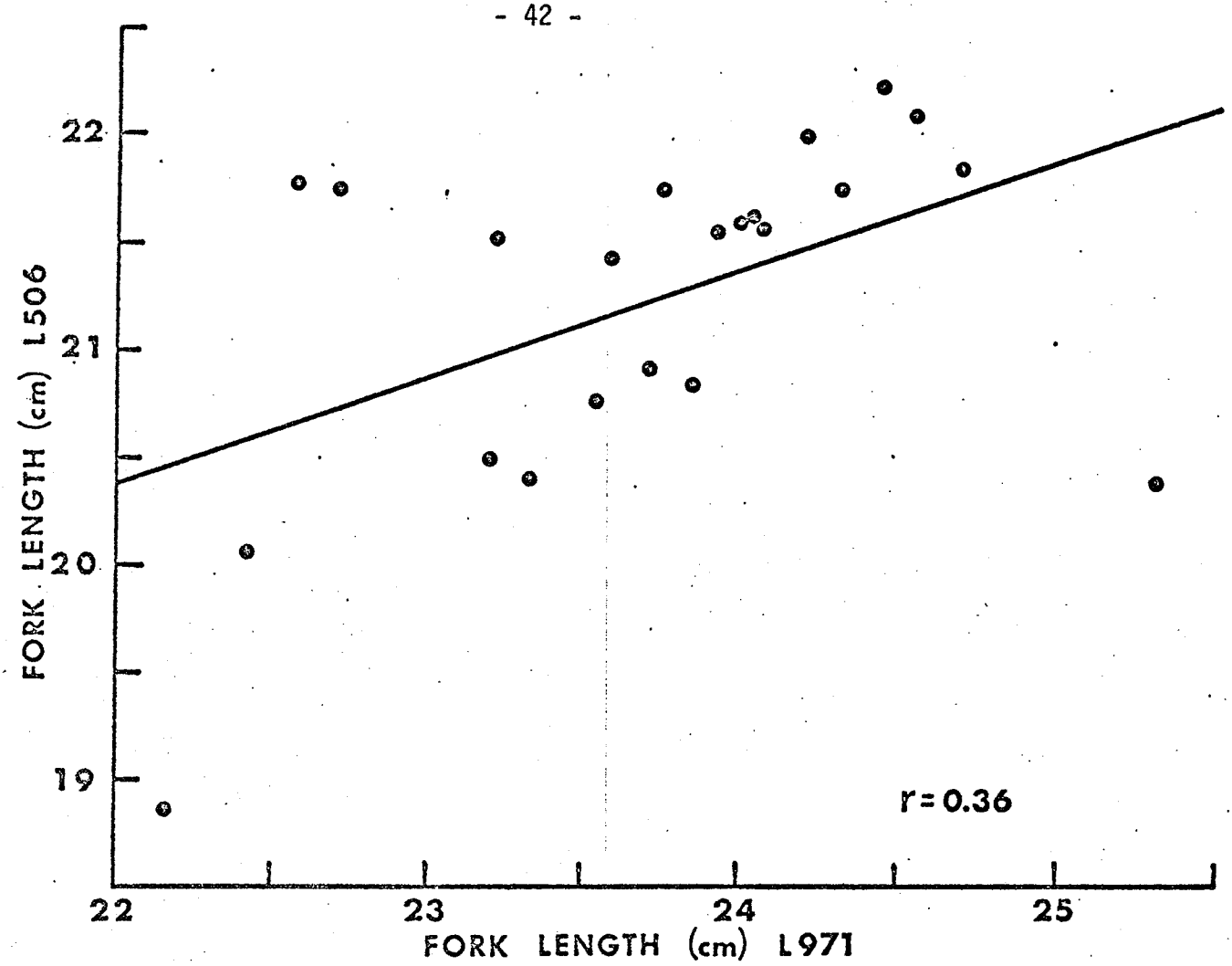
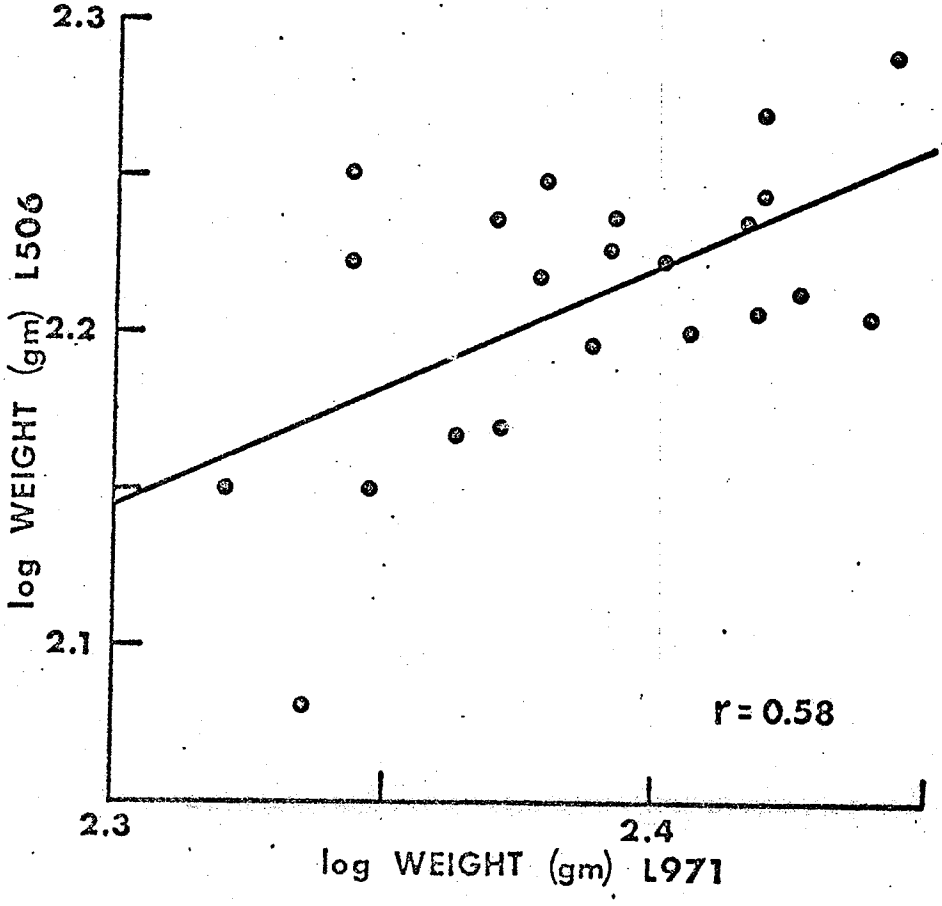

2.3
2.2
2.1
log WEIGHT (gm) L506
r = 0.31
1.25
1.45
1.65
log WEIGHT (gm) MIXED TANK

Figure 12. Comparison of final mean fork lengths of the paternal half sib groups reared in lake 506 and lake 971.

Figure 13. Comparison of final mean log weights of the paternal half sib groups reared in lake 506 and lake 971.





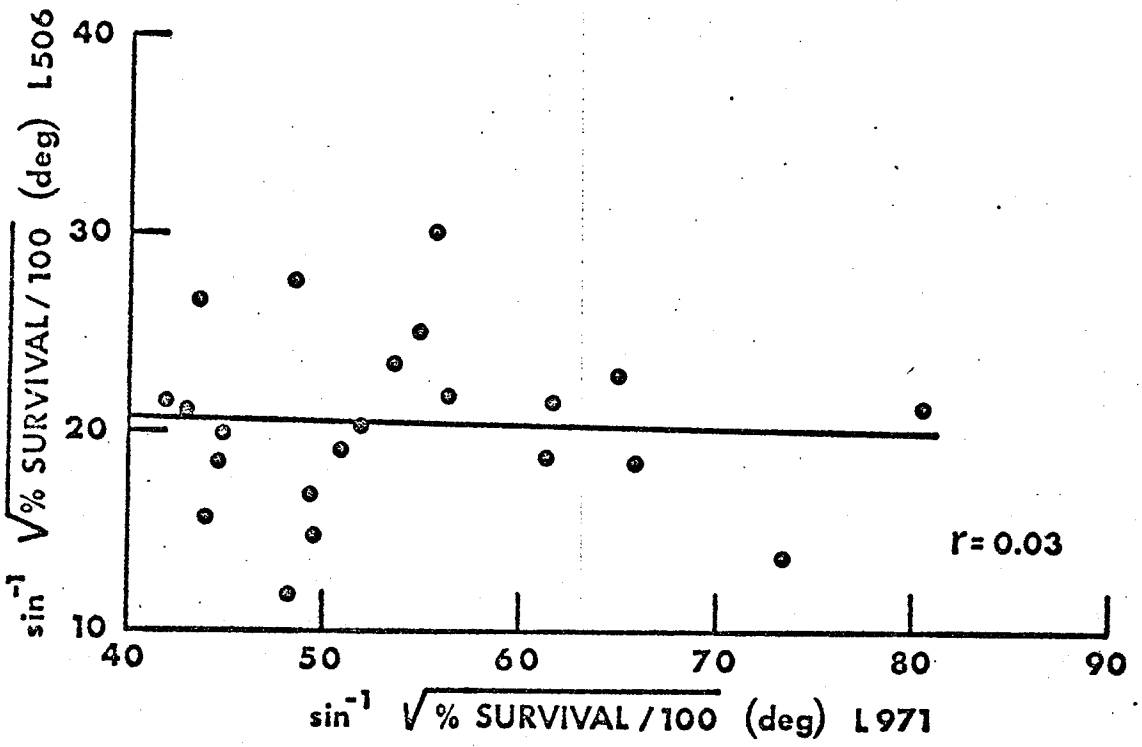


Figure 14. Comparison of final per cent survival (angular transformation) of the paternal half sib groups reared in lake 506 and lake 971.

Table 18. Correlation matrices detailing the comparisons of sire and dam mean fork lengths and weights between all environmental combinations. Partial correlations which removed mean differences at the time of stocking are shown in parentheses.

SIRE MEANS

Fork Length

	Indiv. Tanks	Mixed Tank	Lake 971	Lake 506
Indiv. Tanks	1.00	0.53** (0.11)	0.78** (0.56)**	0.34 (0.29)
Mixed Tank		1.00	0.47* (0.06)	0.41 (0.37)
Lake 971			1.00	0.36 (0.31)
Lake 506				1.00

Log_{10} Weight

	Indiv. Tanks	Mixed Tank	Lake 971	Lake 506
Indiv. Tanks	1.00	0.40 (0.01)	0.67** (0.42)	0.33 (0.14)
Mixed Tank		1.00	0.40 (0.01)	0.31 (0.13)
Lake 971			1.00	0.58** (0.48)*
Lake 506				1.00

DAM MEANS

Fork Length

	Indiv. Tanks	Mixed Tank	Lake 971	Lake 506
Indiv. Tanks	1.00	0.48** (0.30)*	0.58** (0.39)**	0.46** (0.28)*
Mixed Tank		1.00	0.33* (0.21)	0.29* 0.18
Lake 971			1.00	0.58** (0.43)**
Lake 506				1.00

Log_{10} Weight

	Indiv. Tanks	Mixed Tank	Lake 971	Lake 506
Indiv. Tanks	1.00	0.37** (0.25)	0.46** (0.32)*	0.43** (0.29)*
Mixed Tank		1.00	0.35** (0.24)	0.35** (0.24)
Lake 971			1.00	0.52** (0.41)**
Lake 506				1.00

* denotes $p < 0.05$;
** denotes $p < 0.01$

Table 19. Analyses of covariance and covariance components between fork length and $\log_{10}$ weight.

Environment	Source of Covariance	df	Mean Cross Product	Covariance Component	
				Cov.	%
Individual Tanks	Spawning Times	4	28.87	0.07	2.3
	Sires	18	10.21	0.04	1.4
	Dams	37	7.57	0.21	7.1
	Within	1,385	2.61	2.61	89.2
Mixed Tank	Spawning Times	4	44.55	0.12	4.6
	Sires	18	17.04	0.15	5.7
	Dams	36	9.06	0.40	15.5
	Within	1,067	1.92	1.92	74.2
Lake 971	Spawning Times	4	37.99	0.07	2.5
	Sires	18	11.22	0.00	0.0
	Dams	34	9.75	0.24	8.2
	Within	1,794	2.65	2.65	89.3
Lake 506	Spawning Times	4	3.37	0.00	0.0
	Sires	17	3.95	0.05	2.8
	Dams	29	2.85	0.25	15.0
	Within	301	1.35	1.35	82.2

Table 20. Additive genetic, environmental, and phenotypic correlations between fork length and $\log_{10}$ weight in each environment.

Environment	Correlation r_A	r_E	r_P
Individual Tanks	0.82	0.99	0.96
Mixed Tank	0.93	0.90	0.96
Lake 971	-	0.88	0.89
Lake 506	0.92	0.58	0.82

r_A = Additive genetic correlation

r_E = Environmental correlation

r_P = Phenotypic correlation

DISCUSSION

Heritability estimates for traits of economic importance have been made for a number of commercially cultured fish species. At times, estimates for the same trait are confusing, even among studies involving the same species (see Table 1). Inconsistent results can often be attributed to differences among fish strains, culture conditions, and the methods of determining the estimates. For these reasons, it is invalid to make direct comparisons among reported values without an understanding of the statistical models, their genetic interpretation and the environmental conditions under which the studies were made. Unless conditions are identical, only relative magnitudes and general trends are comparable.

In this study, heritability values determined from family means were larger than those calculated from individuals (Table 16). This occurred because the within family variance component (σ^2_W) is disregarded in the mean value of the family. The removal of this component, which made the largest contribution in the individual analyses (see Table 15), caused the sire component of variance (σ^2_S) to become relatively larger, thereby increasing the heritabilities of family means. The removal of the within family variance component also caused a considerable loss of degrees of freedom and heritabilities of family means are much less precise (as reflected by their standard errors) than those of individuals.

Although heritability values differ greatly, depending upon whether they were determined from individuals or family means, the general trends among environments are similar. In order to avoid duplication, both individual and family mean estimates will be discussed simultaneously.

Growth

Heritability estimates for growth (length and weight) in rainbow trout have been reported to be initially (180 days) low and to increase as the age of the population increases (Aulstad et al. 1972); to be initially high and to decrease with increasing age (Moller et al. 1976); and, to be initially high, to decrease somewhat until about

250 days post hatch, to increase again to approximately initial values by about 350 days, after which they remained constant until the termination of the study on day 450 (Chevassus 1976)(see Table 1). Similar estimates for cutthroat trout (*Salmo clarki*) (Calaprice 1967), carp (*Cyprinus carpio*) (Moav and Wohlfarth 1966, Moav 1976) and channel catfish (*Ictalurus punctatus*) (Reagan et al. 1976) all increase with age. In this study, heritabilities for growth traits were zero at the time of stocking (initial measurements) and, with the exception of individual weight in lake 971, increased in all environments by the conclusion of the study (Table 16). Thus, additive genetic differences were small in the early growth stages and became increasingly important later.

Components of reproductive fitness, such as egg number, egg volume and sperm number, are strongly correlated with early growth, in carp (Moav and Wohlfarth 1966). The authors suggest that such components and, because of the strong correlation, early growth, are favoured by natural selection and may be at a selection plateau where additive genetic variability has been exhausted. This hypothesis was supported by the results of a two-way selection experiment in carp which proved ineffective for upward selection (increased growth) but was successful for downward selection (Moav and Wohlfarth 1976). In rainbow trout body weight is also strongly correlated with egg volume and egg number (Gall 1975). In domestic populations of rainbow trout, which have undergone many generations of selective breeding for large size and rapid growth, initial growth may also be approaching a selection plateau.

Although additive genetic variability is absent in the early growth of carp, there is evidence of a large non-additive genetic component (Moav 1976). For individual measurements in this study, the female effect, which includes dominance genetic and early maternal effects in addition to additive effects (see Table 5) contributed approximately 30% of the total variability of initial growth (see Table 15). Since the additive genetic contribution was zero

(determined from males) dominance genetic and early maternal effects contribute all of the variability caused by differences among females. The relative magnitudes of these components could not be determined because the experiment was not designed to partition dominance genetic and early maternal effects.

In a study in which male carp were nested within females "heritabilities" of various morphological traits were much larger when determined from the male component than from the female component (Nenashev 1966). In such a design, as well as containing additive genetic effects, the male component includes dominance genetic effects and the female component contains early maternal effects. Because differences between estimates made from each component give an indication of the relative importance of these two non-additive sources of variation (assuming the additive genetic contributions are constant), the results indicate that dominance genetic effects are larger than early maternal effects for morphological variation in carp. More accurate estimates of the dominance genetic and early maternal effects can be determined from a factorial mating design (Becker 1967).

At the conclusion of the study, the maternal component for individual growth trait measurements accounted for only 7% - 15% of the total variability within each environment (see Table 15). Since this component also contained additive genetic effects in addition to dominance genetic and early maternal effects, these non-additive sources of variation became less important as the age of the population increased.

Heritability estimates for the two studies which reported high values for early growth in rainbow trout (Moller et al. 1976, Chevassus 1976) were both determined from full sib components. Again, in addition to additive genetic effects, these estimates would also contain dominance genetic and early maternal effects. The results of the present study show that non-additive effects are important initially and it is likely that estimates from full sibs would over-estimate the true additive genetic contribution to the total variability of early growth.

Inter-family competition has been found to produce a magnification of genetic differences in the yield capacity of carp (Moav and Wohlfarth 1974) and as a result, heritabilities are larger in populations in which sib groups are combined than in populations in which they are maintained separately. The authors state, "intra-population [inter-family] competitive ability is an integral major component of fitness and natural selection would be expected to increase its correlation with yield capacity". In the hatchery environments the results of the present study were similar to those found in carp. Growth trait heritabilities for the population reared in the mixed tank (competitive) environment were 2-4 times larger than those for the population raised in the individual tanks (non-competitive) environment (Table 16). In a competitive situation, the influence of both growth and competitive ability are reflected only in growth. These influences cannot be separated and the inflated heritabilities in competitive situations are probably due to differences in competitive ability. Therefore, growth in the individual tanks was influenced by different factors than growth in the mixed tank. This can also be seen in the poor growth correlations between hatchery environments (Table 18).

In the lake environments, which were also competitive situations, growth trait heritabilities were similar (with two exceptions which will be discussed later) to those of the individual tanks environment (Table 16). This suggests that competition in the lakes was of minor importance.

The heritabilities for individual fork length in lake 506 and family mean fork length in lake 971 were similar to those of the competitive, mixed tank hatchery environment (Table 16). The standard errors of each estimate were relatively large, and it is possible that the apparent non-conformity was due to sampling. This explanation is particularly convincing for the family mean estimate in lake 971, which exceeded the maximum expected value of unity. Because there were major differences between the lake environments (see Appendix A) the differences between individual fork length heritabilities may be real and not a sampling artifact.

In lake 506, anoxic conditions, which developed in late July following the collapse of the blue-green algae (*Aphanizomenon flos-aquae*) population, caused a partial summerkill (Barica 1975b), which severely reduced the numbers of the trout population. Mean size (length and weight) at harvest in lake 506 was much smaller than in lake 971, which did not summerkill (Table 12). This suggests that the stress producing conditions which resulted from the collapse of the algae population may have caused an inhibition in the growth of the fish which survived the kill. Rose (1960) demonstrated that concentrations of growth inhibiting excretory products gradually increased when tadpoles (*Rana pipiens* and *R. catesbiana*) were raised under crowded conditions, and that these water-borne growth inhibitors had a greater influence on smaller individuals in the population. Thus, variable resistance to growth inhibiting factors would be expected to cause a magnification of genetic differences. Such a model could possibly explain why fork length heritability is larger in lake 506 than in lake 971. However, since fork length and weight are highly correlated in rainbow trout (Table 20) one must then suspect that the $\log_{10}$ weight heritabilities in lake 506 were underestimated.

Survival

Because survival in lake 506 was considerably lower than in lake 971, one might expect that variable resistance to death would have been relatively more important in lake 506 and would cause a magnification of genetic differences in a manner similar to that caused by variability in competitive ability and possibly variable resistance to stress. However, the opposite situation was encountered and it is reflected in the higher heritabilities in lake 971 (Table 17). Mortalities in lake 506 were due to at least two factors -- early mortality and summerkill (Ayles et al. 1976). These factors are probably not related and, therefore, low heritability would be expected. Further evidence that the factors affecting survival in the two lakes were different can be seen in the poor correlation of survival between lake environments (Figure 14).

Genotype-Environment Interactions

Correlation, like regression considers the linear relation between the two variates, x and y. Whereas regression is used to predict y from x, the accuracy of the prediction is dependent upon the correlation between x and y. The correlation coefficient, r, which always lies between -1 and +1, is a measure of the degree of co-relation between x and y (Gilbert 1973). The coefficient of determination, r^2, is that fraction of the variation in x that can be attributed to the variation in y (or vice versa). When correlations are low, different factors affect the variability in each trait.

The pattern and magnitudes of the growth correlation coefficients were similar for both sire and dam means (Table 18) and reflect many of the observations which have been discussed previously. Similar magnitudes for sire and dam means give further indication that dominance genetic and early maternal influences were relatively small at the conclusion of the study. Partial correlations were smaller than full correlations in all comparisons and suggest that final performance was related to initial performance. This was most noticeable in the hatchery environments where all conditions were strictly controlled. Growth was weakly correlated between hatchery environments and this was probably due to the competition factor in the mixed tank environment. The correlations between the mixed tank environment and the lake environments were weaker than those between the lakes and the mixed tank, which gives further evidence that competition in the lakes was relatively minor. Generally, the growth correlations between lake 506 and the hatchery environments were weaker than those between the hatchery environments and lake 971. This indicates that the lakes were somewhat different but that the difference was not as great as that found between the hatchery environments.

Survival was not correlated between lake environments (Figure 14) indicating that completely different factors influenced survival in each lake. This difference is probably due almost entirely to the summerkill conditions which developed in lake 506.

Correlations have important implications in the selective breeding of fish populations. Many desirable economic traits, such as dressed weight, cannot be measured on living animals. In order to improve such traits through genetic selection, one must either use sib selection or select, instead, for some correlated variate, such as condition factor. In addition, when the same trait is measured in two different environments, it can be regarded not as one trait but as two (Falconer 1964). If the performance of a particular trait in a natural environment is correlated with the performance of the same trait in a hatchery environment, selection for the natural environment can be made, with much less risk, in the hatchery. However, unless the correlation is perfect ($r = +1.0$, $r = -1.0$) there will be errors in selection which will tend to increase as the intensity of selection is increased. In other words, with two correlated variates, x and y, if one selects a certain percentage, say p%, of the individuals who have the largest values of x, the percentage of those selected individuals which will also appear in the top p% of y's is dependent upon the correlation between x and y and upon the percent, p, of the x's selected (Gilbert 1961). This relationship is shown for various selection percentages in Figure 15. For example, sire mean fork length correlation between the individual tank environment and the mixed tank environment was 0.53 (Table 18). If the longest 20% of the population (half sib means) was selected in the individual tanks, Figure 15 indicates that 49% of those selected would also be among the longest 20% in the mixed tank. However, if the top 5% of the population in the individual tanks were selected, only 14% of those chosen would be within the top 5% of population in the mixed tank. This example is illustrated in Figure 2 and the types of selection errors which result when the correlation is not perfect can be seen by selecting a fixed number of points on both axes and calculating the percentage common to both selected sub-populations.

The largest partial correlation, 0.56, was sire mean fork length between the individual tanks and lake 971 (Figure 4). Therefore, a maximum of only 31% (r^2) of the variability in one environment could

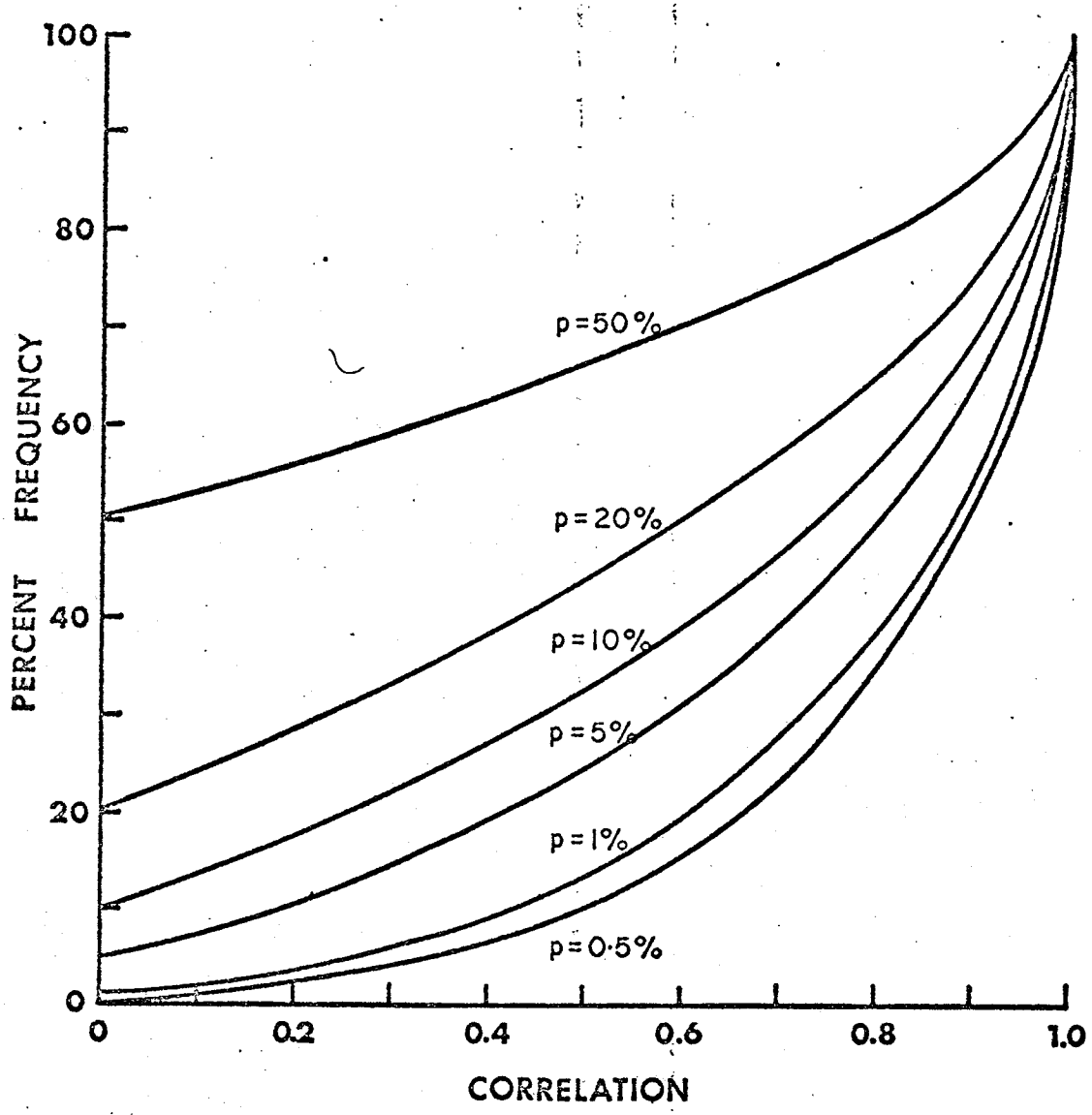


Figure 15. Per cent frequency of those individuals which are included within the top p% of character x which will also be found within the top p% of character y for selected p values (adapted from Table 1 in Gilbert 1961).

be attributed to variability in a second environment. This suggests that genotype-environment interactions are of major importance.

Genetic, Environmental and Phenotypic Correlations

Phenotypic correlations between fork length and $\log_{10}$ weight were positive and large in all environments (Table 20). Since phenotypic expression is determined by genotypic and environmental influences, positive phenotypic correlations may be due either to positive genetic or positive environmental correlations, or both.

Additive genetic correlations were quite high and indicate that many of the genes which contribute to the expression of each trait are pleiotropic (Mode and Robinson 1959). In order to determine the environmental correlation between two traits, it is desirable to exclude as much of the genetic effects as possible from the calculation (Grossman and Gall 1968). Because of the experimental design, three times the early maternal effect are subtracted in the algebraic removal of the additive and dominance genetic effects (see Table 11), and the accuracy of the environmental correlations are inversely related to the magnitude of the early maternal effect. Environmental correlations were higher in the hatchery than in the lakes. The very high environmental correlation in the individual tanks indicates that the tank effect was minimal.

Strong, positive phenotypic and genetic correlations between length and weight at ages 5 and 15 months have also been found in channel catfish (Reagan et al. 1976). The authors of that study concluded "the magnitude and positive nature of the genetic correlations between the four traits indicate that both direct or simultaneous selection for these traits in channel catfish would be effective". The results of the present study support the same conclusion for fork length and weight in rainbow trout.

Implications for Genetic Selection

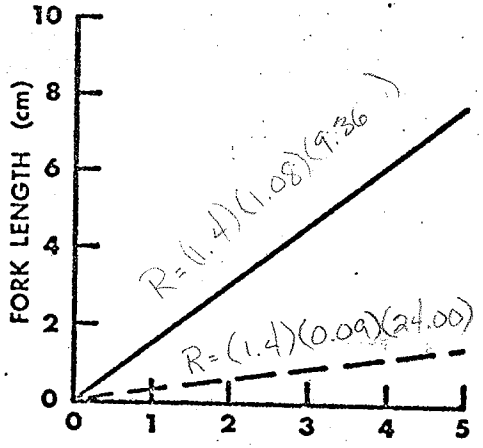
In all environments, heritability values for individual growth and survival were generally low (Tables 16 and 17) and environmental deviations (σ^2_W) constituted a large portion of the total phenotypic variability (Tables 15 and 17). In addition, since rainbow trout typically produce large families, all of the conditions which favour family selection are fulfilled. Any future selection program involving rainbow trout for extensive aquacultural purposes should place major emphasis on family merit. This conclusion is further supported by the relatively larger heritability values determined from family means. Family selection has been recommended previously as the most efficient method for the genetic improvement of various traits in a number of fish species, including: carp (Kirpichnikov 1966), channel catfish (Reagan et al. 1976), Atlantic salmon (Kanis et al. 1976, Refstie et al. 1977), and brown trout (Gjedrem 1976a, Kanis et al. 1976). Recently, family selection for improved growth rate in carp resulted in considerable improvement, whereas, previous programs involving individual selection had been largely ineffective (Moav 1976).

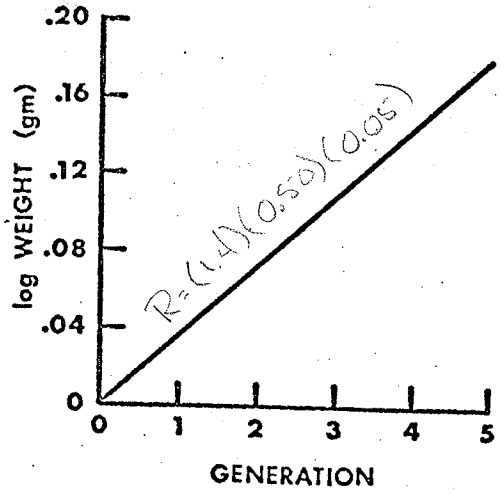
By strict definition, heritability values are only valid for the generation and the population from which they were determined. However, studies with a variety of animals have shown that values based upon a single estimate are often applicable for 10 to 20 generations of artificial selection (Falconer 1964). In order to demonstrate the relative efficiencies of individual and family selection in this system, the heritabilities and phenotypic standard deviations determined from both individuals and family means in each of the lake environments were used to predict the expected response to selection. The results after 5 generations of selection at a selection intensity of 1.4 (20%) are shown in Figure 16. In all cases family selection produced a much greater expected response than individual selection.

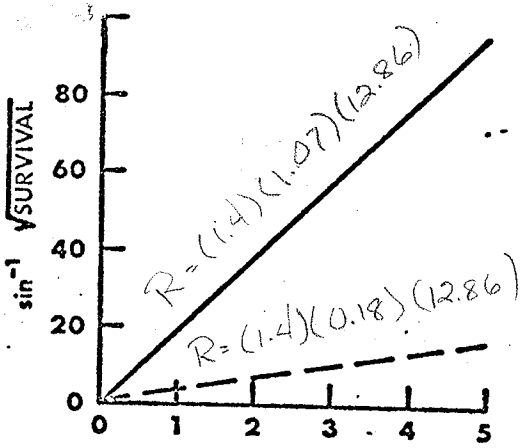
The presence of large genotype-environment interactions (Figures 2-14) indicates that many of the factors which influence growth and survival differ among environments. Therefore selection would be most efficient if carried out on populations reared in the

Figure 16. Comparison of the expected mean improvement in fork length, log weight and per cent survival (transformed) in lakes 971 and 506 for both individual and family selection after 5 generations of selection at a selection intensity of 1.4 (20%) per generation. Individual selection is denoted by the dashed line and family selection by the solid line.

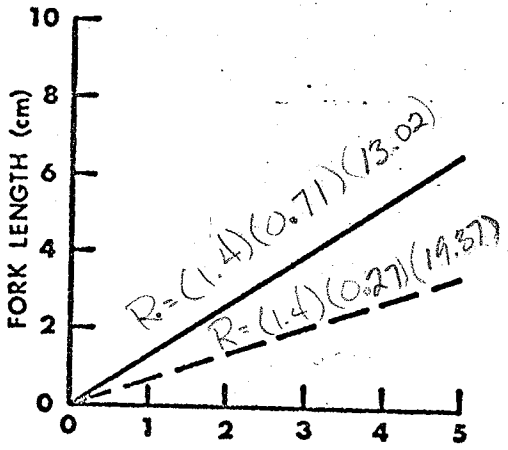
LAKE 971

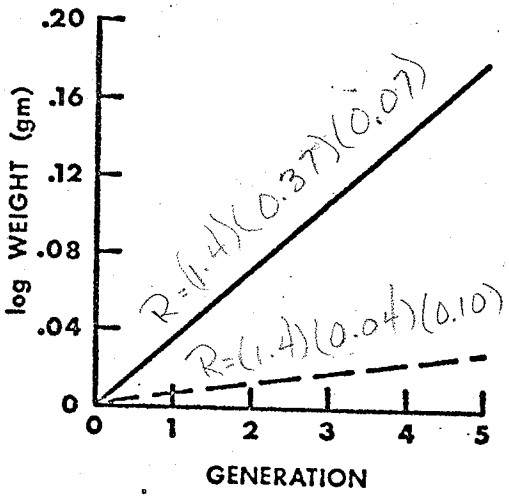


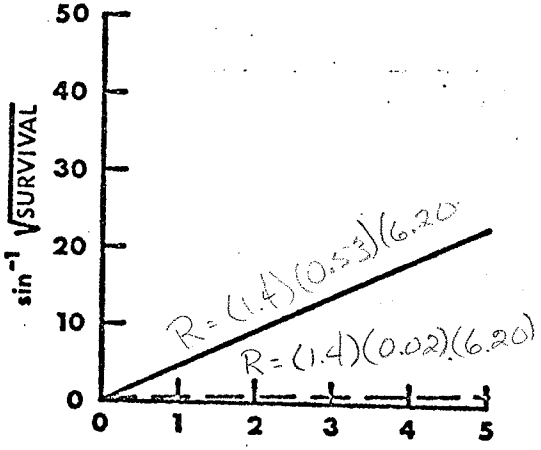




LAKE 506







target environment. Since it would be impractical to attempt to select for individual pothole lakes it may be possible to classify lakes as to limnological similarity and to select for classes of similar lakes. By rearing a portion of each selected family in the hatchery, the risk of losing selected stock, because of uncontrollable environmental conditions, would be reduced. One could then select from hatchery stock on the basis of sib performance in the lake (sib selection). This would also simplify harvest since it would not be necessary to live-trap the fish in the lakes.

Should it be necessary to restrict selection for the lakes to fish in the hatchery, potential gains per generation would be greatly reduced. Because the correlations between the individual tanks environment and the lake environments were higher than those between the lakes and the mixed tank environment (Table 18), fewer selection errors and more rapid response would be expected if the families in the population under selection were maintained in separate tanks. In addition, the strong, positive phenotypic and additive genetic correlations between length and weight found in all environments (Table 20) indicate that simultaneous selection for these traits would be effective.

The results of this experiment are in general agreement with those of previous studies and offer further support to the conclusion of Gjedrem (1976b). "Because of the high fertility, the large variation and a moderately long generation interval, it should be possible to obtain much higher genetic gain per unit time in salmonids than in farm animals."

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APPENDIX A.

DESCRIPTION OF LAKES 971 AND 506.

Lakes 971 and 506 are within the aquaculture experimental lakes area of southwestern Manitoba at approximately 50°30' N. latitude and 100°00' W. longitude. Lake 971 is located 8 km. northwest of Elphinstone, Manitoba and lake 506 is situated 8.5 km. southwest of Sandy Lake, Manitoba and 9 km. southeast of Elphinstone (see Figure 1).

Both lakes are typical of those found in the gently rolling, aspen parkland of central North America. Each lake is small, shallow, highly eutrophic, has no permanent inlet or outlet and winterkills annually. Lake 971 is classified as a low-risk summerkill lake and lake 506 as a high-risk summerkill lake (Barica 1975).

Bathymetric maps of each lake are shown in Figures 2 (lake 971) and 3 (lake 506), and contours areas are compared in Table 1. The surface area, maximum depth, mean depth and volume of each lake is given in Table 2.

Limnological conditions in both lakes have been monitored irregularly since 1972 and the results of the 1975 analyses are given in Tables 3 (lake 971) and 4 (lake 506). Details of the analytical procedures of each test are given in Stainton et al. (1974).

Figure 1. Map of the aquaculture experimental lakes in the Erickson - Elphinstone area in south-western Manitoba. Lakes 971 and 506 are circled.

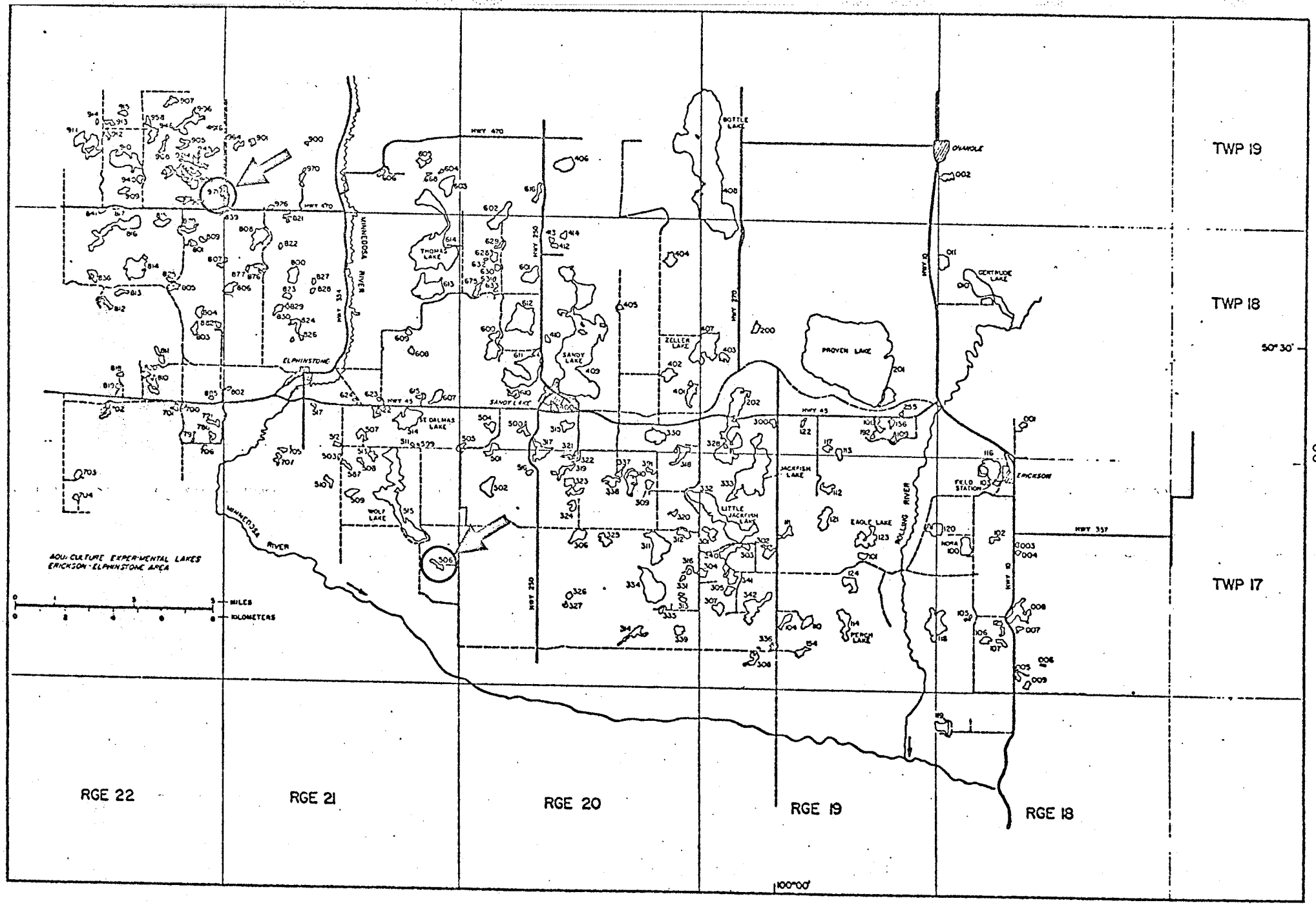
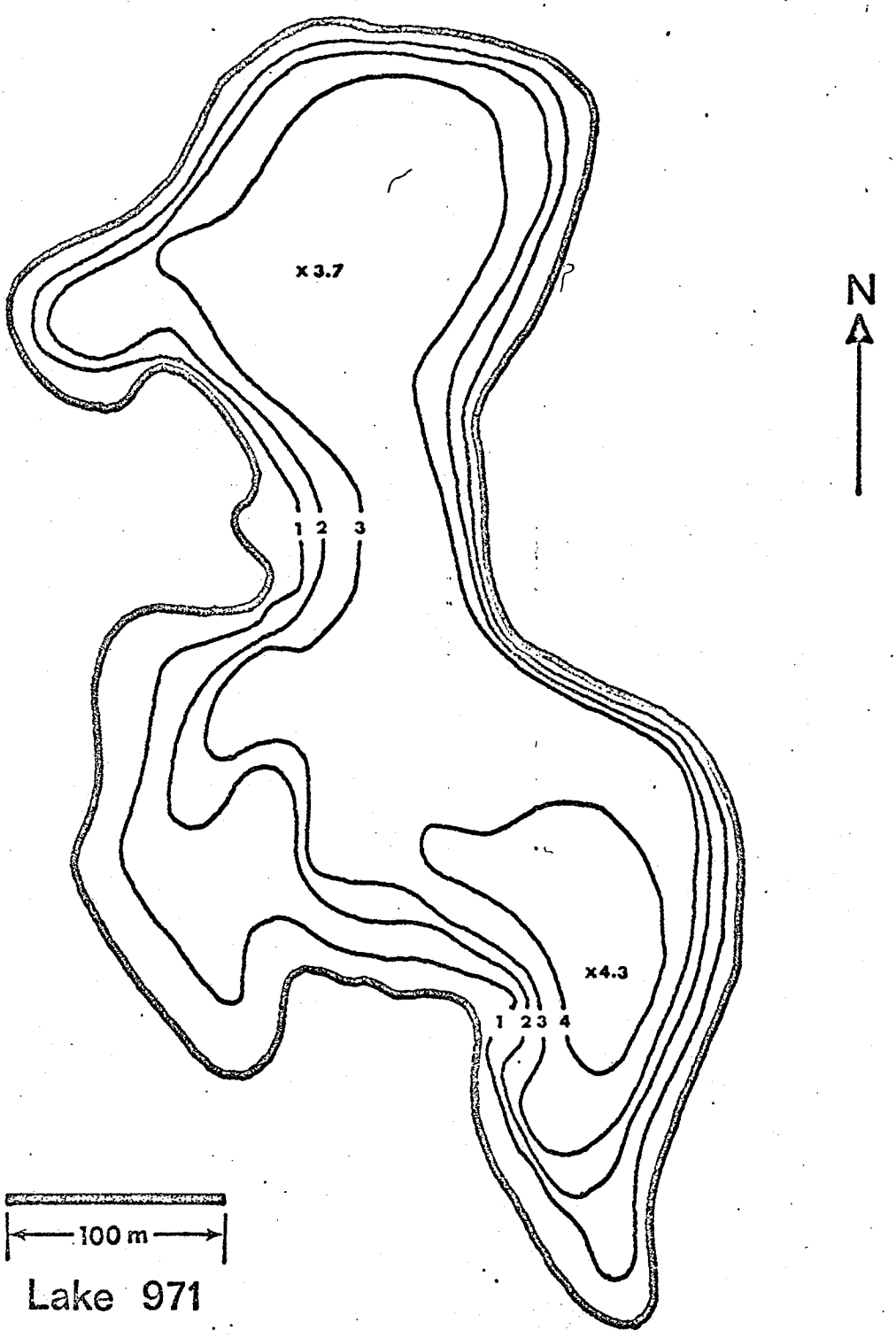
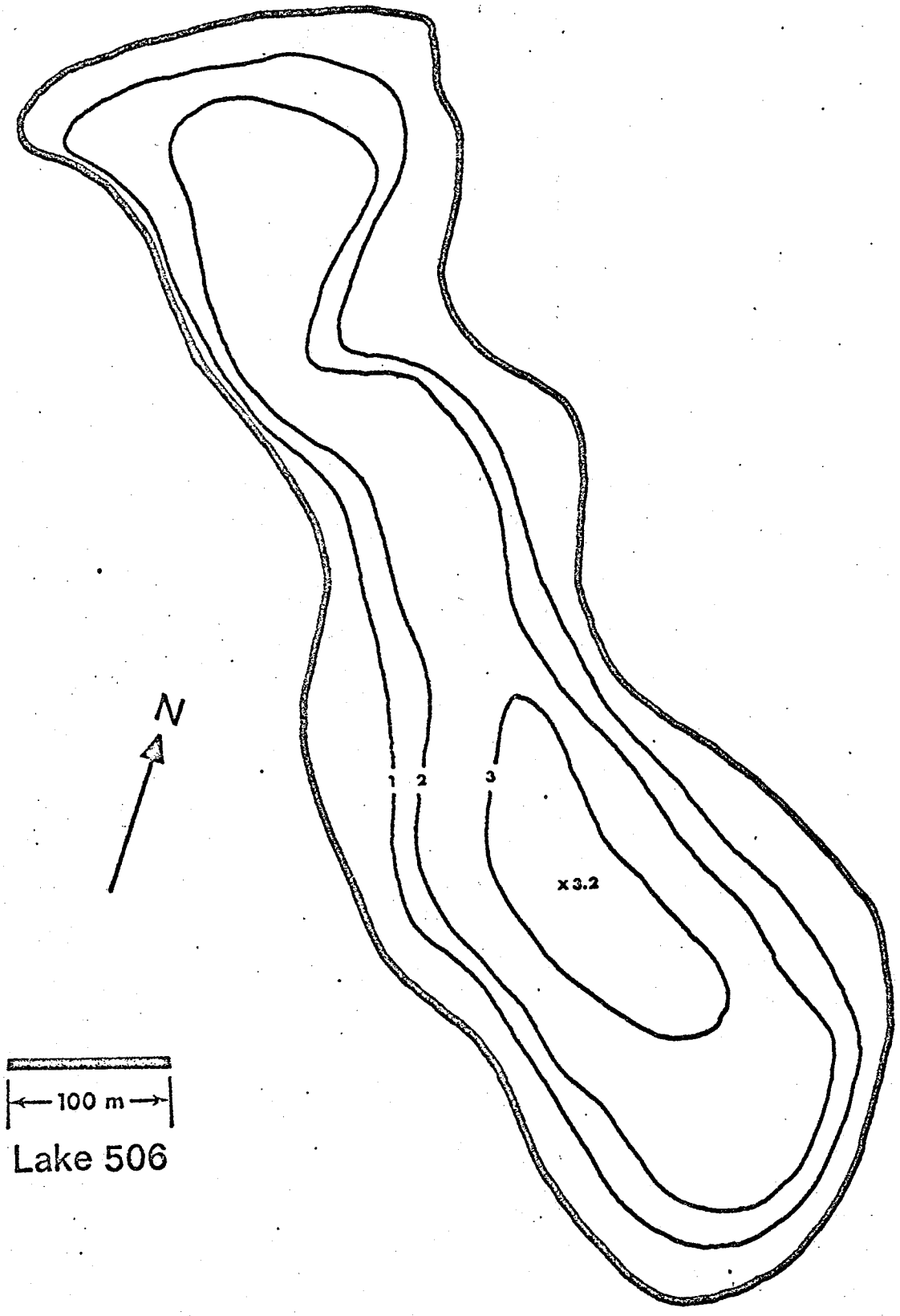

AQUACULTURE EXPERIMENTAL LAKES
ERICKSON - ELPHINSTONE AREA
MILES
KILOMETERS
TWP 19
TWP 18
TWP 17
50° 30'
RGE 22
RGE 21
RGE 20
RGE 19
RGE 18
100°00'
HWY 470
HWY 45
HWY 357
HWY 10
HWY 250
HWY 270
HWY 334
MINNEDOSA RIVER
ROLLING RIVER
ELPHINSTONE
ERICKSON
FIELD STATION
THOMAS LAKE
SANDY LAKE
ZELLER LAKE
PROVEN LAKE
BOTTLE LAKE
GERTRUDE LAKE
ST DALMAS LAKE
WOLF LAKE
JACKFISH LAKE
LITTLE JACKFISH LAKE
EAGLE LAKE
PERCH LAKE
NORA LAKE

Figure 2. Bathymetric map of lake 971. Contours are in 1 meter intervals.



Lake 971

Figure 3. Bathymetric map of lake 506. Contours are in one meter intervals.



Lake 506

Table 1. Contour areas of lakes 971 and 506.

Depth Interval	Lake 971		Lake 506	
	hectares	per cent	hectares	per cent
0 - 1 M	1.7	17.0	5.2	31.3
1 - 2 M	1.8	18.0	3.6	21.7
2 - 3 M	1.6	16.0	6.3	38.0
3 - 4 M	4.2	42.0	1.5	9.0
> 4 M	0.7	7.0		

Table 2. Surface area, maximum depth, mean depth and volume of lakes 971 and 506.

	Lake 971	Lake 506
Surface area (hectares)	10.0	16.6
Maximum depth (meters)	4.3	3.2
Mean depth (meters)	2.48	1.67
Volume (cubic meters)	2.48×10^5	2.78×10^5

Table 3. Lake 971, water chemistry determinations, 1975.

Date	Depth (M)	Temp. (°C)	pH	Oxygen (mg/l)	Chlorophyl-a (ug/l)	Ammonia (NH_3) (ug/l)	Phosphorous (PO_4) (ug/l)	Secchi (m)
Jun. 12	0	16.5		7.62	1.4	99	28	1.58
	1	16.0	8.53	7.80	1.1	75	27	
Jun. 25	0	21.5		7.90	5.6	37	18	1.30
	1	21.2	8.52	7.50	2.7	45	18	
Jul. 9	0	22.8		8.20	6.0	32	22	2.70
	1	22.8	8.86	8.00	3.3	29	24	
Jul. 23	0	19.7		5.02	8.7	66	40	1.00
	1	19.0	8.85	5.71	8.4	55	36	
Aug. 6	0	19.8		4.60	8.7	210	40	2.00
	1	19.8	8.78	4.50	7.6	180	42	
Aug. 19	0	16.0		5.90	15.8		19	1.20
	1	16.0	8.70	5.00	16.0		18	
Dec. 11	0			14.60	17.1	25	26	
	1		8.21	12.60	21.0	32	31	

Table 4. Lake 506, water chemistry determinations, 1975.

Date	Depth (M)	Temp. (°C)	pH	Oxygen (mg/l)	Chlorophyl-a (ug/l)	Ammonia (NH_3) (ug/l)	Phosphorous (PO_4) (ug/l)	Secchi (m)
May 25	0	13.2		9.30	12.3	50	14	0.96
	1	13.0	8.25	9.28	9.7	50	18	
Jun. 11	0	14.3		9.40	13.0	27	34	1.00
	1	14.3	8.31	9.30	12.5	20	33	
Jun. 25	0	22.5		9.10	34.5	26	55	0.80
	1	22.2	9.10	9.18	29.8	25	54	
Jul. 11	0	20.0		12.40	109.0	27	130	0.60
	1	20.0	9.56	12.18	97.3	26	133	
Jul. 24	0	21.2		10.30	24.9	35	186	0.40
	1	18.9	10.09	11.29	23.3	70	176	
Jul. 29	0	24.0		14.00	24.0	34	108	0.40
	1	23.0	9.98	10.00	26.7	36	148	
Aug. 8	0	18.3		7.75		18	168	0.25
	1	18.3	10.16	7.90		15	173	
Aug. 19	0	15.0		8.30	17.3		257	0.25
	1	14.9	9.78	8.10	15.6		287	
Dec. 11	0			11.50	29.8	72	26	
	1		8.00	10.60	25.0	66	25	

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APPENDIX B.

CORRECTION FOR LOSS OF TAGS.

Loss of tags during the study period was a problem common to all environments, approaching 35% overall. Because tag loss was variable among lots it was necessary to apply a correction factor to each lot in order to estimate mean lot survival. In four of the environments (individual tanks, mixed tank, cage A in lake 971, and cage A in lake 506) mortality was negligible. Since the original number of tagged fish per lot in each of these environments was known, it was possible to determine a weighted mean estimate of per cent tag retention (100% - % not tagged) for each lot.

The assumption that per cent tag retention in each lot was constant for each environment was tested using a chi-square goodness of fit test (Snedecor and Cochran 1967). Chi-square values were determined for each lot and yielded a significant value ($p=0.02$) in one lot only (1.8% of the total). The total chi-square value was not significant ($p>0.50$). When lots were pooled within environments the chi-square value was not significant ($p=0.24$). Heterogeneity within lots was tested by subtracting the pooled chi-square from the total chi-square and adjusting the degrees of freedom (Sokal and Rohlf 1969). The heterogeneity chi-square value was also insignificant ($p>0.50$). The calculations are summarized in Table 1.

The results indicate that tag loss is homogeneous within lots among environments and that the expected values yield an acceptable estimate of the observed values. If one assumes equal random mortality for tagged and untagged fish, tag loss can be estimated for environments in which mortality was significant.

Table 1. Estimation of total, pooled, and heterogeneity chi-square values. O and E refer to the observed and expected numbers of fish in the sample which retained tags.

Lot		Mixed Tank	Individual Tank	Lake 971 Cage A	Lake 506 Cage A	df	χ^2	Probability
1-1	O	24.00	48.00	8.00	10.00	3	0.303	0.96
	E	23.94	46.91	9.57	9.57			
1-3	O	70.00	29.00	8.00	5.00	3	0.914	0.82
	E	67.47	31.04	6.75	6.75			
1-4	O	24.00	48.00	8.00	10.00	3	0.258	0.97
	E	23.44	47.81	9.38	9.38			
2-6	O	25.00	52.00	10.00	7.00	3	0.833	0.84
	E	24.23	50.39	9.69	9.69			
2-7	O	25.00	47.00	10.00	8.00	3	0.334	0.95
	E	23.68	47.37	9.47	9.47			
2-8	O	23.00	50.00	9.00	10.00	3	0.118	0.99
	E	23.96	48.87	9.58	9.58			
3-9	O	26.00	51.00	10.00	8.00	3	0.460	0.93
	E	25.00	50.00	10.00	10.00			
3-10	O	20.00	32.00	9.00	6.00	3	1.316	0.73
	E	17.63	35.26	7.05	7.05			
3-11	O	24.00	41.00	10.00	10.00	3	0.678	0.88
	E	22.37	44.74	8.95	8.95			
4-14	O	25.00	48.00	4.00	5.00	3	4.518	0.21
	E	20.30	45.47	8.12	8.12			
5-18	O	23.00	46.00	9.00	7.00	3	0.415	0.94
	E	21 68	45.97	8.67	8.67			
6-22	O	25.00	40.00	7.00	5.00	3	2.460	0.48
	E	20.26	40.53	8.11	8.11			
6-23	O	21.00	38.00	10.00	8.00	3	0.532	0.91
	E	20.48	40.14	8.19	8.19			
7-25	O	22.00	41.00	6.00	7.00	3	0.893	0.83
	E	20.21	39.62	8.09	8.09			
7-26	O	26.00	39.00	9.00	9.00	3	1.174	0.76
	E	22.24	43.64	8.56	8.56			
7-27	O	21.00	34.00	8.00	6.00	3	0.886	0.83
	E	18.15	36.32	7.26	7.26			

Table 1. (Continued)

Lot		Mixed Tank	Individual Tank	Lake 971 Cage A	Lake 506 Cage A	df	χ^2	Probability
8-29	O	11.00	21.00	1.00	5.00	3	3.18	0.36
	E	11.05	18.12	4.42	4.42			
8-30	O	22.00	38.00	6.00	9.00	3	0.922	0.82
	E	19.74	39.47	7.89	7.89			
8-31	O	18.00	36.00	9.00	6.00	3	0.680	0.88
	E	18.96	34.88	7.58	7.58			
9-33	O	28.00	37.00	8.00	4.00	3	4.798	0.19
	E	20.70	37.26	8.28	8.28			
9-34	O	13.00	18.00	4.00	6.00	3	1.583	0.66
	E	10.90	21.37	4.36	4.36			
10-37	O	17.00	29.00	4.00	6.00	3	0.963	0.81
	E	14.74	29.47	5.89	5.89			
10-38	O	15.00	37.00	8.00	7.00	3	0.472	0.93
	E	17.09	36.23	6.84	6.84			
10-39	O	20.00	25.00	6.00	5.00	3	1.853	0.61
	E	15.56	28.00	6.22	6.22			
11-41	O	22.00	45.00	4.00	9.00	3	2.448	0.48
	E	20.62	42.89	8.24	8.24			
11-42	O	10.00	26.00	2.00	2.00	3	3.511	0.32
	E	10.53	21.05	4.21	4.21			
11-43	O	9.00	30.00	7.00	5.00	3	2.897	0.41
	E	14 01	25.78	5.60	5.60			
12-45	O	22.00	36.00	9.00	10.00	3	0.853	0.84
	E	20.92	40.17	8.37	8.37			
14-53	O	24.00	35.00	7.00	8.00	3	1.540	0.67
	E	19.47	38.95	7.79	7.79			
14-54	O	4.00	26.00	9.00	6.00	3	9.582	0.02
	E	11.84	23.68	4.74	4.74			
15-57	O	24.00	45.00	8.00	6.00	3	1.223	0.75
	E	22.07	43.27	8.83	8.83			

Table 1. (Continued)

Lot		Mixed Tank	Individual Tank	Lake 971 Cage A	Lake 506 Cage A	df	χ^2	Probability
15-59	O	11.00	32.00	9.00	1.00	3	7.192	0.07
	E	14 10	27.63	5.64	5.64			
16-62	O	11.00	30.00	3.00	3.00	3	4.302	0.23
	E	13.20	23.24	5.28	5.28			
16-63	O	13.00	29.00	9.00	3.00	3	3.476	0.32
	E	15.17	26.70	6.07	6.07			
17-65	O	8.00	27.00	5.00	3.00	3	3.380	0.34
	E	11.94	21.50	4.78	4.78			
17-66	O	20.00	48.00	8.00	9.00	3	0.728	0.87
	E	22.61	44.31	9.04	9.04			
17-67	O	13.00	32.00	2.00	6.00	3	2.352	0.50
	E	13.12	29.39	5.25	5.25			
18-70	O	22.00	37.00	6.00	9.00	3	1.026	0.79
	E	19.47	38.95	7.79	7.79			
19-72	O	13.00	22.00	6.00	1.00	3	3.600	0.31
	E	10.94	22.31	4.38	4.38			
19-73	O	13.00	15.00	4.00	2.00	3	2.212	0.53
	E	9.66	16.61	3.86	3.86			
19-74	O	34.00	19.00	9.00	5.00	3	4.560	0.21
	E	35.14	22.49	4.69	4.69			
20-76	O	10.00	20.00	3.00	2.00	3	1.223	0.75
	E	9.41	18.06	3.76	3.76			
20-77	O	19.00	20.00	4.00	2.00	3	5.840	0.12
	E	12.36	22.75	4.95	4.95			
21-78	O	15.00	26.00	5.00	3.00	3	1.288	0.73
	E	13.32	25.03	5.33	5.33			
21-79	O	15.00	35.00	9.00	9.00	3	1.419	0.68
	E	17.71	36.12	7.08	7.08			
21-80	O	12.00	36.00	8.00	8.00	3	1.956	0.58
	E	16.67	34.00	6.67	6.67			

Table 1. (Continued)

Lot		Mixed Tank	Individual Tank	Lake 971 Cage A	Lake 506 Cage A	df	χ^2	Probability
21-81	O	8.00	24.00	5.00	4.00	3	1.041	0.79
	E	10.68	21.78	4.27	4.27			
22-83	O	12.00	27.00	8.00	4.00	3	1.970	0.58
	E	12.75	28.05	5.10	5.10			
22-84	O	20.00	37.00	11.00	6.00	3	1.098	0.78
	E	19.68	37.79	8.66	7.87			
23-85	O	19.00	32.00	5.00	9.00	3	1.221	0.75
	E	17.86	32.86	7.14	7.14			
23-86	O	12.00	28.00	4.00	7.00	3	1.491	0.68
	E	14.33	25.21	5.73	5.73			
23-87	O	20.00	42.00	5.00	8.00	3	1.175	0.76
	E	19.27	39.31	7.71	7.71			
24-88	O	17.00	12.00	7.00	7.00	3	0.068	0.99
	E	17.62	11.28	7.05	7.05			
24-89	O	23.00	42.00	9.00	8.00	3	0.186	0.98
	E	21.58	43.16	8.63	8.63			
24-90	O	14.00	29.00	8.00	7.00	3	1.252	0.74
	E	14.65	31.64	5.86	5.86			
24-91	O	13.00	27.00	6.00	5.00	3	0.123	0.99
	E	13.56	26.59	5.43	5.43			
TOTAL						168	106.834	>0.50
POOLED	O	1068.00	1896.00	385.00	350.00	3	4.241	0.24
	E	1040.05	1881.43	386.85	386.06			
HETEROGENEITY						165	102.593	>0.50

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Sokal, R. R., and F. J. Rohlf. 1969. Biometry. The principles and practice of statistics in biological research. W. H. Freeman and Co., San Francisco, Cal. 776 p.

APPENDIX TABLE 1

Summary of the initial measurements arranged by full sib groups. The number preceding the dash refers to the paternal parent and that following refers to the maternal parent. (See Fig. 1, pg. 12.)

LENGTH	=	fork length (mm)
DEPTH	=	body depth (mm)
WEIGHT	=	round weight (gm)
LOGWT	=	$\log_{10}$ weight (gm)
COND	=	coefficient of condition
	=	$(\text{weight(gm)} \times 10^4)/(\text{fork length(mm)})^3$
RATIO	=	body depth(mm)/(fork length(mm)/10)
C.V. %	=	percent coefficient of variation

INITIAL MEASUREMENTS

LOT=01-01

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	64.360000	6.569373	43.156667	1609.000000	1035.760000	52.000000	77.000000	10.207
DEPTH	25	15.520000	2.238303	5.010000	388.000000	120.240000	12.000000	20.000000	14.422
WEIGHT	25	4.032000	1.243222	1.545600	100.800000	37.094400	2.600000	6.800000	30.834
LOGWT	25	0.587501	0.125077	0.015644	14.687525	0.375462	0.414973	0.832509	21.290
COND	25	1.477005	0.121803	0.014836	36.925114	0.356064	1.279759	1.849112	8.247
RATIO	25	2.406931	0.191400	0.036634	60.173277	0.879219	2.063492	2.698413	7.952

LOT=01-03

LENGTH	25	64.920000	6.537839	42.743333	1623.000000	1025.840000	48.000000	75.000000	10.071
DEPTH	25	15.960000	2.111082	4.456667	399.000000	106.960000	11.000000	19.000000	13.227
WEIGHT	25	4.300000	1.294218	1.675000	107.500000	40.200000	1.600000	6.600000	30.098
LOGWT	25	0.611870	0.146231	0.021384	15.296742	0.513206	0.204120	0.819544	23.899
COND	25	1.524442	0.134165	0.018000	38.111046	0.432005	1.286974	1.924198	8.801
RATIO	25	2.452946	0.132888	0.017659	61.323639	0.423822	2.187500	2.714286	5.417

LOT=01-04

LENGTH	25	67.920000	6.987608	48.826667	1698.000000	1171.840000	56.000000	82.000000	10.288
DEPTH	25	15.200000	2.020726	4.083333	380.000000	98.000000	11.000000	20.000000	13.294
WEIGHT	25	4.352000	1.322913	1.750100	108.800000	42.002400	2.100000	7.200000	30.398
LOGWT	25	0.618432	0.138044	0.019056	15.460794	0.457344	0.322219	0.857332	22.322
COND	25	1.350269	0.106716	0.011388	33.756727	0.273318	1.195791	1.630092	7.903
RATIO	25	2.234308	0.138556	0.019198	55.857693	0.460746	1.964286	2.597403	6.201

LOT=02-05

LENGTH	25	87.520000	7.400000	54.760000	2188.000000	1314.240000	74.000000	99.000000	8.455
DEPTH	25	21.920000	1.956187	3.826667	548.000000	91.840000	19.000000	26.000000	8.924
WEIGHT	25	10.696000	2.632407	6.929567	267.400000	166.309600	6.600000	15.900000	24.611
LOGWT	25	1.016833	0.105645	0.011161	25.420816	0.267861	0.819544	1.201397	10.390
COND	25	1.571289	0.122247	0.014944	39.282228	0.358666	1.329640	1.914063	7.780
RATIO	25	2.506893	0.127479	0.016251	62.672326	0.390022	2.289157	2.750000	5.085

LOT=02-06

LENGTH	25	62.360000	6.663833	44.406667	1559.000000	1065.760000	48.000000	75.000000	10.686
DEPTH	25	15.400000	2.198484	4.833333	385.000000	116.000000	12.000000	21.000000	14.276
WEIGHT	25	3.568000	1.196773	1.432267	89.200000	34.374400	1.600000	6.400000	33.542
LOGWT	25	0.530661	0.138956	0.019309	13.266525	0.463407	0.204120	0.806180	26.185
COND	25	1.424418	0.078327	0.006135	35.610440	0.147244	1.224490	1.565934	5.499
RATIO	25	2.465230	0.163626	0.026774	61.630759	0.642565	2.142857	3.000000	6.637

LOT=02-07

LENGTH	25	68.240000	7.383992	54.523333	1706.000000	1308.560000	54.000000	84.000000	10.821
DEPTH	0								
WEIGHT	25	4.604000	1.573870	2.477067	115.100000	59.449600	2.400000	8.800000	34.185
LOGWT	25	0.639463	0.146422	0.021439	15.986564	0.514548	0.380211	0.944483	22.898
COND	25	1.398683	0.097823	0.009569	34.967083	0.229665	1.233583	1.536695	6.994
RATIO	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

INITIAL MEASUREMENTS

LOT=02-08

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	63.560000	6.733498	45.340000	1589.000000	1088.160000	54.000000	75.000000	10.594
DEPTH	25	13.720000	1.744515	3.043333	343.000000	73.040000	11.000000	17.000000	12.715
WEIGHT	25	3.328000	1.099060	1.207933	83.200000	28.990400	1.900000	5.500000	33.025
LOGWT	25	0.499973	0.141166	0.019928	12.499333	0.478270	0.278754	0.740363	28.235
COND	25	1.256702	0.119870	0.014369	31.417547	0.344851	0.972222	1.480503	9.538
RATIO	25	2.157608	0.138349	0.019140	53.940208	0.459371	1.833333	2.352941	6.412

LOT=03-09

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	66.400000	5.400617	29.166667	1660.000000	700.000000	57.000000	77.000000	8.133
DEPTH	25	15.160000	1.675311	2.806667	379.000000	67.360000	12.000000	18.000000	11.051
WEIGHT	25	4.104000	1.028137	1.057067	102.600000	25.369600	2.400000	6.400000	25.052
LOGWT	25	0.600221	0.108850	0.011848	15.005518	0.284358	0.380211	0.806180	18.135
COND	25	1.377598	0.107032	0.011456	34.439962	0.274938	1.176725	1.606786	7.769
RATIO	25	2.281778	0.155007	0.024027	57.044449	0.576653	1.967213	2.608696	6.793

LOT=03-10

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	70.840000	6.135145	37.640000	1771.000000	903.360000	60.000000	81.000000	8.661
DEPTH	25	16.760000	2.107131	4.440000	419.000000	106.560000	13.000000	20.000000	12.572
WEIGHT	25	4.976000	1.327680	1.762733	124.400000	42.305600	3.000000	7.200000	26.682
LOGWT	25	0.681248	0.120653	0.014557	17.031212	0.349372	0.477121	0.857332	17.711
COND	25	1.368648	0.101445	0.010291	34.216211	0.246985	1.199774	1.540741	7.412
RATIO	25	2.359796	0.138863	0.019283	58.994908	0.462793	2.031250	2.631579	5.885

LOT=03-11

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	62.040000	6.274817	39.373333	1551.000000	944.960000	53.000000	77.000000	10.114
DEPTH	25	14.600000	1.848423	3.416667	365.000000	82.000000	11.000000	18.000000	12.660
WEIGHT	25	2.696000	0.843347	0.711233	67.400000	17.069600	1.400000	4.500000	31.281
LOGWT	25	0.410109	0.137537	0.018917	10.252735	0.453996	0.146128	0.653213	33.537
COND	25	1.097642	0.111175	0.012360	27.441044	0.296635	0.925119	1.310878	10.128
RATIO	25	2.349683	0.131071	0.017180	58.742077	0.412311	2.075472	2.542373	5.578

LOT=04-13

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	19	81.684211	10.360462	107.339181	1552.000000	1932.105263	57.000000	97.000000	12.684
DEPTH	19	21.105263	3.177958	10.099415	401.000000	181.789474	13.000000	26.000000	15.058
WEIGHT	19	9.526316	3.411230	11.636491	181.000000	209.456842	3.100000	15.600000	35.808
LOGWT	19	0.948716	0.174610	0.030489	18.025598	0.548797	0.491362	1.193125	18.405
COND	19	1.675483	0.139911	0.019575	31.834185	0.352353	1.508916	2.035416	8.351
RATIO	19	2.580863	0.200071	0.040028	49.036403	0.720509	2.268041	2.987013	7.752

LOT=04-14

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	67.080000	5.957628	35.493333	1677.000000	851.840000	55.000000	79.000000	8.881
DEPTH	25	15.880000	1.877942	3.526667	397.000000	84.640000	12.000000	19.000000	11.826
WEIGHT	25	4.276000	1.206676	1.456067	106.900000	34.945600	2.300000	7.000000	28.220
LOGWT	25	0.614361	0.123762	0.015317	15.359036	0.367610	0.361728	0.845098	20.145
COND	25	1.381991	0.093533	0.008748	34.549785	0.209963	1.195335	1.525879	6.768
RATIO	25	2.364978	0.156436	0.024472	59.124440	0.587332	2.096774	2.608696	6.615

INITIAL MEASUREMENTS
LOT=05-18

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	71.840000	6.107918	37.306667	1796.000000	895.360000	58.000000	83.000000	8.502
DEPTH	25	17.000000	1.914854	3.666667	425.000000	88.000000	12.000000	21.000000	11.264
WEIGHT	25	5.072000	1.325242	1.756267	126.800000	42.150400	2.800000	8.200000	26.129
LOGWT	25	0.691059	0.113342	0.012846	17.276475	0.308314	0.447158	0.913814	16.401
COND	25	1.343582	0.115553	0.013352	33.589543	0.320458	0.937753	1.529358	8.600
RATIO	25	2.363265	0.135345	0.018318	59.081625	0.439636	2.068966	2.602740	5.727

LOT=06-21

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	67.360000	6.264184	39.240000	1684.000000	941.760000	59.000000	81.000000	9.300
DEPTH	25	15.800000	1.957890	3.833333	395.000000	92.000000	12.000000	19.000000	12.392
WEIGHT	25	4.208000	1.237242	1.530767	105.200000	36.738400	2.400000	6.800000	29.402
LOGWT	25	0.606693	0.124592	0.015523	15.167323	0.372555	0.380211	0.832509	20.536
COND	25	1.342115	0.093129	0.008673	33.552881	0.208151	1.168571	1.492945	6.939
RATIO	25	2.343117	0.158914	0.025254	58.577936	0.606091	2.000000	2.602740	6.782

LOT=06-22

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	65.400000	6.751543	45.583333	1635.000000	1094.000000	45.000000	73.000000	10.323
DEPTH	25	15.240000	1.854724	3.440000	381.000000	82.560000	10.000000	18.000000	12.170
WEIGHT	25	4.100000	1.153979	1.331667	102.500000	31.960000	1.200000	5.800000	28.146
LOGWT	25	0.590429	0.155752	0.024259	14.760735	0.582212	0.079181	0.763428	26.380
COND	25	1.419998	0.101526	0.010308	35.499950	0.247383	1.147842	1.620515	7.150
RATIO	25	2.328677	0.126160	0.015916	58.216919	0.381992	2.121212	2.647059	5.418

LOT=06-23

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	65.520000	6.097267	37.176667	1638.000000	892.240000	55.000000	79.000000	9.306
DEPTH	25	14.840000	1.624808	2.640000	371.000000	63.360000	12.000000	19.000000	10.949
WEIGHT	25	4.172000	1.183751	1.401267	104.300000	33.630400	2.600000	7.000000	28.374
LOGWT	25	0.604037	0.121164	0.014681	15.100929	0.352335	0.414973	0.845098	20.059
COND	25	1.448640	0.081257	0.006603	36.215999	0.158466	1.341116	1.638598	5.609
RATIO	25	2.264712	0.122830	0.015087	56.617794	0.362090	2.027027	2.500000	5.424

LOT=07-25

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	65.800000	6.855655	47.000000	1645.000000	1128.000000	53.000000	80.000000	10.419
DEPTH	25	15.840000	1.972308	3.890000	396.000000	93.360000	12.000000	19.000000	12.451
WEIGHT	25	4.332000	1.312669	1.723100	108.300000	41.354400	2.100000	7.100000	30.302
LOGWT	25	0.617100	0.134765	0.018162	15.427508	0.435876	0.322219	0.851258	21.838
COND	25	1.477643	0.063092	0.003981	36.941080	0.095534	1.383821	1.674149	4.270
RATIO	25	2.404930	0.125807	0.015828	60.123261	0.379861	2.142857	2.638889	5.231

LOT=07-26

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	64.160000	5.482396	30.056667	1604.000000	721.360000	55.000000	76.000000	8.545
DEPTH	25	14.800000	1.779513	3.166667	370.000000	76.000000	11.000000	19.000000	12.024
WEIGHT	25	3.892000	1.003710	1.007433	97.300000	24.178400	2.300000	6.100000	25.789
LOGWT	25	0.576378	0.112195	0.012588	14.409459	0.302108	0.361728	0.785330	19.466
COND	25	1.444012	0.066376	0.004406	36.100290	0.105737	1.359744	1.574074	4.597
RATIO	25	2.301994	0.130816	0.017113	57.549838	0.410706	2.000000	2.567568	5.683

INITIAL MEASUREMENTS

LOT=07-27

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	65.320000	4.616276	21.310000	1633.000000	511.440000	56.000000	75.000000	7.067
DEPTH	25	15.160000	1.491085	2.223333	379.000000	53.360000	12.000000	18.000000	9.836
WEIGHT	25	3.992000	0.904120	0.817433	99.800000	19.618400	2.400000	5.700000	22.648
LOGWT	25	0.590214	0.100628	0.010126	14.755339	0.243024	0.380211	0.755875	17.049
COND	25	1.408763	0.076521	0.005855	35.219064	0.140532	1.266974	1.558366	5.432
RATIO	25	2.319770	0.144633	0.020919	57.994245	0.502049	2.068966	2.647059	6.235

LOT=08-29

LENGTH	25	68.480000	6.640281	44.093333	1712.000000	1058.240000	56.000000	88.000000	9.697
DEPTH	25	15.880000	1.855622	3.443333	397.000000	82.640000	13.000000	22.000000	11.685
WEIGHT	25	4.612000	1.558397	2.428600	115.300000	58.286400	2.500000	10.300000	33.790
LOGWT	25	0.644903	0.125834	0.015834	16.122585	0.380019	0.397940	1.012837	19.512
COND	25	1.395045	0.081404	0.006627	34.876114	0.159038	1.253644	1.529358	5.835
RATIO	25	2.318306	0.132771	0.017628	57.957642	0.423074	2.133333	2.656250	5.727

LOT=08-30

LENGTH	25	68.520000	7.533923	56.760000	1713.000000	1362.240000	59.000000	87.000000	10.995
DEPTH	25	16.240000	2.067204	4.273333	406.000000	102.560000	13.000000	22.000000	12.729
WEIGHT	25	4.628000	1.447561	2.095433	115.700000	50.290400	3.000000	8.500000	31.278
LOGWT	25	0.647929	0.121514	0.014766	16.198220	0.354374	0.477121	0.929419	18.754
COND	25	1.408287	0.104235	0.010865	35.207178	0.260759	1.245249	1.679684	7.402
RATIO	25	2.372151	0.189583	0.035942	59.303780	0.862603	2.000000	3.015873	7.992

LOT=08-31

LENGTH	25	66.880000	9.386693	88.110000	1672.000000	2114.640000	40.000000	79.000000	14.035
DEPTH	25	15.880000	2.697530	7.276667	397.000000	174.640000	8.000000	20.000000	16.987
WEIGHT	25	4.364000	1.621183	2.628233	109.100000	63.077600	0.800000	6.900000	37.149
LOGWT	25	0.600526	0.209996	0.044098	15.013155	1.058362	-0.096910	0.838849	34.959
COND	25	1.380325	0.114565	0.013125	34.508119	0.315003	1.168571	1.704372	8.300
RATIO	25	2.365377	0.143683	0.020645	59.134425	0.495472	2.000000	2.631579	6.074

LOT=09-33

LENGTH	7	70.857143	10.172325	103.476190	496.000000	620.857143	52.000000	85.000000	14.356
DEPTH	7	17.285714	2.690371	7.238095	121.000000	43.428571	12.000000	20.000000	15.564
WEIGHT	7	5.614286	1.932553	3.734762	39.300000	22.408571	2.200000	8.100000	34.422
LOGWT	7	0.719888	0.187282	0.035075	5.039215	0.210447	0.342423	0.908485	26.015
COND	7	1.521861	0.117769	0.013870	10.653029	0.083217	1.318950	1.687886	7.738
RATIO	7	2.439053	0.175717	0.030876	17.073371	0.185258	2.235294	2.777778	7.204

LOT=09-34

LENGTH	25	71.280000	4.979290	24.793333	1782.000000	595.040000	56.000000	78.000000	6.986
DEPTH	25	17.680000	1.375984	1.893333	442.000000	45.440000	14.000000	20.000000	7.783
WEIGHT	25	5.004000	1.006015	1.012067	125.100000	24.289600	2.200000	6.900000	20.104
LOGWT	25	0.689196	0.101286	0.010259	17.229900	0.246214	0.342423	0.838849	14.696
COND	25	1.364776	0.117912	0.013903	34.119401	0.333680	1.232593	1.702762	8.640
RATIO	25	2.482751	0.137630	0.018942	62.068782	0.454606	2.285714	2.794118	5.543

INITIAL MEASUREMENTS

LOT=10-37

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	66.160000	5.153316	26.556667	1654.000000	637.360000	56.000000	75.000000	7.789
DEPTH	25	15.560000	1.416569	2.006667	389.000000	48.160000	13.000000	19.000000	9.104
WEIGHT	25	4.064000	0.897162	0.804900	101.600000	19.317600	2.600000	6.000000	22.076
LOGWT	25	0.598546	0.097886	0.009582	14.963647	0.229959	0.414973	0.778151	16.354
COND	25	1.385470	0.096976	0.009404	34.636753	0.225706	1.229356	1.599699	7.000
RATIO	25	2.355475	0.172100	0.029618	58.886887	0.710841	2.000000	2.698413	7.306

LOT=10-38

LENGTH	25	66.040000	8.233468	67.790000	1651.000000	1626.960000	58.000000	87.000000	12.467
DEPTH	25	15.280000	2.072036	4.293333	382.000000	103.040000	13.000000	20.000000	13.560
WEIGHT	25	4.164000	1.830728	3.351567	104.100000	80.437600	2.300000	8.800000	43.956
LOGWT	25	0.588818	0.156698	0.024554	14.720438	0.589301	0.361728	0.944483	26.612
COND	25	1.378689	0.111052	0.012333	34.467221	0.295981	1.178810	1.636400	8.055
RATIO	25	2.312236	0.092812	0.008614	57.805910	0.206736	2.166667	2.500000	4.014

LOT=10-39

LENGTH	25	65.480000	6.345077	40.260000	1637.000000	966.240000	53.000000	84.000000	9.690
DEPTH	25	14.640000	1.496663	2.240000	366.000000	53.760000	12.000000	17.000000	10.223
WEIGHT	25	3.632000	1.011896	1.023933	90.800000	24.574400	2.200000	6.700000	27.861
LOGWT	25	0.545040	0.115890	0.013431	13.626003	0.322333	0.342423	0.826075	21.263
COND	25	1.268829	0.087564	0.007668	31.720726	0.184020	1.079797	1.477730	6.901
RATIO	25	2.239012	0.151281	0.022886	55.975311	0.549264	2.023810	2.641509	6.757

LOT=11-41

LENGTH	25	64.720000	9.365362	87.710000	1618.000000	2105.040000	51.000000	83.000000	14.471
DEPTH	25	14.640000	2.233831	4.990000	366.000000	119.760000	11.000000	19.000000	15.258
WEIGHT	25	3.964000	1.861648	3.465733	99.100000	83.177600	1.700000	7.800000	46.964
LOGWT	25	0.554674	0.196610	0.038655	13.866861	0.927731	0.230449	0.892095	35.446
COND	25	1.364979	0.082567	0.006817	34.124482	0.163614	1.209035	1.526562	6.049
RATIO	25	2.261917	0.102874	0.010583	56.547922	0.253994	2.068966	2.435897	4.548

LOT=11-42

LENGTH	25	65.440000	6.646302	44.173333	1636.000000	1060.160000	53.000000	80.000000	10.156
DEPTH	25	15.040000	1.767295	3.123333	376.000000	74.960000	12.000000	19.000000	11.751
WEIGHT	25	3.868000	1.244896	1.549767	96.700000	37.194400	2.000000	6.900000	32.184
LOGWT	25	0.566595	0.137470	0.018898	14.164873	0.453549	0.301030	0.838849	24.262
COND	25	1.337322	0.077086	0.005942	33.433058	0.142614	1.163707	1.493333	5.764
RATIO	25	2.296858	0.100773	0.010155	57.421444	0.243724	2.089552	2.459016	4.387

LOT=11-43

LENGTH	25	65.680000	7.180529	51.560000	1642.000000	1237.440000	55.000000	85.000000	10.933
DEPTH	25	16.160000	2.095233	4.390000	404.000000	105.360000	13.000000	21.000000	12.966
WEIGHT	25	4.192000	1.346266	1.812433	104.800000	43.498400	2.200000	8.000000	32.115
LOGWT	25	0.601885	0.136375	0.018598	15.047113	0.446357	0.342423	0.903090	22.658
COND	25	1.444598	0.189276	0.035826	36.114942	0.859813	1.252733	2.203862	13.102
RATIO	25	2.457690	0.131368	0.017257	61.442255	0.414179	2.153846	2.698413	5.345

INITIAL MEASUREMENTS

LOT=12-45

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	64.040000	5.086584	25.873333	1601.000000	620.960000	56.000000	75.000000	7.943
DEPTH	25	15.160000	1.312758	1.723333	379.000000	41.360000	13.000000	18.000000	8.659
WEIGHT	25	4.032000	0.995707	0.991433	100.800000	23.794400	2.500000	6.100000	24.695
LOGWT	25	0.592678	0.108438	0.011759	14.816960	0.282211	0.397940	0.785330	18.296
COND	25	1.508312	0.116212	0.013505	37.707807	0.324124	1.279759	1.727927	7.705
RATIO	25	2.368441	0.111933	0.012529	59.211013	0.300698	2.031250	2.580645	4.726

LOT=14-53

LENGTH	25	71.480000	4.574567	20.926667	1787.000000	502.240000	62.000000	81.000000	6.400
DEPTH	25	16.320000	1.796292	3.226667	408.000000	77.440000	12.000000	20.000000	11.007
WEIGHT	25	4.964000	1.143051	1.306567	124.100000	31.357600	3.100000	7.400000	23.027
LOGWT	25	0.684723	0.100757	0.010152	17.118072	0.243648	0.491362	0.869232	14.715
COND	25	1.338164	0.129975	0.016894	33.454105	0.405447	1.147842	1.795053	9.713
RATIO	25	2.278909	0.154278	0.023802	56.972720	0.571242	1.935484	2.571429	6.770

LOT=14-54

LENGTH	25	66.800000	4.500000	20.250000	1670.000000	486.000000	59.000000	75.000000	6.737
DEPTH	25	15.240000	1.267544	1.606667	381.000000	38.560000	13.000000	18.000000	8.317
WEIGHT	25	4.136000	0.837596	0.701567	103.400000	16.837600	2.800000	5.900000	20.251
LOGWT	25	0.607801	0.089917	0.008085	15.195029	0.194042	0.447158	0.770852	14.794
COND	25	1.371707	0.092052	0.008474	34.292679	0.203365	1.208528	1.582909	6.711
RATIO	25	2.281475	0.112795	0.012723	57.036880	0.305347	2.121212	2.537313	4.944

LOT=15-57

LENGTH	25	65.120000	5.525094	30.526667	1628.000000	732.640000	53.000000	73.000000	8.484
DEPTH	25	15.600000	1.683251	2.833333	390.000000	68.000000	12.000000	19.000000	10.790
WEIGHT	25	4.000000	1.039631	1.080833	100.000000	25.940000	2.200000	5.600000	25.991
LOGWT	25	0.586793	0.120292	0.014470	14.669820	0.347282	0.342423	0.748188	20.500
COND	25	1.417007	0.104022	0.010821	35.425178	0.259693	1.258769	1.602185	7.341
RATIO	25	2.394257	0.139145	0.019361	59.856430	0.464675	2.187500	2.714286	5.812

LOT=15-59

LENGTH	25	61.520000	5.323846	28.343333	1538.000000	680.240000	52.000000	71.000000	8.654
DEPTH	25	14.480000	1.262273	1.593333	362.000000	38.240000	13.000000	17.000000	8.717
WEIGHT	25	3.452000	0.883704	0.780933	86.300000	18.742400	2.200000	5.600000	25.600
LOGWT	25	0.524563	0.110691	0.012252	13.114081	0.294058	0.342423	0.748188	21.101
COND	25	1.457317	0.113226	0.012820	36.432936	0.307685	1.230063	1.682945	7.770
RATIO	25	2.355900	0.098028	0.009610	58.897512	0.230628	2.153846	2.539683	4.161

LOT=16-62

LENGTH	25	66.440000	5.716059	32.673333	1661.000000	784.160000	58.000000	78.000000	8.603
DEPTH	0								
WEIGHT	25	4.040000	1.100000	1.210000	101.000000	29.040000	2.300000	6.100000	27.228
LOGWT	25	0.590754	0.119559	0.014294	14.768861	0.343067	0.361728	0.785330	20.238
COND	25	1.345405	0.084596	0.007157	33.635128	0.171757	1.178810	1.529358	6.288
RATIO	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

INITIAL MEASUREMENTS

LOT=16-63

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	61.120000	6.002222	36.026667	1528.000000	864.640000	45.000000	72.000000	9.820
DEPTH	25	13.920000	1.579029	2.493333	348.000000	59.840000	10.000000	18.000000	11.344
WEIGHT	25	3.240000	0.913327	0.834167	81.000000	20.020000	1.200000	5.700000	28.189
LOGWT	25	0.491002	0.141195	0.019936	12.275059	0.478462	0.079181	0.755875	28.756
COND	25	1.380431	0.096077	0.009231	34.510782	0.221540	1.178810	1.588831	6.960
RATIO	25	2.276693	0.104283	0.010875	56.917331	0.260999	2.068966	2.500000	4.580

LOT=17-65

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	62.120000	4.630695	21.443333	1553.000000	514.640000	54.000000	70.000000	7.454
DEPTH	25	14.960000	1.135782	1.290000	374.000000	30.960000	13.000000	17.000000	7.592
WEIGHT	25	3.368000	0.747618	0.558933	84.200000	13.414400	2.200000	4.800000	22.198
LOGWT	25	0.516797	0.098851	0.009772	12.919926	0.234518	0.342423	0.681241	19.128
COND	25	1.386423	0.111154	0.012355	34.660570	0.296523	1.187950	1.620370	8.017
RATIO	25	2.411230	0.129296	0.016717	60.280742	0.401216	2.205882	2.758621	5.362

LOT=17-66

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	72.480000	7.789523	60.676667	1812.000000	1456.240000	57.000000	88.000000	10.747
DEPTH	25	17.160000	2.303620	5.306667	429.000000	127.360000	14.000000	22.000000	13.424
WEIGHT	25	5.360000	1.675808	2.808333	134.000000	67.400000	2.900000	9.000000	31.265
LOGWT	25	0.707932	0.140553	0.019755	17.698288	0.474123	0.462398	0.954243	19.854
COND	25	1.365363	0.078092	0.006098	34.134084	0.146362	1.217623	1.565934	5.720
RATIO	25	2.363103	0.120116	0.014428	59.077577	0.346271	2.028986	2.535211	5.083

LOT=17-67

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	64.840000	5.367184	28.806667	1621.000000	691.360000	55.000000	78.000000	8.278
DEPTH	25	14.680000	1.796292	3.226667	367.000000	77.440000	12.000000	19.000000	12.236
WEIGHT	25	3.676000	1.065473	1.135233	91.900000	27.245600	2.300000	6.800000	28.985
LOGWT	25	0.550888	0.110064	0.012114	13.772205	0.290737	0.361728	0.832509	19.979
COND	25	1.320834	0.105543	0.011139	33.020839	0.267342	1.128812	1.527778	7.991
RATIO	25	2.262980	0.186303	0.034709	56.574494	0.833015	1.857143	2.686567	8.233

LOT=18-70

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	67.480000	5.244998	27.510000	1687.000000	660.240000	57.000000	75.000000	7.773
DEPTH	25	16.720000	1.429452	2.043333	418.000000	49.040000	14.000000	20.000000	8.549
WEIGHT	25	4.568000	0.946802	0.896433	114.200000	21.514400	2.900000	6.700000	20.727
LOGWT	25	0.650576	0.091765	0.008421	16.264390	0.202101	0.462398	0.826075	14.105
COND	25	1.479173	0.194665	0.037895	36.979330	0.909471	1.253644	2.202828	13.160
RATIO	25	2.481564	0.162109	0.026279	62.039105	0.630704	2.191781	2.950820	6.533

LOT=19-72

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	66.200000	4.582576	21.000000	1655.000000	504.000000	56.000000	72.000000	6.922
DEPTH	25	15.000000	1.554563	2.416667	375.000000	58.000000	12.000000	16.000000	10.364
WEIGHT	25	4.052000	0.746168	0.556767	101.300000	13.362400	2.300000	5.400000	18.415
LOGWT	25	0.599981	0.085553	0.007319	14.999522	0.175662	0.361728	0.732394	14.259
COND	25	1.410403	0.360404	0.129891	35.260076	3.117382	1.182556	3.017948	25.553
RATIO	25	2.263183	0.134618	0.018122	56.579579	0.434928	2.031250	2.500000	5.948

INITIAL MEASUREMENTS

LOT=19-73

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	62.560000	6.964673	48.506667	1564.000000	1164.160000	50.000000	79.000000	11.133
DEPTH	25	14.240000	1.832121	3.356667	356.000000	80.560000	10.000000	18.000000	12.866
WEIGHT	25	3.396000	1.040224	1.082067	84.900000	25.969600	1.500000	6.400000	30.631
LOGWT	25	0.509952	0.142756	0.020379	12.748801	0.489105	0.176091	0.806180	27.994
COND	25	1.351935	0.139215	0.019381	33.798369	0.465140	1.130787	1.884645	10.297
RATIO	25	2.275979	0.157190	0.024709	56.899487	0.593009	1.960784	2.586207	6.906

LOT=19-74

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	62.560000	5.432004	29.506667	1564.000000	708.160000	51.000000	71.000000	8.683
DEPTH	25	14.240000	1.331666	1.773333	356.000000	42.560000	11.000000	17.000000	9.352
WEIGHT	25	3.368000	0.816354	0.666433	84.200000	15.994400	1.800000	4.900000	24.239
LOGWT	25	0.514079	0.112524	0.012662	12.851975	0.303878	0.255273	0.690196	21.888
COND	25	1.351256	0.074928	0.005614	33.781412	0.134739	1.163707	1.457938	5.545
RATIO	25	2.277543	0.111963	0.012536	56.938586	0.300858	2.089552	2.539683	4.916

LOT=20-76

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	69.520000	5.493329	30.176667	1738.000000	724.240000	57.000000	79.000000	7.902
DEPTH	25	16.800000	1.632993	2.666667	420.000000	64.000000	14.000000	20.000000	9.720
WEIGHT	25	5.276000	1.169501	1.367733	131.900000	32.825600	3.300000	7.400000	22.166
LOGWT	25	0.711935	0.097293	0.009466	17.798372	0.227183	0.518514	0.869232	13.666
COND	25	1.552497	0.131327	0.017247	38.812430	0.413923	1.311953	1.781925	8.459
RATIO	25	2.417923	0.154442	0.023852	60.448063	0.572453	2.027027	2.647059	6.387

LOT=20-77

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	65.040000	6.079200	36.956667	1626.000000	886.960000	55.000000	79.000000	9.347
DEPTH	25	16.160000	1.841195	3.390000	404.000000	81.360000	13.000000	20.000000	11.394
WEIGHT	25	4.368000	1.158922	1.343100	109.200000	32.234400	2.600000	7.400000	26.532
LOGWT	25	0.626554	0.110232	0.012151	15.663838	0.291629	0.414973	0.869232	17.593
COND	25	1.568998	0.213430	0.045552	39.224958	1.093258	1.342687	2.404207	13.603
RATIO	25	2.488765	0.226941	0.051502	62.219134	1.236050	2.142857	3.272727	9.119

LOT=21-78

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	65.800000	5.423713	29.416667	1645.000000	706.000000	55.000000	73.000000	8.243
DEPTH	25	15.560000	1.959592	3.840000	389.000000	92.160000	12.000000	20.000000	12.594
WEIGHT	25	3.908000	1.070794	1.146600	97.700000	27.518400	2.200000	5.800000	27.400
LOGWT	25	0.574710	0.128201	0.016435	14.367744	0.394450	0.342423	0.763428	22.307
COND	25	1.335793	0.107098	0.011470	33.394813	0.275281	1.127558	1.530456	8.018
RATIO	25	2.358683	0.146565	0.021481	58.967074	0.515550	2.096774	2.739726	6.214

LOT=21-79

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	15	69.200000	8.470116	71.742857	1038.000000	1004.400000	55.000000	84.000000	12.240
DEPTH	15	16.666667	2.257263	5.095238	250.000000	71.333333	13.000000	21.000000	13.544
WEIGHT	15	5.080000	1.814308	3.291714	76.200000	46.084000	2.500000	9.400000	35.715
LOGWT	15	0.679223	0.160375	0.025720	10.188340	0.360082	0.397940	0.973128	23.612
COND	15	1.476767	0.103075	0.010624	22.151504	0.148741	1.319752	1.743050	6.980
RATIO	15	2.407786	0.118999	0.014161	36.116794	0.198251	2.222222	2.571429	4.942

INITIAL MEASUREMENTS

LOT=21-80

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	63.600000	6.892024	47.500000	1590.000000	1140.000000	52.000000	77.000000	10.837
DEPTH	25	15.440000	2.161789	4.673333	386.000000	112.160000	12.000000	21.000000	14.001
WEIGHT	25	3.844000	1.336687	1.786733	96.100000	42.881600	2.000000	6.900000	34.773
LOGWT	25	0.561235	0.144208	0.020796	14.030886	0.499102	0.301030	0.838849	25.695
COND	25	1.446684	0.164109	0.026932	36.167111	0.646361	1.199774	2.098083	11.344
RATIO	25	2.424409	0.160377	0.025721	60.610218	0.617301	2.187500	2.758621	6.615

LOT=21-81

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	64.120000	6.697761	44.860000	1603.000000	1076.640000	50.000000	81.000000	10.446
DEPTH	25	14.880000	1.691153	2.860000	372.000000	68.640000	11.000000	19.000000	11.365
WEIGHT	25	3.676000	1.241733	1.541900	91.900000	37.005600	1.500000	7.100000	33.779
LOGWT	25	0.542285	0.145842	0.021270	13.557123	0.510479	0.176091	0.851258	26.894
COND	25	1.346054	0.091763	0.008420	33.651339	0.202091	1.200000	1.522028	6.817
RATIO	25	2.320287	0.104941	0.011013	58.007177	0.264304	2.153846	2.580645	4.523

LOT=22-82

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	13	72.230769	6.771925	45.858974	939.000000	550.307692	59.000000	81.000000	9.375
DEPTH	13	17.000000	1.870829	3.500000	221.000000	42.000000	14.000000	19.000000	11.005
WEIGHT	13	5.584615	1.432856	2.053077	72.600000	24.636923	2.900000	7.300000	25.657
LOGWT	13	0.731783	0.124317	0.015455	9.513184	0.185457	0.462398	0.863323	16.988
COND	13	1.451696	0.092608	0.008576	18.872051	0.102915	1.335990	1.659259	6.379
RATIO	13	2.352653	0.124805	0.015576	30.584484	0.186915	2.187500	2.571429	5.305

LOT=22-83

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	64.000000	5.686241	32.333333	1600.000000	776.000000	51.000000	75.000000	8.885
DEPTH	25	15.480000	1.782321	3.176667	387.000000	76.240000	11.000000	18.000000	11.514
WEIGHT	25	4.116000	1.032666	1.066400	102.900000	25.593600	2.100000	6.100000	25.089
LOGWT	25	0.600171	0.116792	0.013640	15.004272	0.327368	0.322219	0.785330	19.460
COND	25	1.539747	0.091931	0.008451	38.493686	0.202832	1.341116	1.716614	5.971
RATIO	25	2.415902	0.142056	0.020180	60.397541	0.484321	2.112676	2.656250	5.880

LOT=22-84

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	54.840000	7.203471	51.890000	1371.000000	1245.360000	35.000000	64.000000	13.135
DEPTH	25	14.760000	2.067204	4.273333	369.000000	102.560000	8.000000	18.000000	14.005
WEIGHT	25	3.184000	0.931701	0.868067	79.600000	20.833600	0.700000	4.500000	29.262
LOGWT	25	0.475201	0.181022	0.032769	11.880037	0.786455	-0.154902	0.653213	38.094
COND	25	1.896582	0.395669	0.156554	47.414546	3.757295	1.384646	2.864660	20.862
RATIO	25	2.703567	0.332224	0.110373	67.589174	2.648943	2.258065	3.529412	12.288

LOT=23-85

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	61.600000	4.203173	17.666667	1540.000000	424.000000	51.000000	68.000000	6.823
DEPTH	25	14.560000	1.044031	1.090000	364.000000	26.160000	12.000000	16.000000	7.171
WEIGHT	25	3.540000	0.629153	0.395833	88.500000	9.500000	2.000000	4.600000	17.773
LOGWT	25	0.541515	0.085336	0.007282	13.537883	0.174775	0.301030	0.662758	15.759
COND	25	1.503659	0.120647	0.014556	37.591482	0.349338	1.296296	1.712963	8.024
RATIO	25	2.366067	0.120079	0.014419	59.151668	0.346058	2.096774	2.580645	5.075

INITIAL MEASUREMENTS

LOT=23-86

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	63.280000	3.931921	15.460000	1582.000000	371.040000	53.000000	72.000000	6.214
DEPTH	25	14.680000	0.988264	0.976667	367.000000	23.440000	12.000000	17.000000	6.732
WEIGHT	25	3.712000	0.610546	0.372767	92.800000	8.946400	2.400000	4.800000	16.448
LOGWT	25	0.563701	0.074149	0.005498	14.092525	0.131955	0.380211	0.681241	13.154
COND	25	1.457434	0.111093	0.012342	36.435852	0.296198	1.205633	1.630092	7.622
RATIO	25	2.321963	0.117743	0.013863	58.049086	0.332720	2.083333	2.539683	5.071

LOT=23-87

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	60.080000	4.358134	18.993333	1502.000000	455.840000	47.000000	68.000000	7.254
DEPTH	25	14.440000	1.850225	3.423333	361.000000	82.160000	10.000000	18.000000	12.813
WEIGHT	25	3.440000	0.763217	0.582500	86.000000	13.980000	1.500000	5.100000	22.187
LOGWT	25	0.524947	0.107049	0.011460	13.123683	0.275029	0.176091	0.707570	20.392
COND	25	1.562889	0.142807	0.020394	39.072222	0.489450	1.359744	1.888154	9.137
RATIO	25	2.398420	0.202252	0.040906	59.960497	0.981741	2.068966	2.903226	8.433

LOT=24-88

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	63.240000	6.443860	41.523333	1581.000000	996.560000	53.000000	76.000000	10.190
DEPTH	25	15.040000	2.051016	4.206667	376.000000	100.960000	12.000000	19.000000	13.637
WEIGHT	25	3.568000	1.214400	1.474767	89.200000	35.394400	1.900000	6.800000	34.036
LOGWT	25	0.529490	0.143144	0.020490	13.237260	0.491766	0.278754	0.832509	27.034
COND	25	1.362002	0.105759	0.011185	34.050060	0.268440	1.230063	1.602185	7.765
RATIO	25	2.374186	0.156051	0.024352	59.354652	0.584448	2.166667	2.758621	6.573

LOT=24-89

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	64.000000	5.024938	25.250000	1600.000000	606.000000	53.000000	73.000000	7.851
DEPTH	25	15.680000	1.492202	2.226667	392.000000	53.440000	13.000000	19.000000	9.517
WEIGHT	25	3.924000	0.896419	0.803567	98.100000	19.285600	2.200000	5.500000	22.845
LOGWT	25	0.581531	0.108573	0.011788	14.538274	0.282915	0.342423	0.740363	18.670
COND	25	1.477081	0.163401	0.026700	36.927028	0.640799	1.126301	2.026601	11.062
RATIO	25	2.453325	0.181689	0.033011	61.333127	0.792266	2.173913	2.786885	7.406

LOT=24-90

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	61.320000	4.819405	23.226667	1533.000000	557.440000	52.000000	67.000000	7.859
DEPTH	25	14.080000	1.681269	2.826667	352.000000	67.840000	11.000000	17.000000	11.941
WEIGHT	25	3.400000	0.888819	0.790000	85.000000	18.960000	1.700000	4.800000	26.142
LOGWT	25	0.515558	0.123811	0.015329	12.888938	0.367902	0.230449	0.681241	24.015
COND	25	1.438645	0.108672	0.011810	35.966113	0.283430	1.209035	1.640320	7.554
RATIO	25	2.290499	0.130102	0.016926	57.262464	0.406234	2.063492	2.537313	5.680

LOT=24-91

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	61.400000	5.552777	30.833333	1535.000000	740.000000	44.000000	69.000000	9.044
DEPTH	25	14.200000	1.732051	3.000000	355.000000	72.000000	10.000000	17.000000	12.198
WEIGHT	25	3.380000	0.884119	0.781667	84.500000	18.760000	1.300000	4.700000	26.157
LOGWT	25	0.511524	0.133232	0.017751	12.788104	0.426020	0.113943	0.672098	26.046
COND	25	1.428413	0.142854	0.020407	35.710329	0.489777	1.057357	1.759669	10.001
RATIO	25	2.308766	0.136282	0.018573	57.719156	0.445746	2.031250	2.537313	5.903

APPENDIX TABLE 2

Summary of the final individual tank measurements arranged by full sib groups. The number preceding the dash refers to the paternal parent and that following refers to the maternal parent. (See Fig. 1, pg. 12.)

LENGTH	=	fork length (mm)
DEPTH	=	body depth (mm)
WEIGHT	=	round weight (gm)
LOGWT	=	$\log_{10}$ weight(gm)
COND	=	coefficient of condition
	=	$(\text{weight(gm)} \times 10^4)/(\text{fork length(mm)})^3$
RATIO	=	body depth(mm)/(fork length(mm)/10)
C.V. %	=	percent coefficient of variation

INDIVIDUAL TANKS
LOT=01-01

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	140.000000	15.516121	240.750000	3500.000000	5778.000000	114.000000	162.000000	11.083
DEPTH	25	33.840000	3.847943	14.806667	846.000000	355.360000	27.000000	39.000000	11.371
WEIGHT	25	37.400000	11.884864	141.250000	935.000000	3390.000000	19.000000	54.000000	31.778
LOGWT	25	1.550039	0.146965	0.021599	38.750965	0.518372	1.278754	1.732394	9.481
COND	25	1.327568	0.177066	0.031352	33.189206	0.752454	0.908047	1.955032	13.338
RATIO	25	2.418202	0.095742	0.009167	60.455055	0.219996	2.183099	2.656250	3.959

LOT=01-03

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	141.640000	14.465130	209.240000	3541.000000	5021.760000	117.000000	163.000000	10.213
DEPTH	25	35.880000	3.711693	13.776667	897.000000	330.640000	31.000000	43.000000	10.345
WEIGHT	25	40.120000	12.231517	149.610000	1003.000000	3590.640000	22.000000	66.000000	30.487
LOGWT	25	1.584258	0.131442	0.017277	39.606457	0.414649	1.342423	1.819544	8.297
COND	25	1.375170	0.096226	0.009259	34.379250	0.222226	1.156762	1.552383	6.997
RATIO	25	2.536357	0.124960	0.015615	63.408914	0.374758	2.260274	2.714286	4.927

LOT=01-04

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	143.680000	11.260995	126.810000	3592.000000	3043.440000	122.000000	168.000000	7.838
DEPTH	25	34.560000	2.724579	7.423333	864.000000	178.160000	29.000000	41.000000	7.884
WEIGHT	25	38.440000	8.651012	74.840000	961.000000	1796.160000	23.000000	61.000000	22.505
LOGWT	25	1.574139	0.098897	0.009781	39.353487	0.234735	1.361728	1.785330	6.283
COND	25	1.276884	0.050194	0.002519	31.922103	0.060467	1.164796	1.378948	3.931
RATIO	25	2.406303	0.069659	0.004852	60.157575	0.116458	2.260274	2.518519	2.895

LOT=02-05

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	155.520000	23.070761	532.260000	3888.000000	12774.240000	82.000000	177.000000	14.835
DEPTH	25	36.440000	5.416641	29.340000	911.000000	704.160000	19.000000	42.000000	14.865
WEIGHT	25	47.160000	14.476072	209.556667	1179.000000	5029.360000	7.000000	66.000000	30.696
LOGWT	25	1.633606	0.233405	0.054478	40.840159	1.307468	0.845098	1.819544	14.288
COND	25	1.196474	0.097563	0.009519	29.911862	0.228445	1.045531	1.469238	8.154
RATIO	25	2.344477	0.097301	0.009467	58.611927	0.227219	2.195122	2.597403	4.150

LOT=02-06

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	138.760000	11.952266	142.856667	3469.000000	3428.560000	112.000000	160.000000	8.614
DEPTH	25	32.240000	3.431229	11.773333	806.000000	282.560000	24.000000	38.000000	10.643
WEIGHT	25	33.080000	9.192026	84.493333	827.000000	2027.840000	12.000000	52.000000	27.787
LOGWT	25	1.500995	0.136396	0.018604	37.524867	0.446494	1.079181	1.716003	9.087
COND	25	1.203493	0.096671	0.009345	30.087322	0.224286	0.854136	1.365498	8.033
RATIO	25	2.320095	0.083884	0.007037	58.002372	0.168878	2.142857	2.500000	3.616

LOT=02-07

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	154.120000	14.359434	206.193333	3853.000000	4948.640000	124.000000	177.000000	9.317
DEPTH	25	35.320000	3.210919	10.310000	883.000000	247.440000	28.000000	42.000000	9.091
WEIGHT	25	43.560000	10.186102	103.756667	1089.000000	2490.160000	23.000000	62.000000	23.384
LOGWT	25	1.626867	0.107466	0.011549	40.671672	0.277176	1.361728	1.792392	6.606
COND	25	1.177475	0.113416	0.012863	29.436868	0.308716	0.839650	1.434803	9.632
RATIO	25	2.296181	0.133380	0.017790	57.404524	0.426963	2.000000	2.635659	5.809

INDIVIDUAL TANKS

LOT=02-08

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	142.120000	14.961952	223.860000	3553.000000	5372.640000	113.000000	162.000000	10.528
DEPTH	25	33.440000	3.096773	9.590000	836.000000	230.160000	27.000000	37.000000	9.261
WEIGHT	25	36.960000	10.035271	100.706667	924.000000	2416.960000	20.000000	52.000000	27.152
LOGWT	25	1.550463	0.128932	0.016623	38.761586	0.398964	1.301030	1.716003	8.316
COND	25	1.261258	0.096489	0.009310	31.531439	0.223442	1.128506	1.537251	7.650
RATIO	25	2.357726	0.102923	0.010593	58.943148	0.254237	2.222222	2.635659	4.365

LOT=03-09

LENGTH	25	146.760000	9.256889	85.690000	3669.000000	2056.560000	125.000000	165.000000	6.308
DEPTH	25	33.160000	1.993322	3.973333	829.000000	95.360000	27.000000	37.000000	6.011
WEIGHT	25	37.520000	6.602525	43.593333	938.000000	1046.240000	21.000000	49.000000	17.597
LOGWT	25	1.567034	0.083565	0.006983	39.175862	0.167596	1.322219	1.690196	5.333
COND	25	1.176192	0.068348	0.004671	29.404806	0.112116	1.046275	1.285291	5.811
RATIO	25	2.262606	0.117844	0.013887	56.565139	0.333295	2.105263	2.677165	5.208

LOT=03-10

LENGTH	25	138.680000	16.794642	282.060000	3467.000000	6769.440000	107.000000	165.000000	12.110
DEPTH	25	32.480000	4.253626	18.093333	812.000000	434.240000	25.000000	39.000000	13.096
WEIGHT	25	34.000000	12.206556	149.000000	850.000000	3576.000000	17.000000	56.000000	35.902
LOGWT	25	1.504785	0.155377	0.024142	37.619625	0.579406	1.230449	1.748188	10.326
COND	25	1.227066	0.081383	0.006623	30.676650	0.158955	1.086972	1.420820	6.632
RATIO	25	2.341034	0.089971	0.008095	58.525840	0.194274	2.164179	2.617450	3.843

LOT=03-11

LENGTH	26	156.769231	13.327589	177.624615	4076.000000	4440.615385	104.000000	170.000000	8.501
DEPTH	26	36.846154	2.921538	8.535385	958.000000	213.384615	29.000000	41.000000	7.929
WEIGHT	26	49.038462	9.378617	87.958462	1275.000000	2198.961538	19.000000	62.000000	19.125
LOGWT	26	1.680434	0.103738	0.010762	43.691295	0.269041	1.278754	1.792392	6.173
COND	26	1.263017	0.108637	0.011802	32.838449	0.295051	1.113059	1.689093	8.601
RATIO	26	2.355850	0.127935	0.016367	61.252098	0.409182	2.179487	2.788462	5.431

LOT=04-13

LENGTH	25	159.160000	15.635643	244.473333	3979.000000	5867.360000	104.000000	177.000000	9.824
DEPTH	25	36.680000	3.837534	14.726667	917.000000	353.440000	24.000000	41.000000	10.462
WEIGHT	25	50.640000	13.012430	169.323333	1266.000000	4063.760000	14.000000	72.000000	25.696
LOGWT	25	1.685183	0.146726	0.021529	42.129586	0.516687	1.146128	1.857332	8.707
COND	25	1.224414	0.100017	0.010003	30.610361	0.240080	1.118901	1.615436	8.169
RATIO	25	2.304885	0.094126	0.008860	57.622118	0.212632	2.117647	2.597403	4.084

LOT=04-14

LENGTH	25	150.440000	12.131502	147.173333	3761.000000	3532.160000	120.000000	165.000000	8.064
DEPTH	25	34.040000	2.879236	8.290000	851.000000	198.960000	27.000000	39.000000	8.458
WEIGHT	25	37.400000	8.798674	77.416667	935.000000	1858.000000	20.000000	50.000000	23.526
LOGWT	25	1.559989	0.111465	0.012425	38.999716	0.298189	1.301030	1.698970	7.145
COND	25	1.078025	0.050601	0.002560	26.950632	0.061450	1.011141	1.176048	4.694
RATIO	25	2.263050	0.072030	0.005188	56.576255	0.124520	2.125984	2.391304	3.183

INDIVIDUAL TANKS

LOT=05-18

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	144.040000	10.979071	120.540000	3601.000000	2892.960000	125.000000	165.000000	7.622
DEPTH	25	33.800000	2.432420	5.916667	845.000000	142.000000	29.000000	40.000000	7.197
WEIGHT	25	37.240000	7.595393	57.690000	931.000000	1384.560000	24.000000	52.000000	20.396
LOGWT	25	1.562051	0.090983	0.008278	39.051285	0.198669	1.380211	1.716003	5.825
COND	25	1.235437	0.108588	0.011791	30.885932	0.282991	1.043493	1.484800	8.789
RATIO	25	2.351395	0.142877	0.020414	58.784880	0.489933	2.162162	2.720000	6.076

LOT=06-21

LENGTH	25	145.000000	17.771700	315.833333	3625.000000	7580.000000	114.000000	185.000000	12.256
DEPTH	25	34.400000	4.320494	18.666667	860.000000	448.000000	25.000000	41.000000	12.560
WEIGHT	25	36.760000	13.029710	169.773333	919.000000	4074.560000	13.000000	67.000000	35.445
LOGWT	25	1.536602	0.167789	0.028153	38.415051	0.675675	1.113943	1.826075	10.919
COND	25	1.158487	0.105008	0.011027	28.962173	0.264642	0.832855	1.415751	9.064
RATIO	25	2.374439	0.132864	0.017653	59.360964	0.423671	2.155172	2.755906	5.596

LOT=06-22

LENGTH	25	141.800000	16.633300	276.666667	3545.000000	6640.000000	99.000000	164.000000	11.730
DEPTH	25	34.160000	4.160128	17.306667	854.000000	415.360000	22.000000	40.000000	12.178
WEIGHT	25	36.640000	11.231948	126.156667	916.000000	3027.760000	12.000000	57.000000	30.655
LOGWT	25	1.539478	0.159152	0.025329	38.486949	0.607903	1.079181	1.755875	10.338
COND	25	1.244344	0.091293	0.008334	31.108592	0.200026	1.117061	1.489415	7.337
RATIO	25	2.409081	0.101078	0.010217	60.227033	0.245201	2.222222	2.661871	4.196

LOT=06-23

LENGTH	25	136.400000	11.030261	121.666667	3410.000000	2920.000000	111.000000	152.000000	8.087
DEPTH	25	33.720000	3.062134	9.376667	843.000000	225.040000	29.000000	39.000000	9.081
WEIGHT	25	35.120000	7.672027	58.860000	878.000000	1412.640000	22.000000	50.000000	21.845
LOGWT	25	1.534906	0.100053	0.010011	38.372661	0.240253	1.342423	1.698970	6.518
COND	25	1.367283	0.103932	0.010802	34.182077	0.259245	1.257296	1.649690	7.601
RATIO	25	2.472179	0.100367	0.010074	61.804475	0.241766	2.325581	2.714286	4.060

LOT=07-25

LENGTH	25	141.480000	20.363611	414.676667	3537.000000	9952.240000	82.000000	176.000000	14.393
DEPTH	25	32.320000	4.955805	24.560000	808.000000	589.440000	21.000000	41.000000	15.334
WEIGHT	25	35.000000	13.235054	175.166667	875.000000	4204.000000	8.000000	66.000000	37.814
LOGWT	25	1.508265	0.193598	0.037480	37.706617	0.899527	0.903090	1.819544	12.836
COND	25	1.181163	0.100346	0.010069	29.529086	0.241663	1.034524	1.450937	8.496
RATIO	25	2.287378	0.160971	0.025912	57.184445	0.621879	1.721311	2.560976	7.037

LOT=07-26

LENGTH	25	134.720000	19.378940	375.543333	3368.000000	9013.040000	83.000000	169.000000	14.385
DEPTH	25	30.840000	4.810405	23.140000	771.000000	555.360000	19.000000	40.000000	15.598
WEIGHT	25	31.360000	12.442802	154.823333	784.000000	3715.760000	8.000000	60.000000	39.677
LOGWT	25	1.458067	0.197955	0.039186	36.451687	0.940470	0.903090	1.778151	13.577
COND	25	1.218856	0.121149	0.014677	30.471405	0.352251	0.960987	1.450937	9.940
RATIO	25	2.287079	0.101282	0.010258	57.176963	0.246192	2.053571	2.520325	4.428

INDIVIDUAL TANKS

LOT=07-27

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	138.160000	24.330502	591.973333	3454.000000	14207.360000	74.000000	169.000000	17.610
DEPTH	25	32.400000	5.730038	32.833333	810.000000	788.000000	17.000000	40.000000	17.685
WEIGHT	25	35.360000	14.008569	196.240000	884.000000	4709.760000	5.000000	62.000000	39.617
LOGWT	25	1.495684	0.254034	0.064533	37.392101	1.548795	0.698970	1.792392	16.984
COND	25	1.307512	0.559360	0.312884	32.687812	7.509210	1.074219	3.969161	42.780
RATIO	25	2.345626	0.065738	0.004322	58.640656	0.103717	2.240000	2.446043	2.803

LOT=08-29

LENGTH	21	148.476190	11.160730	124.561905	3118.000000	2491.238095	116.000000	164.000000	7.517
DEPTH	21	35.761905	2.718543	7.390476	751.000000	147.809524	27.000000	39.000000	7.602
WEIGHT	21	40.761905	8.318081	69.190476	856.000000	1383.809524	18.000000	55.000000	20.407
LOGWT	21	1.599709	0.104263	0.010871	33.593885	0.217417	1.255273	1.740363	6.518
COND	21	1.227463	0.062419	0.003896	25.777133	0.077922	1.095211	1.344869	5.085
RATIO	21	2.410069	0.097232	0.009454	50.611447	0.189080	2.244898	2.661871	4.034

LOT=08-30

LENGTH	25	154.520000	10.021311	100.426667	3863.000000	2410.240000	136.000000	177.000000	6.485
DEPTH	25	33.720000	1.968925	3.876667	843.000000	93.040000	31.000000	38.000000	5.839
WEIGHT	25	41.200000	7.320064	53.583333	1030.000000	1286.000000	30.000000	56.000000	17.767
LOGWT	25	1.608335	0.077138	0.005950	40.208364	0.142808	1.477121	1.748188	4.796
COND	25	1.108068	0.057031	0.003252	27.701695	0.078060	0.977223	1.208419	5.147
RATIO	25	2.184305	0.073326	0.005377	54.607624	0.129042	2.073171	2.297297	3.357

LOT=08-31

LENGTH	25	142.520000	13.127960	172.343333	3563.000000	4136.240000	117.000000	159.000000	9.211
DEPTH	25	33.160000	3.325157	11.056667	829.000000	265.360000	26.000000	37.000000	10.028
WEIGHT	25	36.280000	9.007034	81.126667	907.000000	1947.040000	18.000000	47.000000	24.826
LOGWT	25	1.544565	0.121991	0.014882	38.614127	0.357162	1.255273	1.672098	7.898
COND	25	1.227850	0.069819	0.004875	30.696251	0.116993	1.111142	1.399737	5.686
RATIO	25	2.326394	0.090224	0.008140	58.159849	0.195369	2.170543	2.554745	3.878

LOT=09-33

LENGTH	25	145.640000	10.831590	117.323333	3641.000000	2815.760000	125.000000	170.000000	7.437
DEPTH	25	36.800000	3.201562	10.250000	920.000000	246.000000	30.000000	43.000000	8.700
WEIGHT	25	43.840000	10.330699	106.723333	1096.000000	2561.360000	28.000000	71.000000	23.565
LOGWT	25	1.631043	0.097730	0.009551	40.776067	0.229228	1.447158	1.851258	5.992
COND	25	1.397722	0.087682	0.007688	34.943061	0.184514	1.239439	1.574048	6.273
RATIO	25	2.527588	0.132089	0.017447	63.189704	0.418740	2.222222	2.857143	5.226

LOT=09-34

LENGTH	18	155.277778	14.449936	208.800654	2795.000000	3549.611111	123.000000	178.000000	9.306
DEPTH	18	37.111111	3.802304	14.457516	668.000000	245.777778	29.000000	42.000000	10.246
WEIGHT	18	46.222222	12.235703	149.712418	832.000000	2545.111111	22.000000	66.000000	26.471
LOGWT	18	1.648159	0.129505	0.016772	29.666869	0.285117	1.342423	1.819544	7.858
COND	18	1.204822	0.060280	0.003634	21.686798	0.061773	1.086972	1.325928	5.003
RATIO	18	2.388830	0.080891	0.006543	42.998939	0.111236	2.196970	2.553191	3.386

INDIVIDUAL TANKS

LOT=10-37

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	134.720000	17.742416	314.793333	3368.000000	7555.040000	80.000000	161.000000	13.170
DEPTH	25	31.640000	4.581484	20.990000	791.000000	503.760000	17.000000	40.000000	14.480
WEIGHT	25	31.720000	10.810951	116.876667	793.000000	2805.040000	7.000000	52.000000	34.082
LOGWT	25	1.470733	0.181981	0.033117	36.768313	0.794811	0.845098	1.716003	12.373
COND	25	1.245230	0.059419	0.003531	31.130754	0.084735	1.172143	1.388889	4.772
RATIO	25	2.345417	0.110387	0.012185	58.635421	0.292447	2.125000	2.583333	4.707

LOT=10-38

LENGTH	25	139.560000	15.519021	240.840000	3489.000000	5780.160000	111.000000	170.000000	11.120
DEPTH	25	32.080000	3.277702	10.743333	802.000000	257.840000	26.000000	38.000000	10.217
WEIGHT	25	34.160000	10.482843	109.890000	854.000000	2637.360000	18.000000	56.000000	30.687
LOGWT	25	1.513514	0.136029	0.018504	37.837838	0.444096	1.255273	1.748188	8.988
COND	25	1.225421	0.089213	0.007959	30.635520	0.191016	0.942972	1.399851	7.280
RATIO	25	2.303521	0.120433	0.014504	57.588030	0.348100	2.121212	2.796610	5.228

LOT=10-39

LENGTH	25	141.400000	14.471236	209.416667	3535.000000	5026.000000	107.000000	164.000000	10.234
DEPTH	25	32.080000	3.226453	10.410000	802.000000	249.840000	25.000000	38.000000	10.058
WEIGHT	25	35.080000	9.547775	91.160000	877.000000	2187.840000	17.000000	51.000000	27.217
LOGWT	25	1.527810	0.129128	0.016674	38.195245	0.400174	1.230449	1.707570	8.452
COND	25	1.214669	0.084923	0.007212	30.366716	0.173085	1.050031	1.399737	6.991
RATIO	25	2.271736	0.102370	0.010480	56.793394	0.251510	2.054795	2.460317	4.506

LOT=11-41

LENGTH	25	145.200000	23.066932	532.083333	3630.000000	12770.000000	85.000000	174.000000	15.886
DEPTH	25	34.080000	4.680812	21.910000	852.000000	525.840000	22.000000	40.000000	13.735
WEIGHT	25	40.720000	14.898322	221.960000	1018.000000	5327.040000	9.000000	63.000000	36.587
LOGWT	25	1.569908	0.212252	0.045051	39.247708	1.081217	0.954243	1.799341	13.520
COND	25	1.276511	0.175467	0.030789	31.912781	0.738930	1.138947	1.954000	13.746
RATIO	25	2.366334	0.224476	0.050389	59.158341	1.209346	2.160000	3.294118	9.486

LOT=11-42

LENGTH	26	153.846154	17.208585	296.135385	4000.000000	7403.384615	95.000000	175.000000	11.186
DEPTH	26	36.153846	4.115262	16.935385	940.000000	423.384615	23.000000	42.000000	11.383
WEIGHT	26	44.307692	13.071402	170.861538	1152.000000	4271.538462	11.000000	65.000000	29.501
LOGWT	26	1.621886	0.164364	0.027016	42.169024	0.675390	1.041393	1.812913	10.134
COND	26	1.175767	0.060326	0.003639	30.569931	0.090980	1.034524	1.288255	5.131
RATIO	26	2.350824	0.069529	0.004834	61.121412	0.120856	2.230216	2.516556	2.958

LOT=11-43

LENGTH	25	146.360000	18.268552	333.740000	3659.000000	8009.760000	83.000000	170.000000	12.482
DEPTH	25	36.440000	4.407191	19.423333	911.000000	466.160000	21.000000	43.000000	12.094
WEIGHT	25	40.160000	11.592670	134.390000	1004.000000	3225.360000	8.000000	59.000000	28.866
LOGWT	25	1.577976	0.174653	0.030504	39.449407	0.732089	0.903090	1.770852	11.068
COND	25	1.247661	0.136382	0.018600	31.191525	0.446400	0.859259	1.573563	10.931
RATIO	25	2.495927	0.163883	0.026858	62.398184	0.644580	2.246377	3.046875	6.566

INDIVIDUAL TANKS

LOT=12-45

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	139.840000	13.999048	195.973333	3496.000000	4703.360000	97.000000	162.000000	10.011
DEPTH	25	33.360000	3.134220	9.823333	834.000000	235.760000	25.000000	38.000000	9.395
WEIGHT	25	35.360000	8.707659	75.823333	884.000000	1819.760000	14.000000	51.000000	24.626
LOGWT	25	1.532229	0.130703	0.017083	38.305718	0.409998	1.146128	1.707570	8.530
COND	25	1.268580	0.088788	0.007883	31.714491	0.189198	1.138848	1.533956	6.999
RATIO	25	2.390018	0.111052	0.012333	59.750449	0.295982	2.064516	2.577320	4.647

LOT=14-53

LENGTH	25	141.400000	12.338963	152.250000	3535.000000	3654.000000	102.000000	163.000000	8.726
DEPTH	25	31.920000	2.914332	8.493333	798.000000	203.840000	23.000000	37.000000	9.130
WEIGHT	25	34.680000	8.019352	64.310000	867.000000	1543.440000	12.000000	50.000000	23.124
LOGWT	25	1.525856	0.122895	0.015103	38.146409	0.362475	1.079181	1.698970	8.054
COND	25	1.203354	0.070279	0.004939	30.083861	0.118540	1.094314	1.348397	5.840
RATIO	25	2.258075	0.084629	0.007162	56.451866	0.171889	2.125984	2.517483	3.748

LOT=14-54

LENGTH	26	145.115385	15.618776	243.946154	3773.000000	6098.653846	84.000000	160.000000	10.763
DEPTH	26	32.923077	3.531833	12.473846	856.000000	311.846154	18.000000	36.000000	10.728
WEIGHT	26	36.538462	9.096068	82.738462	950.000000	2068.461538	6.000000	46.000000	24.895
LOGWT	26	1.538905	0.176968	0.031318	40.011523	0.782940	0.778151	1.662758	11.500
COND	26	1.157898	0.069024	0.004764	30.105350	0.119108	1.012310	1.331775	5.961
RATIO	26	2.269305	0.078532	0.006167	59.001935	0.154182	2.137931	2.457627	3.461

LOT=15-57

LENGTH	25	134.200000	19.972898	398.916667	3355.000000	9574.000000	69.000000	155.000000	14.883
DEPTH	25	33.280000	5.358171	28.710000	832.000000	689.040000	15.000000	39.000000	16.100
WEIGHT	25	34.320000	12.351518	152.560000	858.000000	3661.440000	3.000000	52.000000	35.989
LOGWT	25	1.484734	0.264306	0.069858	37.118359	1.676589	0.477121	1.716003	17.802
COND	25	1.323706	0.144786	0.020963	33.092659	0.503112	0.913217	1.639942	10.938
RATIO	25	2.474444	0.103655	0.010744	61.861098	0.257866	2.173913	2.714286	4.189

LOT=15-59

LENGTH	25	127.200000	16.965652	287.833333	3180.000000	6908.000000	98.000000	164.000000	13.338
DEPTH	25	33.080000	4.733920	22.410000	827.000000	537.840000	24.000000	42.000000	14.311
WEIGHT	25	29.440000	11.460366	131.340000	736.000000	3152.160000	13.000000	58.000000	38.928
LOGWT	25	1.437496	0.170094	0.028932	35.937405	0.694365	1.113943	1.763428	11.833
COND	25	1.369378	0.109291	0.011945	34.234451	0.286668	1.199774	1.730808	7.981
RATIO	25	2.600987	0.152124	0.023142	65.024687	0.555401	2.380952	3.145161	5.849

LOT=16-62

LENGTH	25	147.440000	12.800000	163.840000	3686.000000	3932.160000	115.000000	171.000000	8.681
DEPTH	25	35.720000	2.908608	8.460000	893.000000	203.040000	30.000000	41.000000	8.143
WEIGHT	25	42.240000	9.862724	97.273333	1056.000000	2334.560000	22.000000	62.000000	23.349
LOGWT	25	1.613748	0.106214	0.011281	40.343690	0.270755	1.342423	1.792392	6.582
COND	25	1.297893	0.063182	0.003992	32.447317	0.095807	1.179843	1.446536	4.868
RATIO	25	2.424879	0.071369	0.005094	60.621983	0.122246	2.303030	2.608696	2.943

INDIVIDUAL TANKS

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LOT=16-63									
LENGTH	25	143.040000	20.059246	402.373333	3576.000000	9656.960000	94.000000	177.000000	14.024
DEPTH	25	33.160000	5.201602	27.056667	829.000000	649.360000	21.000000	43.000000	15.686
WEIGHT	25	36.480000	13.307642	177.093333	912.000000	4250.240000	12.000000	66.000000	36.479
LOGWT	25	1.529254	0.182656	0.033363	38.231345	0.800714	1.079181	1.819544	11.944
COND	25	1.195569	0.092713	0.008596	29.889237	0.206297	1.074150	1.462383	7.755
RATIO	25	2.314671	0.096080	0.009231	57.866774	0.221552	2.193548	2.522523	4.151
LOT=17-65									
LENGTH	25	143.600000	15.827192	250.500000	3590.000000	6012.000000	114.000000	172.000000	11.022
DEPTH	25	34.920000	3.839705	14.743333	873.000000	353.840000	28.000000	42.000000	10.996
WEIGHT	25	37.600000	10.958254	120.083333	940.000000	2882.000000	19.000000	58.000000	29.144
LOGWT	25	1.556110	0.134303	0.018037	38.902762	0.432897	1.278754	1.763428	8.631
COND	25	1.239689	0.082272	0.006769	30.992217	0.162450	1.122837	1.483540	6.637
RATIO	25	2.434054	0.102415	0.010489	60.851338	0.251730	2.091503	2.605042	4.208
LOT=17-66									
LENGTH	25	147.640000	15.173661	230.240000	3691.000000	5525.760000	121.000000	175.000000	10.277
DEPTH	25	34.120000	3.295451	10.860000	853.000000	260.640000	29.000000	41.000000	9.658
WEIGHT	25	40.160000	12.772627	163.140000	1004.000000	3915.360000	20.000000	65.000000	31.804
LOGWT	25	1.582684	0.139102	0.019349	39.567104	0.464383	1.301030	1.812913	8.789
COND	25	1.208549	0.065989	0.004355	30.213717	0.104509	1.103471	1.362070	5.460
RATIO	25	2.314640	0.104122	0.010841	57.865988	0.260192	2.183099	2.727273	4.498
LOT=17-67									
LENGTH	25	144.000000	23.079572	532.666667	3600.000000	12784.000000	86.000000	175.000000	16.027
DEPTH	25	33.160000	5.312564	28.223333	829.000000	677.360000	21.000000	41.000000	16.021
WEIGHT	25	37.120000	14.655261	214.776667	928.000000	5154.640000	8.000000	62.000000	39.481
LOGWT	25	1.522249	0.232514	0.054063	38.056226	1.297501	0.903090	1.792392	15.274
COND	25	1.165738	0.063472	0.004029	29.143448	0.096689	1.012457	1.264733	5.445
RATIO	25	2.305030	0.079690	0.006350	57.625748	0.152412	2.105263	2.444444	3.457
LOT=18-70									
LENGTH	25	146.640000	13.683567	187.240000	3666.000000	4493.760000	113.000000	168.000000	9.331
DEPTH	25	33.960000	3.746999	14.040000	849.000000	336.960000	25.000000	40.000000	11.034
WEIGHT	25	40.360000	10.262716	105.323333	1009.000000	2527.760000	17.000000	60.000000	25.428
LOGWT	25	1.590509	0.123461	0.015243	39.762723	0.365821	1.230449	1.778151	7.762
COND	25	1.253780	0.078775	0.006206	31.344497	0.148934	1.110873	1.431152	6.283
RATIO	25	2.312898	0.071213	0.005071	57.822461	0.121710	2.212389	2.451613	3.079
LOT=19-72									
LENGTH	22	150.409091	14.500112	210.253247	3309.000000	4415.318182	99.000000	166.000000	9.640
DEPTH	22	33.954545	3.359100	11.283550	747.000000	236.954545	23.000000	39.000000	9.893
WEIGHT	22	42.045455	10.353179	107.188312	925.000000	2250.954545	12.000000	58.000000	24.624
LOGWT	22	1.605822	0.142603	0.020336	35.328082	0.427047	1.079181	1.763428	8.880
COND	22	1.206265	0.066710	0.004450	26.537828	0.093454	1.085301	1.389794	5.530
RATIO	22	2.258335	0.068318	0.004667	49.683377	0.098015	2.101911	2.422360	3.025

INDIVIDUAL TANKS

LOT=19-73

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	15	125.066667	28.524342	813.638095	1876.000000	11390.933333	71.000000	175.000000	22.807
DEPTH	15	28.466667	6.323049	39.980952	427.000000	559.733333	17.000000	39.000000	22.212
WEIGHT	15	26.600000	16.452529	270.685714	399.000000	3789.600000	6.000000	64.000000	61.852
LOGWT	15	1.345776	0.277776	0.077160	20.186637	1.080234	0.778151	1.806180	20.641
COND	15	1.230091	0.140195	0.019655	18.451369	0.275166	1.044860	1.676394	11.397
RATIO	15	2.282246	0.092768	0.008606	34.233685	0.120482	2.091503	2.432432	4.065

LOT=19-74

LENGTH	19	139.368421	13.949156	194.578947	2648.000000	3502.421053	108.000000	158.000000	10.009
DEPTH	19	32.526316	3.356063	11.263158	618.000000	202.736842	27.000000	39.000000	10.318
WEIGHT	19	34.263158	9.302581	86.538012	651.000000	1557.684211	18.000000	49.000000	27.150
LOGWT	19	1.518478	0.125247	0.015687	28.851080	0.282360	1.255273	1.690196	8.248
COND	19	1.239761	0.081476	0.006638	23.555467	0.119490	1.118518	1.428898	6.572
RATIO	19	2.336007	0.108317	0.011733	44.384132	0.211187	2.148148	2.592593	4.637

LOT=20-76

LENGTH	20	144.350000	19.701122	388.134211	2887.000000	7374.550000	93.000000	168.000000	13.648
DEPTH	20	35.350000	4.081731	16.660526	707.000000	316.550000	23.000000	41.000000	11.547
WEIGHT	20	42.850000	12.807379	164.028947	857.000000	3116.550000	12.000000	63.000000	29.889
LOGWT	20	1.606519	0.168125	0.028266	32.130384	0.537057	1.079181	1.799341	10.465
COND	20	1.391426	0.146146	0.021359	27.828513	0.405812	1.199569	1.659846	10.503
RATIO	20	2.460463	0.161933	0.026222	49.209257	0.498222	2.258065	2.755906	6.581

LOT=20-77

LENGTH	20	142.700000	23.748906	564.010526	2854.000000	10716.200000	69.000000	174.000000	16.643
DEPTH	20	34.800000	4.525949	20.484211	696.000000	389.200000	18.000000	39.000000	13.006
WEIGHT	20	40.750000	12.451485	155.039474	815.000000	2945.750000	7.000000	62.000000	30.556
LOGWT	20	1.578175	0.201431	0.040575	31.563492	0.770916	0.845098	1.792392	12.764
COND	20	1.411850	0.395201	0.156184	28.237004	2.967496	1.117061	2.739207	27.992
RATIO	20	2.466817	0.269361	0.072555	49.336335	1.378548	2.236842	3.402062	10.919

LOT=21-78

LENGTH	26	143.269231	22.670788	513.964615	3725.000000	12849.115385	75.000000	171.000000	15.824
DEPTH	26	32.961538	5.466119	29.878462	857.000000	746.961538	16.000000	40.000000	16.583
WEIGHT	26	37.653846	13.169487	173.435385	979.000000	4335.884615	5.000000	60.000000	34.975
LOGWT	26	1.530830	0.241480	0.058312	39.801582	1.457811	0.698970	1.778151	15.774
COND	26	1.210306	0.058173	0.003384	31.467958	0.084603	1.106307	1.349746	4.806
RATIO	26	2.297967	0.068341	0.004671	59.747140	0.116763	2.133333	2.389937	2.974

LOT=21-79

LENGTH	25	146.760000	22.030812	485.356667	3669.000000	11648.560000	88.000000	169.000000	15.011
DEPTH	25	34.320000	5.336353	28.476667	858.000000	683.440000	19.000000	41.000000	15.549
WEIGHT	25	40.960000	14.313397	204.873333	1024.000000	4916.960000	8.000000	62.000000	34.945
LOGWT	25	1.570825	0.223504	0.049954	39.270632	1.198894	0.903090	1.792392	14.228
COND	25	1.227583	0.082924	0.006876	30.689566	0.165033	1.094615	1.433600	6.755
RATIO	25	2.338168	0.102642	0.010535	58.454188	0.252850	2.159091	2.560000	4.390

INDIVIDUAL TANKS
LOT=21-90

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	141.560000	13.922643	193.840000	3539.000000	4652.160000	116.000000	165.000000	9.835
DEPTH	25	33.400000	3.316625	11.000000	835.000000	264.000000	27.000000	39.000000	9.930
WEIGHT	25	36.520000	9.887366	97.760000	913.000000	2346.240000	20.000000	57.000000	27.074
LOGWT	25	1.546547	0.122364	0.014973	38.663678	0.359350	1.301030	1.755875	7.912
COND	25	1.260887	0.077951	0.006076	31.522164	0.145831	1.173929	1.483978	6.182
RATIO	25	2.361058	0.099669	0.009934	59.026447	0.238413	2.222222	2.681159	4.221

LOT=21-A1

LENGTH	24	142.416667	22.013665	484.601449	3418.000000	11145.833333	94.000000	171.000000	15.457
DEPTH	24	32.916667	5.199638	27.036232	790.000000	621.833333	22.000000	40.000000	15.796
WEIGHT	24	35.291667	14.091253	198.563406	847.000000	4566.958333	11.000000	58.000000	39.928
LOGWT	24	1.507510	0.203346	0.041350	36.180242	0.951044	1.041393	1.763428	13.489
COND	24	1.159850	0.086499	0.007482	27.836407	0.172086	0.903549	1.324369	7.458
RATIO	24	2.312518	0.094243	0.008882	55.500439	0.204281	2.163743	2.500000	4.075

LOT=22-A2

LENGTH	20	138.000000	20.240657	409.684211	2760.000000	7784.000000	77.000000	160.000000	14.667
DEPTH	20	34.500000	5.236511	27.421053	690.000000	521.000000	18.000000	41.000000	15.178
WEIGHT	20	36.250000	11.313127	127.986842	725.000000	2431.750000	6.000000	55.000000	31.209
LOGWT	20	1.525810	0.206795	0.042764	30.516207	0.812518	0.778151	1.740363	13.553
COND	20	1.340047	0.206077	0.042468	26.800942	0.806889	1.049805	1.900000	15.378
RATIO	20	2.502682	0.167658	0.028109	50.053648	0.534077	2.253521	2.949640	6.699

LOT=22-A3

LENGTH	25	138.360000	16.926015	286.490000	3459.000000	6875.760000	97.000000	170.000000	12.233
DEPTH	25	34.080000	4.112177	16.910000	852.000000	405.840000	25.000000	42.000000	12.066
WEIGHT	25	34.760000	11.619954	135.023333	869.000000	3240.560000	13.000000	61.000000	33.429
LOGWT	25	1.514348	0.162654	0.026456	37.858704	0.634953	1.113943	1.785330	10.741
COND	25	1.264428	0.067547	0.004563	31.610707	0.109502	1.153872	1.424387	5.342
RATIO	25	2.464909	0.067831	0.004601	61.622729	0.110426	2.285714	2.577320	2.752

LOT=22-A4

LENGTH	25	123.200000	24.763885	613.250000	3080.000000	14718.000000	79.000000	166.000000	20.101
DEPTH	25	31.640000	5.700000	32.490000	791.000000	779.760000	21.000000	42.000000	18.015
WEIGHT	25	31.000000	15.198684	231.000000	775.000000	5544.000000	9.000000	60.000000	49.028
LOGWT	25	1.434369	0.238416	0.056842	35.859214	1.364207	0.954243	1.778151	16.622
COND	25	1.583251	0.423321	0.179201	39.581282	4.300820	1.274465	3.448003	26.737
RATIO	25	2.595900	0.336497	0.113230	64.897499	2.717524	2.318841	4.050633	12.963

LOT=23-A5

LENGTH	25	148.280000	10.857102	117.876667	3707.000000	2829.040000	115.000000	169.000000	7.322
DEPTH	25	35.120000	2.350886	5.526667	878.000000	132.640000	31.000000	40.000000	6.694
WEIGHT	25	41.800000	8.760708	76.750000	1045.000000	1842.000000	19.000000	62.000000	20.959
LOGWT	25	1.610852	0.100769	0.010154	40.271298	0.243705	1.278754	1.792392	6.256
COND	25	1.263672	0.059392	0.003527	31.591795	0.084657	1.144747	1.347845	4.700
RATIO	25	2.376332	0.192506	0.037059	59.408289	0.889409	2.156863	3.217391	8.101

INDIVIDUAL TANKS

LOT=23-86

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	140.280000	13.651984	186.376667	3507.000000	4473.040000	110.000000	168.000000	9.732
DEPTH	25	32.680000	3.171750	10.060000	817.000000	241.440000	27.000000	40.000000	9.705
WEIGHT	25	34.200000	8.841191	78.166667	855.000000	1876.000000	17.000000	57.000000	25.851
LOGWT	25	1.519620	0.116082	0.013475	37.990498	0.323399	1.230449	1.755875	7.639
COND	25	1.218664	0.092931	0.008636	30.466606	0.207266	1.105871	1.560926	7.626
RATIO	25	2.332119	0.097470	0.009500	58.302983	0.228008	2.158273	2.564103	4.179

LOT=23-87

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	129.360000	15.934449	253.906667	3234.000000	6093.760000	98.000000	155.000000	12.318
DEPTH	25	30.200000	3.278719	10.750000	755.000000	258.000000	24.000000	37.000000	10.857
WEIGHT	25	29.080000	9.600000	92.160000	727.000000	2211.840000	12.000000	49.000000	33.012
LOGWT	25	1.438864	0.154089	0.023744	35.971603	0.569844	1.079181	1.690196	10.709
COND	25	1.302328	0.105808	0.011195	32.558189	0.268690	1.156484	1.547565	8.125
RATIO	25	2.342752	0.136842	0.018726	58.568790	0.449420	2.153846	2.755102	5.841

LOT=24-88

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	12	149.166667	16.748587	280.515152	1790.000000	3085.666667	112.000000	168.000000	11.228
DEPTH	12	36.500000	4.908249	24.090909	438.000000	265.000000	25.000000	42.000000	13.447
WEIGHT	12	47.083333	15.465259	239.174242	565.000000	2630.916667	16.000000	65.000000	32.847
LOGWT	12	1.644555	0.177644	0.031558	19.734658	0.347133	1.204120	1.812913	10.802
COND	12	1.357137	0.090255	0.008146	16.285644	0.089605	1.138848	1.500896	6.650
RATIO	12	2.440747	0.080567	0.006491	29.288964	0.071402	2.232143	2.576687	3.301

LOT=24-89

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	133.280000	14.610270	213.460000	3332.000000	5123.040000	111.000000	157.000000	10.962
DEPTH	25	31.800000	3.851407	14.833333	795.000000	356.000000	24.000000	39.000000	12.111
WEIGHT	25	31.840000	10.257843	105.223333	796.000000	2525.360000	17.000000	51.000000	32.217
LOGWT	25	1.480289	0.145532	0.021180	37.007213	0.508310	1.230449	1.707570	9.831
COND	25	1.301787	0.090985	0.008278	32.544681	0.198680	1.123867	1.512287	6.989
RATIO	25	2.384901	0.109855	0.012068	59.622514	0.289636	2.162162	2.619048	4.606

LOT=24-90

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	136.960000	12.677013	160.706667	3424.000000	3856.960000	106.000000	152.000000	9.256
DEPTH	25	32.960000	3.529400	12.456667	824.000000	298.960000	25.000000	38.000000	10.708
WEIGHT	25	32.640000	8.562904	73.323333	816.000000	1759.760000	15.000000	46.000000	26.234
LOGWT	25	1.496740	0.129991	0.016898	37.418499	0.405543	1.176091	1.662758	8.685
COND	25	1.240968	0.094777	0.008983	31.024204	0.215585	1.139014	1.516711	7.637
RATIO	25	2.405441	0.109889	0.012076	60.136020	0.289816	2.268908	2.700730	4.568

LOT=24-91

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	138.440000	12.393143	153.590000	3461.000000	3686.160000	105.000000	160.000000	8.952
DEPTH	25	32.080000	2.942788	8.660000	802.000000	207.840000	25.000000	38.000000	9.173
WEIGHT	25	31.960000	7.871256	61.956667	799.000000	1486.960000	16.000000	49.000000	24.628
LOGWT	25	1.492005	0.107665	0.011592	37.300136	0.278203	1.204120	1.690196	7.216
COND	25	1.189470	0.109534	0.011998	29.736745	0.287945	0.859320	1.382140	9.209
RATIO	25	2.318163	0.075114	0.005642	57.954074	0.135412	2.164179	2.461538	3.240

APPENDIX TABLE 3

Summary of the final mixed tank measurements arranged by full sib groups. The number preceding the dash refers to the paternal parent and that following refers to the maternal parent. (See Fig. 1, pg. 12.)

LENGTH	=	fork length (mm)
DEPTH	=	body depth (mm)
WEIGHT	=	round weight (gm)
LOGWT	=	$\log_{10}$ weight (gm)
COND	=	coefficient of condition
	=	$(\text{weight(gm)} \times 10^4)/(\text{fork length(mm)})^3$
RATIO	=	body depth(mm)/(fork length(mm)/10)
C.V. %	=	percent coefficient of variation

MIXED TANK
LOT=01-01

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	24	126.041667	11.719472	137.346014	3025.000000	3158.958333	103.000000	154.000000	9.298
DEPTH	24	30.250000	2.706675	7.326087	726.000000	168.500000	24.000000	35.000000	8.948
WEIGHT	24	27.125000	7.485130	56.027174	651.000000	1288.625000	14.000000	47.000000	27.595
LOGWT	24	1.417403	0.121415	0.014742	34.017677	0.339056	1.146128	1.672098	8.566
COND	24	1.325561	0.096518	0.009316	31.813453	0.214260	1.101414	1.464570	7.281
RATIO	24	2.401956	0.081740	0.006681	57.646948	0.153672	2.272727	2.545455	3.403

LOT=01-03

LENGTH	70	120.857143	13.670327	186.877847	8460.000000	12894.571429	91.000000	147.000000	11.311
DEPTH	70	29.714286	3.431072	11.772257	2080.000000	812.285714	23.000000	39.000000	11.547
WEIGHT	70	25.228571	7.839276	61.454244	1766.000000	4240.342857	12.000000	44.000000	31.073
LOGWT	70	1.380437	0.139671	0.019508	96.630595	1.346048	1.079181	1.643453	10.118
COND	70	1.396745	0.157489	0.024803	97.772184	1.711401	0.712099	1.747062	11.275
RATIO	70	2.462468	0.151887	0.023070	172.372770	1.591807	1.932773	2.909091	6.168

LOT=01-04

LENGTH	24	128.500000	13.233686	175.130435	3084.000000	4028.000000	95.000000	160.000000	10.299
DEPTH	24	29.500000	3.833491	14.695652	708.000000	338.000000	19.000000	37.000000	12.995
WEIGHT	24	27.875000	9.312509	86.722826	669.000000	1994.625000	10.000000	54.000000	33.408
LOGWT	24	1.421302	0.151680	0.023007	34.111246	0.529156	1.000000	1.732394	10.672
COND	24	1.265937	0.084490	0.007139	30.382480	0.164187	1.099793	1.397501	6.674
RATIO	24	2.290795	0.120504	0.014521	54.979083	0.333987	2.000000	2.558140	5.260

LOT=02-05

LENGTH	24	142.750000	13.384774	179.152174	3426.000000	4120.500000	116.000000	165.000000	9.376
DEPTH	24	32.375000	3.241209	10.505435	777.000000	241.625000	25.000000	37.000000	10.011
WEIGHT	24	36.666667	9.707311	94.231884	880.000000	2167.333333	20.000000	51.000000	26.474
LOGWT	24	1.547888	0.125913	0.015854	37.149300	0.364643	1.301030	1.707570	8.134
COND	24	1.233195	0.093141	0.008675	29.596684	0.199531	1.049803	1.411185	7.553
RATIO	24	2.269588	0.123190	0.015176	54.470120	0.349041	1.984127	2.479339	5.428

LOT=02-06

LENGTH	25	125.400000	13.880442	192.666667	3135.000000	4624.000000	93.000000	143.000000	11.069
DEPTH	25	29.200000	3.862210	14.916667	730.000000	358.000000	21.000000	35.000000	13.227
WEIGHT	25	26.680000	8.214418	67.476667	667.000000	1619.440000	11.000000	40.000000	30.789
LOGWT	25	1.401677	0.157774	0.024893	35.041930	0.597425	1.041393	1.602060	11.256
COND	25	1.306507	0.094797	0.008987	32.662680	0.215677	1.155695	1.478281	7.256
RATIO	25	2.324400	0.100491	0.010098	58.109990	0.242363	2.195122	2.536232	4.323

LOT=02-07

LENGTH	25	137.560000	13.172193	173.506667	3439.000000	4164.160000	109.000000	160.000000	9.576
DEPTH	25	30.800000	3.329164	11.083333	770.000000	266.000000	25.000000	36.000000	10.809
WEIGHT	25	33.800000	9.287088	86.250000	845.000000	2070.000000	18.000000	50.000000	27.477
LOGWT	25	1.512419	0.124155	0.015415	37.810485	0.369950	1.255273	1.698970	8.209
COND	25	1.269654	0.079057	0.006250	31.741354	0.149999	1.127811	1.423560	6.227
RATIO	25	2.237996	0.083928	0.007044	55.949897	0.169053	2.045455	2.362205	3.750

MIXED TANK
LOT=02-08

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	23	121.391304	11.777247	138.703557	2792.000000	3051.478261	103.000000	140.000000	9.702
DEPTH	23	27.434783	3.159777	9.984190	631.000000	219.652174	22.000000	32.000000	11.517
WEIGHT	23	22.913043	6.646346	44.173913	527.000000	971.826087	13.000000	33.000000	29.007
LOGWT	23	1.341514	0.132079	0.017445	30.854811	0.383785	1.113943	1.518514	9.845
COND	23	1.247720	0.096228	0.009260	28.697556	0.203718	1.074768	1.430511	7.712
RATIO	23	2.258162	0.110916	0.012302	51.937727	0.270653	2.113821	2.500000	4.912

LOT=03-09

LENGTH	26	131.307692	12.852297	165.181538	3414.000000	4129.538462	108.000000	152.000000	9.788
DEPTH	26	29.000000	3.187475	10.160000	754.000000	254.000000	23.000000	35.000000	10.991
WEIGHT	26	28.884615	8.120724	65.946154	751.000000	1648.653846	17.000000	42.000000	28.114
LOGWT	26	1.444069	0.122795	0.015079	37.545801	0.376968	1.230449	1.623249	8.503
COND	26	1.250659	0.121415	0.014742	32.517125	0.368543	1.103471	1.629923	9.708
RATIO	26	2.209421	0.124640	0.015535	57.444943	0.388379	2.032520	2.500000	5.641

LOT=03-10

LENGTH	20	119.550000	15.247001	232.471053	2391.000000	4416.950000	95.000000	150.000000	12.754
DEPTH	20	26.250000	3.767940	14.197368	525.000000	269.750000	19.000000	33.000000	14.354
WEIGHT	20	21.550000	7.612144	57.944737	431.000000	1100.950000	11.000000	40.000000	35.323
LOGWT	20	1.308619	0.150610	0.022684	26.172384	0.430987	1.041393	1.602060	11.509
COND	20	1.224209	0.120828	0.014600	24.484174	0.277391	0.986274	1.555741	9.870
RATIO	20	2.193287	0.117600	0.013830	43.865738	0.262767	2.000000	2.427184	5.362

LOT=03-11

LENGTH	24	132.666667	14.860706	220.840580	3184.000000	5079.333333	91.000000	159.000000	11.202
DEPTH	24	30.666667	4.039658	16.318841	736.000000	375.333333	20.000000	38.000000	13.173
WEIGHT	24	31.041667	9.719900	94.476449	745.000000	2172.958333	10.000000	54.000000	31.312
LOGWT	24	1.466481	0.163579	0.026758	35.195542	0.615439	1.000000	1.732394	11.155
COND	24	1.281328	0.073119	0.005346	30.751866	0.122967	1.157407	1.389930	5.707
RATIO	24	2.306706	0.074385	0.005533	55.360954	0.127261	2.156863	2.500000	3.225

LOT=04-13

LENGTH	22	140.954545	18.894386	356.997835	3101.000000	7496.954545	97.000000	165.000000	13.405
DEPTH	22	31.318182	4.235748	17.941558	689.000000	376.772727	20.000000	38.000000	13.525
WEIGHT	22	35.409091	13.514222	182.634199	779.000000	3835.318182	10.000000	60.000000	38.166
LOGWT	22	1.512616	0.193853	0.037579	33.277542	0.789161	1.000000	1.778151	12.816
COND	22	1.197365	0.075272	0.005666	26.342020	0.118984	1.095683	1.362963	6.287
RATIO	22	2.222841	0.096332	0.009280	48.902495	0.194878	2.060606	2.434783	4.334

LOT=04-14

LENGTH	25	140.240000	12.829913	164.606667	3506.000000	3950.560000	118.000000	160.000000	9.149
DEPTH	25	31.560000	2.631223	6.923333	789.000000	166.160000	26.000000	35.000000	8.337
WEIGHT	25	33.720000	8.629021	74.460000	843.000000	1787.040000	19.000000	51.000000	25.590
LOGWT	25	1.513788	0.114184	0.013038	37.844708	0.312913	1.278754	1.707570	7.543
COND	25	1.200474	0.081023	0.006565	30.011846	0.157554	1.067831	1.369825	6.749
RATIO	25	2.253153	0.079215	0.006275	56.328832	0.150601	2.133333	2.463768	3.516

MIXED TANK

LOT=05-18

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	23	140.000000	14.777132	218.363636	3220.000000	4804.000000	97.000000	159.000000	10.555
DEPTH	23	32.043478	3.913592	15.316206	737.000000	336.956522	21.000000	38.000000	12.213
WEIGHT	23	35.782609	9.534419	90.905138	823.000000	1999.913043	11.000000	52.000000	26.645
LOGWT	23	1.531264	0.161098	0.025953	35.219061	0.570957	1.041393	1.716003	10.521
COND	23	1.264788	0.096237	0.009262	29.090117	0.203754	1.098170	1.547565	7.609
RATIO	23	2.285977	0.105065	0.011039	52.577474	0.242849	2.038835	2.556391	4.596

LOT=06-22

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	128.520000	13.500370	182.260000	3213.000000	4374.240000	98.000000	152.000000	10.504
DEPTH	25	29.920000	3.239341	10.493333	748.000000	251.840000	23.000000	38.000000	10.827
WEIGHT	25	28.040000	8.238527	67.873333	701.000000	1628.960000	13.000000	44.000000	29.381
LOGWT	25	1.428722	0.134237	0.018020	35.718056	0.432470	1.113943	1.643453	9.396
COND	25	1.290842	0.128794	0.016588	32.271039	0.398108	1.074768	1.643791	9.978
RATIO	25	2.331058	0.131591	0.017316	58.276458	0.415591	2.068966	2.567568	5.645

LOT=06-23

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	21	124.952381	11.311393	127.947619	2624.000000	2558.952381	102.000000	155.000000	9.053
DEPTH	21	28.904762	3.031580	9.190476	607.000000	183.809524	25.000000	37.000000	10.488
WEIGHT	21	26.142857	7.767147	60.328571	549.000000	1206.571429	15.000000	50.000000	29.710
LOGWT	21	1.400796	0.121254	0.014703	29.416723	0.294051	1.176091	1.698970	8.656
COND	21	1.309768	0.116585	0.013592	27.505134	0.271840	1.096787	1.507716	8.901
RATIO	21	2.313228	0.113627	0.012911	48.577782	0.258220	2.113821	2.556391	4.912

LOT=07-25

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	22	120.545455	9.236198	85.307359	2652.000000	1791.454545	99.000000	135.000000	7.662
DEPTH	22	27.136364	2.531618	6.409091	597.000000	134.590909	23.000000	35.000000	9.329
WEIGHT	22	21.545455	5.011675	25.116883	474.000000	527.454545	14.000000	38.000000	23.261
LOGWT	22	1.323563	0.091966	0.008458	29.118395	0.177612	1.146128	1.579784	6.948
COND	22	1.224917	0.186592	0.034817	26.948177	0.731151	1.001358	1.855098	15.233
RATIO	22	2.254447	0.165291	0.027321	49.597835	0.573744	2.032520	2.727273	7.332

LOT=07-26

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	26	134.000000	15.328405	234.960000	3484.000000	5874.000000	103.000000	157.000000	11.439
DEPTH	26	30.192308	3.406103	11.601538	785.000000	290.038462	23.000000	36.000000	11.281
WEIGHT	26	29.769231	9.572075	91.624615	774.000000	2290.615385	14.000000	46.000000	32.154
LOGWT	26	1.449752	0.152254	0.023181	37.693554	0.579532	1.146128	1.662758	10.502
COND	26	1.198653	0.112246	0.012599	31.164970	0.314976	0.986274	1.464227	9.364
RATIO	26	2.255342	0.098739	0.009749	58.638904	0.243735	2.086331	2.457627	4.378

LOT=07-27

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	21	118.619048	15.275720	233.347619	2491.000000	4666.952381	95.000000	154.000000	12.878
DEPTH	21	27.428571	4.093549	16.757143	576.000000	335.142857	18.000000	35.000000	14.924
WEIGHT	21	22.000000	9.154234	83.800000	462.000000	1676.000000	8.000000	45.000000	41.610
LOGWT	21	1.308196	0.177779	0.031605	27.472110	0.632110	0.903090	1.653213	13.590
COND	21	1.251992	0.117011	0.013692	26.291836	0.273831	0.933081	1.409447	9.346
RATIO	21	2.307659	0.122600	0.015031	48.460841	0.300613	1.894737	2.521739	5.313

MIXED TANK

LOT=08-29

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	11	143.636364	12.556056	157.654545	1580.000000	1576.545455	121.000000	165.000000	8.742
DEPTH	11	32.909091	2.586679	6.690909	362.000000	66.909091	29.000000	37.000000	7.860
WEIGHT	11	37.909091	8.360078	69.890909	417.000000	698.909091	25.000000	49.000000	22.053
LOGWT	11	1.568834	0.098210	0.009645	17.257179	0.096453	1.397940	1.690196	6.260
COND	11	1.267254	0.100879	0.010177	13.939796	0.101767	1.068537	1.411185	7.960
RATIO	11	2.294534	0.096291	0.009272	25.239876	0.092720	2.121212	2.448980	4.197

LOT=08-30

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	22	141.954545	18.653424	347.950216	3123.000000	7306.954545	90.000000	165.000000	13.140
DEPTH	22	32.000000	3.964125	15.714286	704.000000	330.000000	23.000000	37.000000	12.388
WEIGHT	22	35.500000	10.905438	118.928571	781.000000	2497.500000	11.000000	51.000000	30.720
LOGWT	22	1.523395	0.171031	0.029252	33.514696	0.614283	1.041393	1.707570	11.227
COND	22	1.203534	0.091467	0.008366	26.477740	0.175692	1.108354	1.508916	7.600
RATIO	22	2.259739	0.102654	0.010538	49.714259	0.221294	2.108844	2.555556	4.543

LOT=08-31

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	18	145.111111	10.145349	102.928105	2612.000000	1749.777778	132.000000	168.000000	6.991
DEPTH	18	33.666667	2.930569	8.588235	606.000000	146.000000	29.000000	40.000000	8.705
WEIGHT	18	39.000000	8.970540	80.470588	702.000000	1368.000000	29.000000	62.000000	23.001
LOGWT	18	1.581108	0.093955	0.008827	28.459945	0.150067	1.462398	1.792392	5.942
COND	18	1.257221	0.058691	0.003445	22.629976	0.058558	1.161794	1.360176	4.668
RATIO	18	2.318552	0.080374	0.006460	41.733927	0.109819	2.185430	2.452830	3.467

LOT=09-33

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	28	124.964286	15.418801	237.739418	3499.000000	6418.964286	87.000000	160.000000	12.339
DEPTH	28	29.071429	3.990067	15.920635	814.000000	429.857143	20.000000	36.000000	13.725
WEIGHT	28	27.142857	9.139715	83.534392	760.000000	2255.428571	9.000000	50.000000	33.673
LOGWT	28	1.406268	0.165512	0.027394	39.375505	0.739642	0.954243	1.698970	11.770
COND	28	1.343567	0.147579	0.021780	37.619877	0.588052	1.154296	1.749671	10.984
RATIO	28	2.327027	0.166999	0.027889	65.156746	0.752995	1.834862	2.660550	7.177

LOT=09-34

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	13	141.000000	9.146948	83.666667	1833.000000	1004.000000	124.000000	155.000000	6.487
DEPTH	13	32.076923	2.431102	5.910256	417.000000	70.923077	27.000000	35.000000	7.579
WEIGHT	13	34.692308	7.087367	50.230769	451.000000	602.769231	23.000000	46.000000	20.429
LOGWT	13	1.531514	0.091720	0.008413	19.909683	0.100951	1.361728	1.662758	5.989
COND	13	1.222903	0.085183	0.007256	15.897744	0.087073	1.092497	1.396995	6.966
RATIO	13	2.274715	0.086396	0.007464	29.571296	0.089571	2.177419	2.464789	3.798

LOT=10-37

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	17	127.117647	9.245826	85.485294	2161.000000	1367.764706	110.000000	147.000000	7.273
DEPTH	17	29.294118	2.687115	7.220588	498.000000	115.529412	24.000000	36.000000	9.173
WEIGHT	17	25.882353	5.935932	35.235294	440.000000	563.764706	18.000000	38.000000	22.934
LOGWT	17	1.402913	0.095287	0.009080	23.849518	0.145274	1.255273	1.579784	6.792
COND	17	1.243345	0.091388	0.008352	21.136857	0.133630	1.099793	1.477821	7.350
RATIO	17	2.305054	0.138817	0.019270	39.185913	0.308325	2.123894	2.627737	6.022

MIXED TANK

LOT=10-38

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	15	130.266667	13.051911	170.352381	1954.000000	2384.933333	105.000000	154.000000	10.019
DEPTH	15	30.533333	3.248443	10.552381	458.000000	147.733333	25.000000	38.000000	10.639
WEIGHT	15	30.933333	9.497869	90.209524	464.000000	1262.933333	15.000000	50.000000	30.704
LOGWT	15	1.471006	0.136193	0.018548	22.065094	0.259678	1.176091	1.698970	9.258
COND	15	1.361560	0.119274	0.014226	20.423404	0.199169	1.220475	1.729631	8.760
RATIO	15	2.343529	0.060497	0.003660	35.152935	0.051238	2.222222	2.467532	2.581

LOT=10-39

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	20	130.050000	14.482203	209.734211	2601.000000	3984.950000	101.000000	151.000000	11.136
DEPTH	20	29.600000	3.560012	12.673684	592.000000	240.800000	22.000000	35.000000	12.027
WEIGHT	20	29.550000	8.543850	72.997368	591.000000	1386.950000	14.000000	43.000000	28.913
LOGWT	20	1.451425	0.136638	0.018670	29.028495	0.354729	1.146128	1.633468	9.414
COND	20	1.314913	0.131248	0.017226	26.298268	0.327297	1.179572	1.762262	9.982
RATIO	20	2.278782	0.165120	0.027265	45.575646	0.518027	1.971831	2.868852	7.246

LOT=11-41

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	22	123.772727	13.423263	180.183983	2723.000000	3783.863636	97.000000	145.000000	10.845
DEPTH	22	27.636364	2.984810	8.909091	608.000000	187.090909	22.000000	33.000000	10.800
WEIGHT	22	23.818182	7.235076	52.346320	524.000000	1099.272727	12.000000	38.000000	30.376
LOGWT	22	1.355875	0.142183	0.020216	29.829245	0.424539	1.079181	1.579784	10.486
COND	22	1.220455	0.080475	0.006476	26.850021	0.136000	1.095536	1.382140	6.594
RATIO	22	2.235036	0.094023	0.008840	49.170802	0.185648	2.033898	2.476190	4.207

LOT=11-42

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	10	134.100000	8.089087	65.433333	1341.000000	588.900000	123.000000	151.000000	6.032
DEPTH	10	30.800000	2.250926	5.066667	308.000000	45.600000	28.000000	35.000000	7.308
WEIGHT	10	30.900000	6.822349	46.544444	309.000000	418.900000	23.000000	46.000000	22.079
LOGWT	10	1.481157	0.090615	0.008211	14.811572	0.073899	1.361728	1.662758	6.118
COND	10	1.264516	0.087443	0.007646	12.645161	0.068817	1.092399	1.397198	6.915
RATIO	10	2.295861	0.061864	0.003827	22.958605	0.034444	2.230769	2.428571	2.695

LOT=11-43

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	9	122.000000	15.149257	229.500000	1098.000000	1836.000000	89.000000	140.000000	12.417
DEPTH	9	28.222222	3.073181	9.444444	254.000000	75.555556	22.000000	31.000000	10.889
WEIGHT	9	24.777778	6.437736	41.444444	223.000000	331.555556	16.000000	35.000000	25.982
LOGWT	9	1.380788	0.114618	0.013137	12.427093	0.105098	1.204120	1.544068	8.301
COND	9	1.383330	0.344221	0.118488	12.449969	0.947904	1.123867	2.269603	24.884
RATIO	9	2.319574	0.098700	0.009742	20.876163	0.077934	2.214286	2.471910	4.255

LOT=12-45

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	22	122.500000	10.852913	117.785714	2695.000000	2473.500000	103.000000	139.000000	8.860
DEPTH	22	29.409091	2.218088	4.919913	647.000000	103.318182	25.000000	32.000000	7.542
WEIGHT	22	24.681818	5.515229	30.417749	543.000000	638.772727	15.000000	33.000000	22.345
LOGWT	22	1.381306	0.102249	0.010455	30.388742	0.219553	1.176091	1.518514	7.402
COND	22	1.329523	0.127430	0.016239	29.249499	0.341009	1.166701	1.689093	9.585
RATIO	22	2.405339	0.102154	0.010436	52.917466	0.219146	2.262774	2.596154	4.247

MIXED TANK
LOT=14-53

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	24	140.291667	11.475794	131.693841	3367.000000	3028.958333	119.000000	161.000000	8.180
DEPTH	24	31.125000	2.786809	7.766304	747.000000	178.625000	25.000000	35.000000	8.954
WEIGHT	24	34.791667	8.587044	73.737319	835.000000	1695.958333	18.000000	52.000000	24.681
LOGWT	24	1.527810	0.114313	0.013067	36.667430	0.300552	1.255273	1.716003	7.482
COND	24	1.235548	0.082073	0.006736	29.653155	0.154929	1.068148	1.355583	6.643
RATIO	24	2.219189	0.104568	0.010934	53.260537	0.251491	2.056738	2.419355	4.712

LOT=14-54

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	4	124.000000	14.306176	204.666667	496.000000	614.000000	103.000000	135.000000	11.537
DEPTH	4	28.000000	4.690416	22.000000	112.000000	66.000000	21.000000	31.000000	16.751
WEIGHT	4	24.750000	8.616844	74.250000	99.000000	222.750000	12.000000	30.000000	34.816
LOGWT	4	1.366197	0.192556	0.037078	5.464788	0.111233	1.079181	1.477121	14.094
COND	4	1.244239	0.137705	0.018963	4.976956	0.056888	1.098170	1.430511	11.067
RATIO	4	2.247656	0.161462	0.026070	8.990624	0.078210	2.038835	2.421875	7.184

LOT=15-57

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	24	125.083333	12.731053	162.079710	3002.000000	3727.833333	105.000000	148.000000	10.178
DEPTH	24	29.708333	3.617339	13.085145	713.000000	300.958333	23.000000	37.000000	12.176
WEIGHT	24	26.541667	7.740235	59.911232	637.000000	1377.958333	15.000000	41.000000	29.163
LOGWT	24	1.405576	0.130744	0.017094	33.733819	0.393161	1.176091	1.612784	9.302
COND	24	1.322547	0.088342	0.007804	31.741128	0.179498	1.217408	1.578039	6.680
RATIO	24	2.372689	0.115349	0.013305	56.944545	0.306023	2.110092	2.589286	4.862

LOT=15-59

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	11	123.727273	12.806958	164.018182	1361.000000	1640.181818	104.000000	144.000000	10.351
DEPTH	11	29.818182	4.643666	21.563636	328.000000	215.636364	23.000000	38.000000	15.573
WEIGHT	11	26.727273	10.100405	102.018182	294.000000	1020.181818	16.000000	46.000000	37.791
LOGWT	11	1.400971	0.154830	0.023972	15.410685	0.239723	1.204120	1.662758	11.052
COND	11	1.354012	0.127926	0.016365	14.894133	0.163652	1.157407	1.606545	9.448
RATIO	11	2.400332	0.160305	0.025698	26.403649	0.256978	2.166667	2.676056	6.678

LOT=16-62

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	11	129.636364	14.080289	198.254545	1426.000000	1982.545455	113.000000	149.000000	10.861
DEPTH	11	30.545455	3.697665	13.672727	336.000000	136.727273	27.000000	37.000000	12.105
WEIGHT	11	29.454545	9.626668	92.672727	324.000000	926.727273	20.000000	46.000000	32.683
LOGWT	11	1.449110	0.136530	0.018640	15.940208	0.186403	1.301030	1.662758	9.422
COND	11	1.313692	0.076189	0.005805	14.450610	0.058048	1.177600	1.446759	5.800
RATIO	11	2.354977	0.089903	0.008083	25.904752	0.080826	2.160000	2.500000	3.818

LOT=16-63

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	13	118.461538	12.080393	145.935897	1540.000000	1751.230769	105.000000	144.000000	10.198
DEPTH	13	26.230769	3.295296	10.858974	341.000000	130.307692	23.000000	33.000000	12.563
WEIGHT	13	20.461538	6.899461	47.602564	266.000000	571.230769	14.000000	35.000000	33.719
LOGWT	13	1.290807	0.133465	0.017813	16.780497	0.213755	1.146128	1.544068	10.340
COND	13	1.194592	0.091620	0.008394	15.529690	0.100730	1.072500	1.382140	7.670
RATIO	13	2.211087	0.092513	0.008559	28.744125	0.102704	2.066116	2.380952	4.184

MIXED TANK

LOT=17-65

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	8	132.750000	11.634309	135.357143	1062.000000	947.500000	117.000000	152.000000	8.764
DEPTH	8	31.250000	2.492847	6.214286	250.000000	43.500000	28.000000	35.000000	7.977
WEIGHT	8	30.625000	8.158037	66.553571	245.000000	465.875000	21.000000	45.000000	26.638
LOGWT	8	1.472990	0.113309	0.012839	11.783918	0.089873	1.322219	1.653213	7.692
COND	8	1.283497	0.036184	0.001309	10.267973	0.009165	1.211168	1.327146	2.819
RATIO	8	2.357174	0.098084	0.009620	18.857395	0.067343	2.222222	2.481752	4.161

LOT=17-66

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	20	130.350000	11.027597	121.607895	2607.000000	2310.550000	108.000000	149.000000	8.460
DEPTH	20	29.250000	2.788605	7.776316	585.000000	147.750000	22.000000	34.000000	9.534
WEIGHT	20	27.050000	6.708008	44.997368	541.000000	854.950000	14.000000	42.000000	24.799
LOGWT	20	1.418371	0.115569	0.013356	28.367418	0.253770	1.146128	1.623249	8.148
COND	20	1.199459	0.094840	0.008995	23.989188	0.170898	0.933361	1.415751	7.907
RATIO	20	2.244384	0.112852	0.012736	44.887684	0.241975	1.970803	2.377049	5.028

LOT=17-67

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	13	132.923077	18.589699	345.576923	1728.000000	4146.923077	102.000000	157.000000	13.985
DEPTH	13	29.615385	3.884552	15.089744	385.000000	181.076923	24.000000	35.000000	13.117
WEIGHT	13	30.153846	11.824030	139.807692	392.000000	1677.692308	15.000000	46.000000	39.212
LOGWT	13	1.446382	0.179283	0.032142	18.802971	0.385707	1.176091	1.662758	12.395
COND	13	1.227269	0.092682	0.008590	15.954498	0.103080	1.046882	1.413484	7.552
RATIO	13	2.234186	0.123052	0.015142	29.044419	0.181701	2.076923	2.549020	5.508

LOT=18-70

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	23	145.130435	10.997125	120.936759	3338.000000	2660.608696	116.000000	165.000000	7.577
DEPTH	23	34.217391	2.610408	6.814229	787.000000	149.913043	27.000000	39.000000	7.629
WEIGHT	23	41.260870	8.362347	69.928854	949.000000	1538.434783	21.000000	58.000000	20.267
LOGWT	23	1.606162	0.095222	0.009067	36.941724	0.199478	1.322219	1.763428	5.929
COND	23	1.334295	0.073252	0.005366	30.688781	0.118050	1.166236	1.444084	5.490
RATIO	23	2.359202	0.087669	0.007686	54.261650	0.169088	2.151899	2.500000	3.716

LOT=19-72

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	13	149.384615	10.563605	111.589744	1942.000000	1339.076923	127.000000	163.000000	7.071
DEPTH	13	33.076923	3.067614	9.410256	430.000000	112.923077	26.000000	37.000000	9.274
WEIGHT	13	41.153846	9.072359	82.307692	535.000000	987.692308	24.000000	56.000000	22.045
LOGWT	13	1.603961	0.101336	0.010269	20.851499	0.123228	1.380211	1.748188	6.318
COND	13	1.215111	0.058547	0.003428	15.796443	0.041132	1.105163	1.293945	4.818
RATIO	13	2.211519	0.079887	0.006382	28.749745	0.076582	2.047244	2.312500	3.612

LOT=19-73

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	13	131.769231	14.872535	221.192308	1713.000000	2654.307692	103.000000	146.000000	11.287
DEPTH	13	28.384615	3.927223	15.423077	369.000000	185.076923	22.000000	34.000000	13.836
WEIGHT	13	27.461538	9.492237	90.102564	357.000000	1081.230769	11.000000	40.000000	34.566
LOGWT	13	1.409906	0.173452	0.030086	18.328777	0.361028	1.041393	1.602060	12.302
COND	13	1.147984	0.094473	0.008925	14.923797	0.107102	0.986274	1.285291	8.229
RATIO	13	2.149715	0.095356	0.009093	27.946296	0.109113	2.000000	2.344828	4.436

MIXED TANK

LOT=19-74

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	34	132.882353	12.708300	161.500891	4518.000000	5329.529412	96.000000	156.000000	9.564
DEPTH	34	30.382353	3.446691	11.879679	1033.000000	392.029412	20.000000	36.000000	11.344
WEIGHT	34	30.058824	8.253342	68.117647	1022.000000	2247.882353	10.000000	45.000000	27.457
LOGWT	34	1.458643	0.140175	0.019649	49.593851	0.648419	1.000000	1.653213	9.610
COND	34	1.246395	0.090679	0.008223	42.377432	0.271347	0.933361	1.452179	7.275
RATIO	34	2.284144	0.106463	0.011334	77.660904	0.374037	2.043796	2.481203	4.661

LOT=20-76

LENGTH	10	143.800000	7.539525	56.844444	1438.000000	511.600000	134.000000	154.000000	5.243
DEPTH	10	32.600000	1.646545	2.711111	326.000000	24.400000	30.000000	36.000000	5.051
WEIGHT	10	37.100000	5.173651	26.766667	371.000000	240.900000	30.000000	46.000000	13.945
LOGWT	10	1.565602	0.060261	0.003631	15.656020	0.032682	1.477121	1.662758	3.849
COND	10	1.242607	0.055516	0.003082	12.426069	0.027739	1.164796	1.322261	4.468
RATIO	10	2.268208	0.068078	0.004635	22.682082	0.041711	2.162162	2.357143	3.001

LOT=20-77

LENGTH	19	122.947368	19.967957	398.719298	2336.000000	7176.947368	76.000000	145.000000	16.241
DEPTH	19	29.052632	4.377641	19.163743	552.000000	344.947368	17.000000	35.000000	15.068
WEIGHT	19	27.052632	10.271177	105.497076	514.000000	1898.947368	5.000000	43.000000	37.967
LOGWT	19	1.390874	0.219258	0.048074	26.426604	0.865334	0.698970	1.633468	15.764
COND	19	1.416530	0.388560	0.150979	26.914079	2.717617	1.095211	2.961438	27.430
RATIO	19	2.383442	0.301295	0.090779	45.285390	1.634021	2.148760	3.552632	12.641

LOT=21-78

LENGTH	15	137.400000	19.145309	366.542857	2061.000000	5131.600000	81.000000	157.000000	13.934
DEPTH	15	31.533333	5.026596	25.266667	473.000000	353.733333	17.000000	36.000000	15.941
WEIGHT	15	34.533333	10.676186	113.980952	518.000000	1595.733333	8.000000	47.000000	30.916
LOGWT	15	1.505727	0.201367	0.040549	22.585909	0.567680	0.903090	1.672098	13.373
COND	15	1.280140	0.075480	0.005697	19.202103	0.079762	1.188663	1.505341	5.896
RATIO	15	2.287828	0.090662	0.008220	34.317427	0.115073	2.098765	2.397260	3.963

LOT=21-79

LENGTH	15	131.933333	15.484862	239.780952	1979.000000	3356.933333	108.000000	162.000000	11.737
DEPTH	15	30.533333	3.961722	15.695238	458.000000	219.733333	24.000000	38.000000	12.975
WEIGHT	15	29.800000	10.421132	108.600000	447.000000	1520.400000	12.000000	52.000000	34.970
LOGWT	15	1.448186	0.159838	0.025548	21.722787	0.357673	1.079181	1.716003	11.037
COND	15	1.253154	0.135272	0.018298	18.797315	0.256179	0.926620	1.508281	10.795
RATIO	15	2.313795	0.119149	0.014196	34.706929	0.198751	2.094595	2.482759	5.150

LOT=21-80

LENGTH	12	121.583333	15.808274	249.901515	1459.000000	2748.916667	97.000000	146.000000	13.002
DEPTH	12	29.083333	4.294994	18.446970	349.000000	202.916667	23.000000	37.000000	14.768
WEIGHT	12	25.166667	9.952919	99.060606	302.000000	1089.666667	14.000000	46.000000	39.548
LOGWT	12	1.370572	0.169087	0.028590	16.446859	0.314495	1.146128	1.662758	12.337
COND	12	1.344012	0.137366	0.018869	16.128140	0.207562	1.039575	1.533956	10.221
RATIO	12	2.389837	0.124316	0.015454	28.678044	0.169998	2.123894	2.534247	5.202

MIXED TANK
LOT=21-81

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	8	125.625000	18.149675	329.410714	1005.000000	2305.875000	98.000000	146.000000	14.448
DEPTH	8	28.875000	5.139136	26.410714	231.000000	184.875000	22.000000	37.000000	17.798
WEIGHT	8	26.125000	10.868533	118.125000	209.000000	826.875000	12.000000	42.000000	41.602
LOGWT	8	1.381449	0.192772	0.037161	11.051591	0.260128	1.079181	1.623249	13.954
COND	8	1.252112	0.085925	0.007383	10.016893	0.051682	1.138038	1.372712	6.862
RATIO	8	2.291848	0.121576	0.014781	18.334787	0.103466	2.180451	2.534247	5.305

LOT=22-82

LENGTH	8	132.000000	16.775833	281.428571	1056.000000	1970.000000	105.000000	152.000000	12.709
DEPTH	8	31.625000	3.159453	9.982143	253.000000	69.875000	26.000000	35.000000	9.990
WEIGHT	8	31.625000	9.022789	81.410714	253.000000	569.875000	17.000000	43.000000	28.531
LOGWT	8	1.481852	0.140169	0.019647	11.854813	0.137531	1.230449	1.633468	9.459
COND	8	1.355666	0.149154	0.022247	10.845331	0.155729	1.103704	1.516711	11.002
RATIO	8	2.406582	0.147533	0.021766	19.252657	0.152362	2.222222	2.566372	6.130

LOT=22-83

LENGTH	12	126.250000	10.287901	105.840909	1515.000000	1164.250000	112.000000	142.000000	8.149
DEPTH	12	28.666667	2.741378	7.515152	344.000000	82.666667	25.000000	33.000000	9.563
WEIGHT	12	25.166667	6.766674	45.787879	302.000000	503.666667	18.000000	37.000000	26.887
LOGWT	12	1.387483	0.110287	0.012163	16.649800	0.133795	1.255273	1.568202	7.949
COND	12	1.226795	0.087191	0.007602	14.721535	0.083625	1.025199	1.319910	7.107
RATIO	12	2.270334	0.106840	0.011415	27.244002	0.125562	2.047244	2.439024	4.706

LOT=22-84

LENGTH	20	121.200000	17.319293	299.957895	2424.000000	5699.200000	88.000000	146.000000	14.290
DEPTH	20	29.050000	3.940011	15.523684	581.000000	294.950000	23.000000	35.000000	13.563
WEIGHT	20	25.800000	9.655105	93.221053	516.000000	1771.200000	13.000000	42.000000	37.423
LOGWT	20	1.381341	0.168574	0.028417	27.626819	0.539929	1.113943	1.623249	12.204
COND	20	1.408138	0.219661	0.048251	28.162765	0.916769	1.138848	1.907635	15.599
RATIO	20	2.405783	0.177354	0.031454	48.115670	0.597632	2.149533	2.783505	7.372

LOT=23-85

LENGTH	19	137.368421	8.951788	80.134503	2610.000000	1442.421053	123.000000	155.000000	6.517
DEPTH	19	31.684211	2.729522	7.450292	602.000000	134.105263	25.000000	37.000000	8.615
WEIGHT	19	33.000000	6.429101	41.333333	627.000000	744.000000	21.000000	45.000000	19.482
LOGWT	19	1.510366	0.087541	0.007663	28.696948	0.137942	1.322219	1.653213	5.796
COND	19	1.259349	0.080565	0.006491	23.927638	0.116833	1.128506	1.457726	6.397
RATIO	19	2.306252	0.129196	0.016692	43.818794	0.300450	2.032520	2.571429	5.602

LOT=23-86

LENGTH	13	132.153846	10.769139	115.974359	1718.000000	1391.692308	117.000000	151.000000	8.149
DEPTH	13	30.153846	2.444250	5.974359	392.000000	71.692308	25.000000	33.000000	8.106
WEIGHT	13	29.384615	7.170989	51.423077	382.000000	617.076923	20.000000	42.000000	24.404
LOGWT	13	1.455819	0.108527	0.011778	18.925649	0.141336	1.301030	1.623249	7.455
COND	13	1.251295	0.079566	0.006331	16.266840	0.075968	1.153872	1.444084	6.359
RATIO	13	2.284567	0.124664	0.015541	29.699368	0.186495	2.083333	2.500000	5.457

MIXED TANK
LOT=23-87

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	20	119.850000	16.490109	271.923584	2397.000000	5166.550000	72.000000	146.000000	13.759
DEPTH	20	27.200000	3.981536	15.852632	544.000000	301.200000	16.000000	33.000000	14.638
WEIGHT	20	23.250000	8.459657	71.565789	465.000000	1359.750000	4.000000	42.000000	36.386
LOGWT	20	1.326334	0.220139	0.048461	26.526689	0.920766	0.602060	1.623249	16.598
COND	20	1.276090	0.122482	0.015002	25.521800	0.285033	1.049716	1.560926	9.598
RATIO	20	2.269221	0.126030	0.015884	45.384424	0.301787	2.033898	2.564103	5.554

LOT=24-88

LENGTH	17	106.352941	17.535468	307.492647	1808.000000	4919.882353	72.000000	135.000000	16.488
DEPTH	17	23.000000	4.373214	19.125000	391.000000	306.000000	15.000000	31.000000	19.014
WEIGHT	17	15.941176	7.377928	54.433824	271.000000	870.941176	4.000000	30.000000	46.282
LOGWT	17	1.146467	0.247927	0.061468	19.489947	0.983484	0.602060	1.477121	21.625
COND	17	1.223286	0.149476	0.022343	20.795864	0.357487	0.876169	1.424387	12.219
RATIO	17	2.154540	0.100007	0.010001	36.627172	0.160024	1.948052	2.296296	4.642

LOT=24-89

LENGTH	23	117.608696	12.510865	156.521739	2705.000000	3443.478261	97.000000	142.000000	10.638
DEPTH	23	27.391304	3.512822	12.339921	630.000000	271.478261	22.000000	34.000000	12.825
WEIGHT	23	22.043478	7.789727	60.679842	507.000000	1334.956522	11.000000	37.000000	35.338
LOGWT	23	1.317095	0.155293	0.024116	30.293185	0.530548	1.041393	1.568202	11.791
COND	23	1.304379	0.135245	0.018291	30.000718	0.402404	0.854771	1.513389	10.369
RATIO	23	2.325846	0.107197	0.011491	53.494451	0.252808	2.169811	2.598425	4.609

LOT=24-90

LENGTH	14	119.785714	14.417823	207.873626	1677.000000	2702.357143	97.000000	147.000000	12.036
DEPTH	14	26.928571	3.852358	14.840659	377.000000	192.928571	21.000000	36.000000	14.306
WEIGHT	14	21.571429	8.464535	71.648352	302.000000	931.428571	11.000000	42.000000	39.240
LOGWT	14	1.305246	0.161669	0.026137	18.273437	0.339779	1.041393	1.623249	12.386
COND	14	1.205032	0.128612	0.016541	16.870443	0.215034	0.925314	1.508281	10.673
RATIO	14	2.245522	0.127264	0.016196	31.437314	0.210550	2.095238	2.500000	5.667

LOT=24-91

LENGTH	13	120.076923	15.359370	235.910256	1561.000000	2830.923077	100.000000	149.000000	12.791
DEPTH	13	27.230769	3.961352	15.692308	354.000000	188.307692	21.000000	34.000000	14.547
WEIGHT	13	23.153846	8.924182	79.641026	301.000000	955.692308	14.000000	42.000000	38.543
LOGWT	13	1.336619	0.160236	0.025676	17.376050	0.308108	1.146128	1.623249	11.988
COND	13	1.284130	0.075249	0.005662	16.693696	0.067949	1.128506	1.400000	5.860
RATIO	13	2.265452	0.119642	0.014314	29.450877	0.171770	2.032520	2.452830	5.281

APPENDIX TABLE 4

Summary of the final lake 971 measurements arranged by full sib groups. The number preceding the dash refers to the paternal parent and that following refers to the maternal parent. (See Fig. 1, pg. 12.)

LENGTH	=	fork length (mm)
DEPTH	=	body depth (mm)
WEIGHT	=	round weight (gm)
LOGWT	=	$\log_{10}$ weight (gm)
COND	=	coefficient of condition
	=	$(\text{weight(gm)} \times 10^4)/(\text{fork length(mm)})^3$
RATIO	=	body depth(mm)/(fork length(mm)/10)
C.V. %	=	percent coefficient of variation

LAKE 971
LOT=01-01

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	51	235.137255	20.303714	412.240784	11992.000000	20612.039216	149.000000	279.000000	8.635
DEPTH	51	71.431373	7.574312	57.370196	3643.000000	2868.509804	38.000000	85.000000	10.604
WEIGHT	51	259.372549	61.455011	3776.718431	13228.000000	188835.921569	49.000000	405.000000	23.694
LOGWT	51	2.397150	0.137795	0.018986	122.254648	0.949377	1.690196	2.607455	5.748
COND	51	1.957180	0.248323	0.061664	99.816162	3.083218	1.266252	3.219242	12.688
RATIO	51	3.034266	0.158076	0.024988	154.747573	1.249403	2.550336	3.452915	5.210

LOT=01-03

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	2	240.500000	10.606602	112.500000	481.000000	112.500000	233.000000	248.000000	4.410
DEPTH	2	67.500000	0.707107	0.500000	135.000000	0.500000	67.000000	68.000000	1.048
WEIGHT	2	273.500000	62.932504	3960.500000	547.000000	3960.500000	229.000000	318.000000	23.010
LOGWT	2	2.431131	0.100828	0.010166	4.862263	0.010166	2.359835	2.502427	4.147
COND	2	1.947604	0.194076	0.037666	3.895208	0.037666	1.810372	2.084837	9.965
RATIO	2	2.808736	0.094470	0.008925	5.617472	0.008925	2.741935	2.875536	3.363

LOT=01-04

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	48	228.104167	19.266595	371.201684	10949.000000	17446.479167	167.000000	281.000000	8.446
DEPTH	48	67.812500	7.739526	59.900266	3255.000000	2815.312500	40.000000	93.000000	11.413
WEIGHT	48	228.229167	61.472443	3778.861259	10955.000000	177606.479167	66.000000	470.000000	26.935
LOGWT	48	2.341240	0.130660	0.017072	112.379508	0.802385	1.819544	2.672098	5.581
COND	48	1.877582	0.182191	0.033194	90.123956	1.560095	1.417081	2.322502	9.703
RATIO	48	2.968076	0.169542	0.028744	142.467635	1.350991	2.395210	3.364486	5.712

LOT=02-06

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	50	240.240000	20.028103	401.124898	12012.000000	19655.120000	163.000000	283.000000	8.337
DEPTH	50	69.640000	7.482660	55.990204	3482.000000	2743.520000	43.000000	86.000000	10.745
WEIGHT	50	255.200000	63.231354	3998.204082	12760.000000	195912.000000	78.000000	444.000000	24.777
LOGWT	50	2.391964	0.121577	0.014781	119.598179	0.724268	1.892095	2.647383	5.083
COND	50	1.802502	0.126419	0.015982	90.125099	0.783101	1.433334	2.057173	7.014
RATIO	50	2.895145	0.149957	0.022487	144.757239	1.101873	2.535885	3.151261	5.180

LOT=02-07

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	41	234.024390	16.988949	288.624390	9595.000000	11544.975610	178.000000	258.000000	7.259
DEPTH	41	66.512195	6.614839	43.756098	2727.000000	1750.243902	42.000000	76.000000	9.945
WEIGHT	41	235.317073	48.154148	2318.821951	9648.000000	92752.878049	86.000000	309.000000	20.464
LOGWT	41	2.360679	0.105613	0.011154	96.787855	0.446165	1.934498	2.489958	4.474
COND	41	1.811109	0.153124	0.023447	74.255485	0.937876	1.524890	2.163332	8.455
RATIO	41	2.841970	0.212387	0.045108	116.520774	1.804322	2.359551	3.395349	7.473

LOT=02-08

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	54	231.648148	22.641719	512.647449	12509.000000	27170.314815	142.000000	270.000000	9.774
DEPTH	54	65.462963	7.740394	59.913697	3535.000000	3175.425926	39.000000	80.000000	11.824
WEIGHT	54	228.351852	60.467723	3656.345563	12331.000000	193786.314815	50.000000	337.000000	26.480
LOGWT	54	2.338532	0.147399	0.021727	126.280731	1.151505	1.698970	2.527630	6.303
COND	54	1.786594	0.126288	0.015949	96.476098	0.845279	1.442666	2.148438	7.069
RATIO	54	2.823503	0.156448	0.024476	152.469148	1.297220	2.413793	3.225806	5.541

LAKE 971
LOT=03-09

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	50	250.300000	27.765233	770.908163	12515.000000	37774.500000	119.000000	285.000000	11.093
DEPTH	50	69.940000	6.717051	45.118776	3497.000000	2210.820000	43.000000	81.000000	9.604
WEIGHT	50	271.320000	57.277855	3280.752653	13566.000000	160756.880000	74.000000	372.000000	21.111
LOGWT	50	2.420441	0.119080	0.014180	121.022053	0.694828	1.869232	2.570543	4.920
COND	50	1.826960	1.156307	1.337046	91.347993	65.515261	1.397368	9.791361	63.291
RATIO	50	2.816672	0.338045	0.114275	140.833619	5.599463	2.500000	4.957983	12.002

LOT=03-10

LENGTH	46	239.304348	28.841228	831.816425	11008.000000	37431.739130	160.000000	370.000000	12.052
DEPTH	46	66.413043	8.048674	64.781159	3055.000000	2915.152174	42.000000	82.000000	12.119
WEIGHT	46	245.391304	67.637096	4574.776812	11288.000000	205864.956522	70.000000	366.000000	27.563
LOGWT	46	2.369918	0.142602	0.020335	109.016215	0.915094	1.845098	2.563481	6.017
COND	46	1.762112	0.208789	0.043593	81.057146	1.961672	0.716641	2.116777	11.849
RATIO	46	2.777448	0.170351	0.029019	127.762624	1.305870	2.216216	3.099174	6.133

LOT=03-11

LENGTH	50	246.040000	20.345947	413.957551	12302.000000	20283.920000	173.000000	280.000000	8.269
DEPTH	50	74.060000	7.454378	55.567755	3703.000000	2722.820000	47.000000	88.000000	10.065
WEIGHT	50	293.700000	65.883091	4340.581633	14685.000000	212688.500000	93.000000	431.000000	22.432
LOGWT	50	2.454950	0.114320	0.013069	122.747517	0.640385	1.968483	2.634477	4.657
COND	50	1.942986	0.181053	0.032780	97.149316	1.606227	1.671056	2.564742	9.318
RATIO	50	3.009973	0.182588	0.033338	150.498660	1.633576	2.678571	3.489583	6.066

LOT=04-14

LENGTH	59	253.016949	26.818349	719.223846	14928.000000	41714.983051	132.000000	366.000000	10.599
DEPTH	59	73.932203	8.482974	71.960842	4362.000000	4173.728814	33.000000	92.000000	11.474
WEIGHT	59	288.661017	63.296949	4006.503799	17031.000000	232377.220339	35.000000	417.000000	21.928
LOGWT	59	2.443426	0.146778	0.021544	144.162156	1.249542	1.544068	2.620136	6.007
COND	59	1.760116	0.202126	0.040855	103.846830	2.369583	0.785267	2.220225	11.484
RATIO	59	2.922419	0.190505	0.036292	172.422719	2.104937	2.500000	3.366337	6.519

LOT=05-18

LENGTH	45	244.288889	17.259546	297.891919	10993.000000	13107.244444	194.000000	280.000000	7.065
DEPTH	45	72.000000	6.812422	46.409091	3240.000000	2042.000000	55.000000	84.000000	9.462
WEIGHT	45	268.200000	53.206544	2830.936364	12069.000000	124561.200000	122.000000	369.000000	19.838
LOGWT	45	2.418834	0.096517	0.009316	108.847508	0.409882	2.086360	2.567026	3.990
COND	45	1.819934	0.159343	0.025390	81.897040	1.117167	1.414080	2.256464	8.755
RATIO	45	2.946260	0.173349	0.030050	132.581678	1.322190	2.586207	3.291139	5.884

LOT=06-21

LENGTH	7	226.428571	19.234146	369.952381	1585.000000	2219.714286	188.000000	243.000000	8.495
DEPTH	7	66.571429	6.778819	45.952381	466.000000	275.714286	52.000000	71.000000	10.183
WEIGHT	7	216.142857	44.629693	1991.809524	1513.000000	11950.857143	124.000000	260.000000	20.648
LOGWT	7	2.324640	0.107642	0.011587	16.272480	0.069521	2.093422	2.414973	4.630
COND	7	1.842907	0.160077	0.025625	12.900346	0.153749	1.673735	2.172570	8.686
RATIO	7	2.938329	0.149682	0.022405	20.568300	0.134429	2.765957	3.225806	5.094

LAKE 471
LOT=06-22

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	218.000000	16.578098	274.833333	5450.000000	6596.000000	184.000000	256.000000	7.605
DEPTH	25	65.720000	7.138627	50.960000	1643.000000	1223.040000	50.000000	79.000000	10.862
WEIGHT	25	205.400000	46.788531	2189.166667	5135.000000	52540.000000	106.000000	286.000000	22.779
LOGWT	25	2.299806	0.112693	0.012700	57.495155	0.304794	2.025306	2.456366	4.900
COND	25	1.955565	0.243091	0.059093	48.889124	1.418235	1.455732	2.626184	12.431
RATIO	25	3.014927	0.252804	0.063910	75.373178	1.533832	2.500000	3.674419	8.385

LOT=06-23

LENGTH	45	229.888889	24.368592	593.828283	10345.000000	26128.444444	144.000000	276.000000	10.600
DEPTH	45	69.800000	8.711539	75.890909	3141.000000	3339.200000	38.000000	84.000000	12.481
WEIGHT	45	248.355556	72.650832	5278.143434	11176.000000	232238.311111	45.000000	445.000000	29.253
LOGWT	45	2.370011	0.167314	0.027994	106.650497	1.231735	1.653213	2.648360	7.060
COND	45	1.980593	0.261408	0.068334	89.126676	3.006711	1.507041	3.051278	13.198
RATIO	45	3.035009	0.228114	0.052036	136.575405	2.289588	2.500000	3.915344	7.516

LOT=07-25

LENGTH	33	243.515152	20.054802	402.195076	8036.000000	12870.242424	201.000000	276.000000	8.236
DEPTH	33	68.848485	7.404058	54.820076	2272.000000	1754.242424	54.000000	80.000000	10.754
WEIGHT	33	249.030303	61.922070	3834.342803	8218.000000	122698.969697	130.000000	359.000000	24.865
LOGWT	33	2.381307	0.120173	0.014442	78.583118	0.462130	2.113943	2.555094	5.047
COND	33	1.689104	0.140416	0.019717	55.740424	0.630935	1.446928	1.982545	8.313
RATIO	33	2.825883	0.179486	0.032215	93.254135	1.030884	2.529644	3.278689	6.351

LOT=07-26

LENGTH	34	234.588235	35.822050	1283.219251	7976.000000	42346.235294	82.000000	274.000000	15.270
DEPTH	34	69.441176	10.804576	116.738859	2361.000000	3852.382353	41.000000	84.000000	15.559
WEIGHT	34	257.558824	81.424139	6629.890374	8757.000000	218786.382353	77.000000	408.000000	31.614
LOGWT	34	2.381086	0.180144	0.032452	80.956925	1.070906	1.886491	2.610660	7.566
COND	34	2.314108	2.739105	7.502694	78.679659	247.588894	1.436735	17.773973	118.365
RATIO	34	3.001736	0.515375	0.265611	102.059028	8.765163	2.342857	5.609756	17.169

LOT=07-27

LENGTH	33	234.030303	52.206013	2725.467803	7723.000000	87214.969697	51.000000	275.000000	22.307
DEPTH	33	69.121212	11.002152	121.047348	2281.000000	3873.515152	39.000000	84.000000	15.917
WEIGHT	33	253.848485	83.104648	6906.382576	8377.000000	221004.242424	51.000000	390.000000	32.738
LOGWT	33	2.373086	0.186795	0.034892	78.311845	1.116552	1.707570	2.591065	7.871
COND	33	3.510782	6.967841	48.550802	115.855813	1553.625674	1.282074	38.446751	198.470
RATIO	33	3.141467	1.008551	1.017175	103.668396	32.549601	2.400000	7.647059	32.104

LOT=08-29

LENGTH	20	240.950000	27.174824	738.471053	4819.000000	14030.950000	178.000000	290.000000	11.278
DEPTH	20	71.650000	10.281690	105.713158	1433.000000	2008.550000	50.000000	89.000000	14.350
WEIGHT	20	268.550000	93.884293	8814.260526	5371.000000	167470.950000	95.000000	469.000000	34.960
LOGWT	20	2.400818	0.168203	0.028292	48.016356	0.537550	1.977724	2.671173	7.006
COND	20	1.840932	0.169182	0.028623	36.818648	0.543829	1.618895	2.248984	9.190
RATIO	20	2.967727	0.192759	0.037156	59.354534	0.705963	2.709163	3.333333	6.495

LAKE 971
LOT=08-30

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	53	247.000000	18.183890	330.653846	13091.000000	17194.000000	185.000000	269.000000	7.362
DEPTH	53	69.264151	6.412581	41.121190	3671.000000	2138.301887	48.000000	81.000000	9.258
WEIGHT	53	259.547170	56.758790	3221.560232	13756.000000	167521.132075	93.000000	398.000000	21.868
LOGWT	53	2.401682	0.112783	0.012720	127.289131	0.661445	1.968483	2.599883	4.696
COND	53	1.693652	0.143823	0.020685	89.763551	1.075623	1.468817	2.238523	8.492
RATIO	53	2.802095	0.125308	0.015702	148.511010	0.816503	2.538860	3.086420	4.472

LOT=08-31

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	45	232.000000	20.441713	417.863636	10440.000000	18386.000000	178.000000	264.000000	8.811
DEPTH	45	66.888889	7.556521	57.101010	3010.000000	2512.444444	46.000000	80.000000	11.297
WEIGHT	45	228.266667	59.159415	3499.836364	10272.000000	153992.800000	87.000000	321.000000	25.917
LOGWT	45	2.340420	0.135394	0.018331	105.318898	0.806583	1.939519	2.506505	5.785
COND	45	1.784833	0.185055	0.034245	80.317500	1.506789	1.240363	2.159563	10.368
RATIO	45	2.880998	0.186652	0.034839	129.644893	1.532918	2.453704	3.265306	6.479

LOT=09-33

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	28	233.678571	22.257839	495.411376	6543.000000	13376.107143	173.000000	272.000000	9.525
DEPTH	28	74.678571	5.464048	29.855820	2091.000000	806.107143	61.000000	84.000000	7.317
WEIGHT	28	269.107143	53.411983	2852.839947	7535.000000	77026.678571	153.000000	358.000000	19.848
LOGWT	28	2.420465	0.095909	0.009199	67.773010	0.248362	2.184691	2.553883	3.962
COND	28	2.117609	0.339348	0.115157	59.293042	3.109246	1.426430	2.954970	16.025
RATIO	28	3.211005	0.247262	0.061139	89.908148	1.650742	2.794118	3.870968	7.700

LOT=09-34

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	17	247.941176	13.469737	181.433824	4215.000000	2902.941176	213.000000	277.000000	5.433
DEPTH	17	72.058824	4.993378	24.933824	1225.000000	398.941176	61.000000	78.000000	6.930
WEIGHT	17	276.294118	45.748995	2092.970588	4697.000000	33487.529412	177.000000	367.000000	16.558
LOGWT	17	2.435448	0.075265	0.005665	41.402614	0.090636	2.247973	2.564666	3.090
COND	17	1.798093	0.094794	0.008986	30.567577	0.143773	1.660150	1.961451	5.272
RATIO	17	2.906073	0.124154	0.015414	49.403237	0.246628	2.745902	3.181818	4.272

LOT=10-37

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	41	236.756098	19.155653	366.939024	9707.000000	14677.560976	179.000000	279.000000	8.091
DEPTH	41	69.682927	6.286649	39.521951	2857.000000	1580.878049	49.000000	85.000000	9.022
WEIGHT	41	255.780488	57.134277	3264.325610	10487.000000	130573.024390	88.000000	433.000000	22.337
LOGWT	41	2.396095	0.107617	0.011581	98.239907	0.463252	1.944483	2.636488	4.491
COND	41	1.906913	0.246423	0.060724	78.183419	2.428979	1.534347	3.203662	12.923
RATIO	41	2.944040	0.141650	0.020065	120.705635	0.802588	2.687747	3.227273	4.811

LOT=10-38

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	47	233.510638	22.194665	492.603145	10975.000000	22659.744681	161.000000	297.000000	9.505
DEPTH	47	68.765957	7.307568	53.400555	3232.000000	2456.425532	42.000000	82.000000	10.627
WEIGHT	47	249.382979	62.350187	3887.545791	11721.000000	178827.106383	70.000000	443.000000	25.002
LOGWT	47	2.380613	0.129543	0.016782	111.888827	0.771950	1.845098	2.646404	5.442
COND	47	1.921786	0.186350	0.034726	90.323935	1.597414	1.574629	2.437500	9.697
RATIO	47	2.946532	0.190091	0.036135	138.486998	1.662197	2.525253	3.350000	6.451

LAKE 971
LOT=10-39

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	24	238.291667	23.510366	552.737319	5719.000000	12712.958333	165.000000	270.000000	9.866
DEPTH	24	70.833333	9.106456	82.927536	1700.000000	1907.333333	43.000000	86.000000	12.856
WEIGHT	24	269.666667	75.085845	5637.884058	6472.000000	129671.333333	74.000000	399.000000	27.844
LOGWT	24	2.408427	0.158015	0.024969	57.802259	0.574282	1.869232	2.600973	6.561
COND	24	1.932525	0.199057	0.039624	46.380595	0.911347	1.537500	2.317976	10.300
RATIO	24	2.966780	0.197695	0.039083	71.202714	0.898917	2.600000	3.412698	6.664

LOT=11-41

LENGTH	43	234.906977	30.391739	923.657807	10101.000000	38793.627907	114.000000	274.000000	12.938
DEPTH	43	66.627907	8.668562	75.143965	2865.000000	3156.046512	32.000000	81.000000	13.010
WEIGHT	43	242.767442	63.921767	4085.992248	10439.000000	171611.674419	37.000000	358.000000	26.330
LOGWT	43	2.363466	0.160389	0.025725	101.629026	1.080430	1.568202	2.553883	6.786
COND	43	1.983083	1.365436	1.864417	85.272558	78.305503	1.487630	10.597053	68.854
RATIO	43	2.856046	0.371064	0.137688	122.809957	5.782916	2.417062	5.000000	12.992

LOT=11-42

LENGTH	17	247.235294	21.114359	445.816176	4203.000000	7133.058824	187.000000	279.000000	8.540
DEPTH	17	70.235294	9.705214	94.191176	1194.000000	1507.058824	43.000000	85.000000	13.818
WEIGHT	17	269.000000	70.473399	4966.500000	4573.000000	79464.000000	90.000000	393.000000	26.198
LOGWT	17	2.411250	0.142943	0.020433	40.991251	0.326924	1.954243	2.594393	5.928
COND	17	1.733898	0.183743	0.033762	29.476262	0.540185	1.376315	2.201265	10.597
RATIO	17	2.832751	0.250259	0.062630	48.156765	1.002073	2.299465	3.333333	8.834

LOT=11-43

LENGTH	21	246.619048	23.105143	533.847619	5179.000000	10676.952381	168.000000	290.000000	9.369
DEPTH	21	71.619048	8.840114	78.147619	1504.000000	1562.952381	48.000000	93.000000	12.343
WEIGHT	21	280.238095	74.902540	5610.390476	5885.000000	112207.809524	88.000000	490.000000	26.728
LOGWT	21	2.429477	0.139180	0.019371	51.019021	0.387422	1.944483	2.690196	5.729
COND	21	1.825064	0.163165	0.026623	36.326354	0.532457	1.510395	2.124800	8.940
RATIO	21	2.900292	0.170889	0.029203	60.906129	0.584059	2.620968	3.206897	5.892

LOT=12-45

LENGTH	77	229.636364	18.383996	337.971292	17682.000000	25685.818182	190.000000	273.000000	8.006
DEPTH	77	69.311688	5.412606	29.296309	5337.000000	2226.519481	57.000000	80.000000	7.809
WEIGHT	77	234.194805	48.781208	2379.606288	18033.000000	180850.077922	133.000000	379.000000	20.829
LOGWT	77	2.359825	0.094227	0.008879	181.706540	0.674778	2.123852	2.578639	3.993
COND	77	1.924222	0.247550	0.061281	148.165128	4.657353	1.232182	2.833676	12.865
RATIO	77	3.026138	0.214698	0.046095	233.012647	3.503224	2.579186	3.736842	7.095

LOT=14-53

LENGTH	29	246.379310	21.754168	473.243842	7145.000000	13250.827586	179.000000	292.000000	8.830
DEPTH	29	69.862069	7.557986	57.123153	2026.000000	1599.448276	49.000000	85.000000	10.818
WEIGHT	29	272.620690	64.346392	4140.458128	7906.000000	115932.827586	100.000000	427.000000	23.603
LOGWT	29	2.420475	0.126149	0.015914	70.193775	0.445583	2.000000	2.630428	5.212
COND	29	1.789802	0.165621	0.027430	51.904258	0.768047	1.440115	2.283207	9.254
RATIO	29	2.834727	0.172857	0.029879	82.207094	0.836623	2.500000	3.333333	6.098

LAKE 971

LOT=14-54

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	25	247.400000	14.177447	201.000000	6185.000000	4824.000000	216.000000	278.000000	5.731
DEPTH	25	69.560000	6.665083	44.423333	1739.000000	1066.160000	58.000000	80.000000	9.582
WEIGHT	25	265.240000	51.871861	2690.690000	6631.000000	64576.560000	174.000000	375.000000	19.557
LOGWT	25	2.415576	0.085832	0.007367	60.389399	0.176811	2.240549	2.574031	3.553
COND	25	1.731586	0.117186	0.013733	43.289662	0.329581	1.449588	1.892449	6.768
RATIO	25	2.808641	0.170479	0.029063	70.216028	0.697513	2.489960	3.100775	6.070

LOT=15-57

LENGTH	33	232.424242	19.855777	394.251894	7670.000000	12616.060606	166.000000	263.000000	8.543
DEPTH	33	71.818182	8.386949	70.340909	2370.000000	2250.909091	41.000000	81.000000	11.678
WEIGHT	33	256.818182	63.076072	3978.590909	8475.000000	127314.909091	71.000000	360.000000	24.561
LOGWT	33	2.393098	0.133024	0.017695	78.972223	0.566251	1.851258	2.556303	5.559
COND	33	2.001458	0.202600	0.041047	66.048126	1.313491	1.552151	2.612153	10.123
RATIO	33	3.084012	0.196202	0.038495	101.772404	1.231847	2.469880	3.411215	6.362

LOT=15-59

LENGTH	20	203.850000	18.644246	347.607895	4077.000000	6604.550000	168.000000	229.000000	9.146
DEPTH	20	65.250000	8.440972	71.250000	1305.000000	1353.750000	47.000000	77.000000	12.936
WEIGHT	20	181.100000	52.304674	2735.778947	3622.000000	51979.800000	87.000000	265.000000	28.882
LOGWT	20	2.238134	0.139981	0.019595	44.762688	0.372298	1.939519	2.423246	6.254
COND	20	2.083881	0.267261	0.071428	41.677615	1.357136	1.631724	2.682768	12.825
RATIO	20	3.198291	0.278891	0.077780	63.965813	1.477821	2.786885	3.826531	8.720

LOT=16-62

LENGTH	33	251.393939	20.519715	421.058712	8296.000000	13473.878788	188.000000	284.000000	8.162
DEPTH	33	73.848485	8.768271	76.882576	2437.000000	2460.242424	49.000000	88.000000	11.873
WEIGHT	33	291.939394	71.674150	5137.183712	9634.000000	164389.878788	103.000000	444.000000	24.551
LOGWT	33	2.449467	0.127524	0.016262	80.832408	0.520394	2.012837	2.647383	5.206
COND	33	1.796095	0.145089	0.021051	59.271135	0.673630	1.550114	2.014110	8.078
RATIO	33	2.931567	0.183043	0.033505	96.742363	1.072147	2.500000	3.281250	6.244

LOT=16-63

LENGTH	38	235.763158	21.291331	453.320768	8959.000000	16772.868421	180.000000	272.000000	9.031
DEPTH	38	67.763158	8.984775	80.726174	2575.000000	2986.868421	43.000000	82.000000	13.259
WEIGHT	38	240.157895	69.968150	4895.541963	9126.000000	181135.052632	82.000000	376.000000	29.134
LOGWT	38	2.358063	0.151560	0.022970	89.606410	0.849905	1.913814	2.575188	6.427
COND	38	1.777086	0.224596	0.050444	67.529252	1.866410	1.264888	2.437894	12.638
RATIO	38	2.865491	0.193596	0.037479	108.888640	1.386738	2.299465	3.203125	6.756

LOT=17-65

LENGTH	17	235.823529	18.574967	345.029412	4009.000000	5520.470588	181.000000	257.000000	7.877
DEPTH	17	72.058824	8.188945	67.058824	1225.000000	1072.941176	48.000000	86.000000	11.364
WEIGHT	17	250.882353	60.322967	3638.860294	4265.000000	58221.764706	88.000000	334.000000	24.044
LOGWT	17	2.382917	0.136279	0.018572	40.509584	0.297150	1.944483	2.523746	5.719
COND	17	1.868478	0.187085	0.035001	31.764125	0.560011	1.484045	2.146505	10.013
RATIO	17	3.049651	0.186334	0.034720	51.844073	0.555526	2.651934	3.359375	6.110

LAKE 971
LOT=17-66

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	21	244.666667	16.472199	271.333333	5138.000000	5426.666667	196.000000	277.000000	6.733
DEPTH	21	72.380952	7.459733	55.647619	1520.000000	1112.952381	56.000000	87.000000	10.306
WEIGHT	21	280.380952	64.223420	4124.647619	5888.000000	82492.952381	121.000000	410.000000	22.906
LOGWT	21	2.435128	0.112948	0.012757	51.137689	0.255143	2.082785	2.612784	4.638
COND	21	1.879116	0.164705	0.027128	39.461442	0.542554	1.607005	2.154022	8.765
RATIO	21	2.954359	0.169973	0.028891	62.041543	0.577816	2.643172	3.258427	5.753

LOT=17-67

LENGTH	26	243.653846	18.804132	353.595385	6335.000000	8839.884615	200.000000	295.000000	7.718
DEPTH	26	71.423077	5.974433	35.693846	1857.000000	892.346154	61.000000	82.000000	8.365
WEIGHT	26	274.423077	52.490893	2755.293846	7135.000000	68882.346154	180.000000	393.000000	19.128
LOGWT	26	2.430774	0.083355	0.006948	63.200134	0.173701	2.255273	2.594393	3.429
COND	26	1.891034	0.217934	0.047495	49.166896	1.187379	1.530828	2.700000	11.525
RATIO	26	2.933497	0.145807	0.021260	76.270911	0.531493	2.738095	3.300000	4.970

LOT=18-70

LENGTH	40	236.950000	23.720542	562.664103	9478.000000	21943.900000	165.000000	288.000000	10.011
DEPTH	40	71.700000	8.959167	80.266667	2868.000000	3130.400000	43.000000	88.000000	12.495
WEIGHT	40	267.400000	73.908051	5462.400000	10696.000000	213033.600000	79.000000	475.000000	27.640
LOGWT	40	2.406446	0.148833	0.022151	96.257842	0.863895	1.897627	2.676694	6.185
COND	40	1.973072	0.328819	0.108122	78.922887	4.216743	1.255637	3.279017	16.665
RATIO	40	3.024405	0.239106	0.057172	120.976199	2.229698	2.556818	3.763441	7.906

LOT=19-72

LENGTH	22	235.636364	20.749172	430.528139	5184.000000	9041.090909	180.000000	269.000000	8.806
DEPTH	22	65.954545	8.747665	76.521645	1451.000000	1606.954545	44.000000	83.000000	13.263
WEIGHT	22	226.545455	56.959240	3244.354978	4984.000000	68131.454545	83.000000	330.000000	25.143
LOGWT	22	2.338760	0.130943	0.017146	51.452723	0.360068	1.919078	2.518514	5.599
COND	22	1.696656	0.175096	0.030659	37.326423	0.643829	1.181601	1.944399	10.320
RATIO	22	2.792233	0.206214	0.042524	61.429132	0.893005	2.444444	3.192308	7.385

LOT=19-73

LENGTH	27	239.000000	22.005244	484.230769	6453.000000	12590.000000	179.000000	265.000000	9.207
DEPTH	27	64.592593	6.271175	39.327635	1744.000000	1022.518519	48.000000	71.000000	9.709
WEIGHT	27	234.074074	56.812733	3227.686610	6320.000000	83919.851852	87.000000	304.000000	24.271
LOGWT	27	2.352588	0.133696	0.017875	63.519869	0.464742	1.939519	2.482874	5.683
COND	27	1.675299	0.107826	0.011627	45.233067	0.302290	1.477730	1.964634	6.436
RATIO	27	2.703684	0.114867	0.013195	72.999463	0.343058	2.480916	2.969432	4.249

LOT=19-74

LENGTH	35	224.485714	27.090666	733.904202	7857.000000	24952.742857	118.000000	258.000000	12.068
DEPTH	35	66.114286	6.110605	37.339496	2314.000000	1269.542857	53.000000	80.000000	9.242
WEIGHT	35	223.171429	48.225259	2325.675630	7811.000000	79072.971429	114.000000	301.000000	21.609
LOGWT	35	2.337506	0.103282	0.010667	81.812719	0.362681	2.056905	2.478566	4.418
COND	35	2.118307	1.340937	1.798113	74.140757	61.135827	1.521430	9.738094	63.302
RATIO	35	2.976277	0.361427	0.130630	104.169704	4.441414	2.558140	4.661017	12.144

LAKE 971
LOT=20-76

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	19	241.631579	19.108493	365.134503	4591.000000	6572.421053	197.000000	285.000000	7.908
DEPTH	19	73.105263	8.245502	67.988304	1389.000000	1223.789474	51.000000	85.000000	11.279
WEIGHT	19	283.684211	68.208058	4652.339181	5390.000000	83742.105263	117.000000	434.000000	24.044
LOGWT	19	2.438652	0.121032	0.014649	46.334384	0.263677	2.068186	2.637490	4.963
COND	19	1.974961	0.213314	0.045503	37.524252	0.819052	1.530337	2.434499	10.801
RATIO	19	3.022695	0.227818	0.051901	57.431214	0.934216	2.588832	3.534483	7.537

LOT=20-77

LENGTH	23	235.652174	20.039980	401.600791	5420.000000	8835.217391	191.000000	271.000000	8.504
DEPTH	23	75.217391	8.580933	73.632411	1730.000000	1619.913043	50.000000	86.000000	11.408
WEIGHT	23	285.869565	72.770064	5295.482213	6575.000000	116500.608696	100.000000	438.000000	25.456
LOGWT	23	2.438876	0.135670	0.018406	56.094150	0.404940	2.000000	2.641474	5.563
COND	23	2.139331	0.270803	0.073334	49.204611	1.613357	1.435159	2.687500	12.658
RATIO	23	3.190523	0.258760	0.066957	73.382039	1.473044	2.617801	3.700000	8.110

LOT=21-78

LENGTH	24	237.083333	24.090259	580.340580	5690.000000	13347.833333	175.000000	267.000000	10.161
DEPTH	24	68.125000	9.768238	95.418478	1635.000000	2194.625000	48.000000	80.000000	14.339
WEIGHT	24	243.416667	73.282608	5370.340580	5842.000000	123517.833333	86.000000	365.000000	30.106
LOGWT	24	2.361568	0.162171	0.026299	56.677623	0.604885	1.934498	2.562293	6.867
COND	24	1.761416	0.170563	0.029092	42.273989	0.669111	1.502352	2.122466	9.683
RATIO	24	2.864891	0.210552	0.044332	68.757377	1.019636	2.388060	3.305785	7.349

LOT=21-79

LENGTH	23	249.652174	17.266912	298.146245	5742.000000	6559.217391	215.000000	282.000000	6.916
DEPTH	23	75.217391	6.908207	47.723320	1730.000000	1049.913043	62.000000	86.000000	9.184
WEIGHT	23	294.652174	60.212207	3625.509881	6777.000000	79761.217391	193.000000	458.000000	20.435
LOGWT	23	2.460686	0.088817	0.007889	56.595783	0.173548	2.285557	2.660865	3.609
COND	23	1.876306	0.161635	0.026126	43.155038	0.574772	1.548146	2.188221	8.615
RATIO	23	3.011240	0.150514	0.022654	69.258521	0.498397	2.754717	3.277311	4.998

LOT=21-80

LENGTH	29	233.379310	22.075218	487.315271	6768.000000	13644.827586	181.000000	277.000000	9.459
DEPTH	29	68.724138	8.514259	72.492611	1993.000000	2029.793103	49.000000	80.000000	12.389
WEIGHT	29	232.275862	63.081521	3979.278325	6736.000000	111419.793103	87.000000	356.000000	27.158
LOGWT	29	2.345625	0.146583	0.021486	68.023133	0.601622	1.939519	2.551450	6.249
COND	29	1.774330	0.153705	0.023625	51.455570	0.661510	1.467180	2.041789	8.663
RATIO	29	2.940347	0.189941	0.036078	85.270073	1.010177	2.512077	3.292181	6.460

LOT=21-81

LENGTH	7	244.000000	18.788294	353.000000	1708.000000	2118.000000	217.000000	272.000000	7.700
DEPTH	7	71.714286	8.260635	68.238095	502.000000	409.428571	57.000000	84.000000	11.519
WEIGHT	7	266.285714	62.996599	3968.571429	1864.000000	23811.428571	172.000000	355.000000	23.658
LOGWT	7	2.414232	0.108106	0.011687	16.899625	0.070121	2.235528	2.550228	4.478
COND	7	1.808350	0.180290	0.032505	12.658452	0.195028	1.530328	2.064920	9.970
RATIO	7	2.936182	0.215275	0.046343	20.553271	0.278060	2.544643	3.225806	7.332

LAKE 971
LOT=22-83

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	23	236.304348	15.783866	249.130435	5435.000000	5480.869565	197.000000	274.000000	6.679
DEPTH	23	71.434783	6.043976	36.529644	1643.000000	803.652174	60.000000	85.000000	8.461
WEIGHT	23	259.217391	48.353769	2338.086957	5962.000000	51437.913043	180.000000	381.000000	18.654
LOGWT	23	2.406465	0.081046	0.006568	55.348704	0.144505	2.255273	2.580925	3.368
COND	23	1.951166	0.163311	0.026671	44.876829	0.586754	1.684129	2.380525	8.370
RATIO	23	3.025491	0.201053	0.040422	69.586294	0.889294	2.730924	3.553299	6.645

LOT=22-84

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	31	220.225806	23.790348	565.980645	6827.000000	16979.419355	177.000000	288.000000	10.803
DEPTH	31	68.129032	7.032031	49.449.02	2112.000000	1483.483871	49.000000	83.000000	10.322
WEIGHT	31	226.451613	56.055829	3142.255914	7020.000000	94267.677419	135.000000	411.000000	24.754
LOGWT	31	2.342739	0.104368	0.010893	72.624914	0.326779	2.130334	2.613842	4.455
COND	31	2.123962	0.365255	0.133411	65.842808	4.002341	1.567012	3.099914	17.197
RATIO	31	3.108184	0.300968	0.090582	96.353706	2.717458	2.390244	3.857868	9.683

LOT=23-85

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	39	234.743590	19.622380	385.037787	9155.000000	14631.435897	182.000000	268.000000	8.359
DEPTH	39	70.153846	7.216715	52.080972	2736.000000	1979.076923	49.000000	83.000000	10.287
WEIGHT	39	254.769231	58.382794	3408.550607	9936.000000	129524.923077	97.000000	355.000000	22.916
LOGWT	39	2.392586	0.116929	0.013672	93.310868	0.519553	1.986772	2.550228	4.887
COND	39	1.941571	0.218949	0.047939	75.721252	1.821673	1.373034	2.620593	11.277
RATIO	39	2.990387	0.221974	0.049273	116.625103	1.872359	2.622951	3.465347	7.423

LOT=23-86

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	15	223.200000	20.636999	425.885714	3348.000000	5962.400000	183.000000	257.000000	9.246
DEPTH	15	65.333333	8.582929	73.666667	980.000000	1031.333333	50.000000	76.000000	13.137
WEIGHT	15	214.066667	60.802334	3696.923810	3211.000000	51756.933333	99.000000	303.000000	28.403
LOGWT	15	2.310699	0.143261	0.020524	34.660482	0.287333	1.995635	2.481443	6.200
COND	15	1.871337	0.195217	0.038110	28.070061	0.533536	1.598863	2.203580	10.432
RATIO	15	2.919184	0.180360	0.032530	43.787767	0.455416	2.575758	3.179916	6.178

LOT=23-87

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	23	207.043478	23.848915	568.770751	4762.000000	12512.956522	138.000000	244.000000	11.519
DEPTH	23	58.782609	8.913506	79.450593	1352.000000	1747.913043	34.000000	69.000000	15.164
WEIGHT	23	171.086957	52.729941	2780.446640	3935.000000	61169.826087	43.000000	258.000000	30.821
LOGWT	23	2.204309	0.181250	0.032851	50.699113	0.722732	1.633468	2.411620	8.223
COND	23	1.853045	0.203469	0.041400	42.620044	0.910796	1.557896	2.380525	10.980
RATIO	23	2.830172	0.210121	0.044151	65.093959	0.971321	2.463768	3.165138	7.424

LOT=24-88

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	16	228.687500	19.516553	380.895833	3659.000000	5713.437500	193.000000	255.000000	8.534
DEPTH	16	63.875000	7.710383	59.450000	1022.000000	891.750000	50.000000	75.000000	12.071
WEIGHT	16	205.937500	57.825564	3343.795833	3295.000000	50156.937500	113.000000	276.000000	28.079
LOGWT	16	2.295348	0.135057	0.018240	36.725570	0.273606	2.053078	2.440909	5.884
COND	16	1.682492	0.202169	0.040872	26.919867	0.613086	1.018976	1.880864	12.016
RATIO	16	2.789848	0.195140	0.038080	44.637565	0.571194	2.242152	3.050847	6.995

LAKE 971
LOT=24-89

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	45	226.066667	20.574035	423.290909	10173.000000	18624.800000	160.000000	258.000000	9.101
DEPTH	45	65.333333	6.815757	46.454545	2940.000000	2044.000000	45.000000	78.000000	10.432
WEIGHT	45	214.355556	60.346784	3641.734343	9646.000000	160236.311111	71.000000	339.000000	28.153
LOGWT	45	2.312305	0.134812	0.018174	104.053704	0.799673	1.851258	2.530200	5.830
COND	45	1.804532	0.133203	0.017743	81.203952	0.780691	1.489744	2.060619	7.382
RATIO	45	2.889271	0.129694	0.016820	130.017196	0.740100	2.629310	3.203463	4.489

LOT=24-90

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	32	242.937500	16.218145	263.028226	7774.000000	8153.875000	214.000000	281.000000	6.676
DEPTH	32	69.218750	5.700789	32.498992	2215.000000	1007.468750	53.000000	79.000000	8.236
WEIGHT	32	257.531250	56.035694	3139.998992	8241.000000	97339.968750	149.000000	396.000000	21.759
LOGWT	32	2.400587	0.097013	0.009412	76.818791	0.291757	2.173186	2.597695	4.041
COND	32	1.770600	0.133856	0.017917	56.659202	0.555439	1.503636	2.021694	7.560
RATIO	32	2.849826	0.157757	0.024887	91.194435	0.771502	2.476636	3.160000	5.536

LOT=24-91

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	30	235.833333	17.618727	310.419540	7075.000000	9002.166667	183.000000	275.000000	7.471
DEPTH	30	69.466667	6.240763	38.947126	2084.000000	1129.466667	50.000000	84.000000	8.984
WEIGHT	30	239.833333	52.968490	2805.660920	7195.000000	81364.166667	104.000000	396.000000	22.086
LOGWT	30	2.368901	0.102925	0.010594	71.067038	0.307215	2.017033	2.597695	4.345
COND	30	1.800622	0.102698	0.010547	54.018655	0.305859	1.632596	2.018820	5.703
RATIO	30	2.944815	0.135210	0.018282	88.344458	0.530171	2.652174	3.148936	4.591

APPENDIX TABLE 5

Summary of the final lake 506 measurements arranged by full sib groups. The number preceding the dash refers to the paternal parent and that following refers to the maternal parent. (See Fig. 1, pg. 12.)

LENGTH	=	fork length (mm)
DEPTH	=	body depth (mm)
WEIGHT	=	round weight (gm)
LOGWT	=	$\log_{10}$ weight (gm)
COND	=	coefficient of condition
	=	$(\text{weight(gm)} \times 10^4)/(\text{fork length(mm)})^3$
RATIO	=	body depth(mm)/(fork length(mm)/10)
C.V. %	=	percent coefficient of variation

LAKE 506
LOT=01-01

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	11	204.909091	14.222901	202.290909	2254.000000	2022.909091	166.000000	225.000000	6.941
DEPTH	11	59.818182	3.868286	14.963636	658.000000	149.636364	53.000000	66.000000	6.467
WEIGHT	11	154.000000	26.630809	709.200000	1694.000000	7092.000000	93.000000	203.000000	17.293
LOGWT	11	2.180794	0.083338	0.006945	23.988738	0.069452	1.968483	2.307496	3.821
COND	11	1.783523	0.179995	0.032398	19.618757	0.323983	1.490120	2.033100	10.092
RATIO	11	2.925412	0.174655	0.030505	32.179529	0.305045	2.666667	3.192771	5.970

LOT=01-03

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	4	208.750000	8.421203	70.916667	835.000000	212.750000	197.000000	217.000000	4.034
DEPTH	4	58.750000	2.986079	8.916667	235.000000	26.750000	56.000000	63.000000	5.083
WEIGHT	4	157.750000	13.073510	170.916667	631.000000	512.750000	142.000000	172.000000	8.287
LOGWT	4	2.196838	0.036301	0.001318	8.787352	0.003953	2.152288	2.235528	1.652
COND	4	1.736338	0.126428	0.015984	6.945353	0.047952	1.604962	1.857333	7.281
RATIO	4	2.817356	0.171316	0.029349	11.269422	0.088048	2.666667	2.985782	6.081

LOT=01-04

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	5	202.000000	6.819091	46.500000	1010.000000	186.000000	196.000000	213.000000	3.376
DEPTH	5	56.000000	3.937004	15.500000	280.000000	62.000000	52.000000	62.000000	7.030
WEIGHT	5	134.800000	22.264321	495.700000	674.000000	1982.800000	115.000000	170.000000	16.517
LOGWT	5	2.125207	0.068826	0.004737	10.626035	0.018948	2.060698	2.230449	3.239
COND	5	1.625500	0.137184	0.018819	8.127500	0.075278	1.481502	1.759179	8.439
RATIO	5	2.770778	0.134955	0.018213	13.853892	0.072851	2.613065	2.910798	4.871

LOT=02-06

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	11	203.454545	18.986119	360.472727	2238.000000	3604.727273	178.000000	232.000000	9.332
DEPTH	11	53.727273	6.435696	41.418182	591.000000	414.181818	45.000000	64.000000	11.978
WEIGHT	11	137.545455	42.216972	1782.272727	1513.000000	17822.727273	96.000000	219.000000	30.693
LOGWT	11	2.120738	0.128588	0.016535	23.328113	0.165349	1.982271	2.340444	6.063
COND	11	1.591898	0.138313	0.019130	17.510873	0.191304	1.403837	1.753800	8.689
RATIO	11	2.639611	0.181056	0.032781	29.035720	0.327811	2.331606	2.886598	6.859

LOT=02-07

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	11	207.727273	12.361965	152.818182	2285.000000	1528.181818	188.000000	223.000000	5.951
DEPTH	11	55.909091	5.146932	26.490909	615.000000	264.909091	48.000000	63.000000	9.206
WEIGHT	11	153.909091	31.551401	995.490909	1693.000000	9954.909091	105.000000	196.000000	20.500
LOGWT	11	2.178523	0.092648	0.008584	23.963753	0.085836	2.021189	2.292256	4.253
COND	11	1.703441	0.228320	0.052130	18.737855	0.521299	1.416072	2.305990	13.403
RATIO	11	2.692042	0.203882	0.041568	29.612464	0.415678	2.461538	3.181818	7.574

LOT=02-08

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	17	210.235294	19.762747	390.566176	3574.000000	6249.058824	173.000000	246.000000	9.400
DEPTH	17	56.941176	4.534184	20.558824	968.000000	328.941176	50.000000	64.000000	7.963
WEIGHT	17	159.235294	39.778338	1582.316176	2707.000000	25317.058824	93.000000	237.000000	24.981
LOGWT	17	2.188571	0.113590	0.012903	37.205710	0.206445	1.968483	2.374748	5.190
COND	17	1.687314	0.127480	0.016251	28.684340	0.260017	1.447844	1.861124	7.555
RATIO	17	2.717720	0.183888	0.033815	46.201239	0.541034	2.385321	3.076923	6.766

LAKE 506

LOT=03-09

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	3	229.333333	6.350853	40.333333	688.000000	80.666667	222.000000	233.000000	2.769
DEPTH	3	61.000000	4.358899	19.000000	183.000000	38.000000	58.000000	66.000000	7.146
WEIGHT	3	188.000000	15.394804	237.000000	564.000000	474.000000	171.000000	201.000000	8.189
LOGWT	3	2.273164	0.036181	0.001309	6.819493	0.002618	2.232996	2.303196	1.592
COND	3	1.556601	0.035994	0.001296	4.669804	0.002591	1.517866	1.589016	2.312
RATIO	3	2.659140	0.155525	0.024188	7.977419	0.048376	2.532189	2.832618	5.849

LOT=03-10

LENGTH	9	214.777778	19.415057	376.944444	1933.000000	3015.555556	170.000000	234.000000	9.040
DEPTH	9	56.111111	5.158596	26.611111	505.000000	212.888889	46.000000	63.000000	9.194
WEIGHT	9	160.333333	37.020265	1370.500000	1443.000000	10964.000000	90.000000	216.000000	23.090
LOGWT	9	2.193268	0.111428	0.012416	19.739411	0.099330	1.954243	2.334454	5.080
COND	9	1.597698	0.116650	0.013607	14.379280	0.108858	1.468394	1.831875	7.301
RATIO	9	2.614487	0.104843	0.010992	23.530382	0.087937	2.467532	2.769953	4.010

LOT=03-11

LENGTH	8	224.625000	10.013384	100.267857	1797.000000	701.875000	215.000000	238.000000	4.458
DEPTH	8	61.000000	2.449490	6.000000	488.000000	42.000000	58.000000	66.000000	4.016
WEIGHT	8	186.375000	24.933841	621.696429	1491.000000	4351.875000	160.000000	233.000000	13.378
LOGWT	8	2.267154	0.055957	0.003131	18.137235	0.021918	2.204120	2.367356	2.468
COND	8	1.637519	0.063395	0.004019	13.100153	0.028133	1.544401	1.728324	3.871
RATIO	8	2.716659	0.058715	0.003447	21.733275	0.024132	2.627119	2.777778	2.161

LOT=04-14

LENGTH	8	203.750000	49.936388	2493.642857	1630.000000	17455.500000	118.000000	244.000000	24.509
DEPTH	8	64.875000	3.136764	9.839286	519.000000	68.875000	59.000000	70.000000	4.835
WEIGHT	8	194.750000	19.499084	380.214286	1558.000000	2661.500000	176.000000	226.000000	10.012
LOGWT	8	2.287641	0.042308	0.001790	18.301127	0.012530	2.245513	2.354108	1.849
COND	8	3.629617	3.749044	14.055330	29.036939	98.387311	1.441480	10.711903	103.290
RATIO	8	3.429944	1.159253	1.343867	27.439553	9.407071	2.543103	5.508475	33.798

LOT=05-18

LENGTH	9	222.222222	15.014808	225.444444	2000.000000	1803.555556	203.000000	242.000000	6.757
DEPTH	9	60.666667	6.708204	45.000000	546.000000	360.000000	55.000000	73.000000	11.057
WEIGHT	9	189.555556	37.195803	1383.527778	1706.000000	11068.222222	150.000000	244.000000	19.623
LOGWT	9	2.270482	0.083708	0.007007	20.434339	0.056057	2.176091	2.387390	3.687
COND	9	1.723178	0.233859	0.054690	15.508600	0.437522	1.352623	2.175621	13.571
RATIO	9	2.728994	0.213068	0.045398	24.560949	0.363183	2.424242	3.016529	7.808

LOT=06-22

LENGTH	4	218.500000	20.436895	417.666667	874.000000	1253.000000	196.000000	243.000000	9.353
DEPTH	4	57.750000	5.678908	32.250000	231.000000	96.750000	52.000000	64.000000	9.834
WEIGHT	4	178.250000	60.312381	3637.583333	713.000000	10912.750000	120.000000	247.000000	33.836
LOGWT	4	2.231909	0.149456	0.022337	8.927636	0.067011	2.079181	2.392697	6.696
COND	4	1.656018	0.144292	0.020820	6.624070	0.062461	1.489704	1.819257	8.713
RATIO	4	2.646322	0.173028	0.029939	10.585287	0.089816	2.488038	2.831858	6.538

LAKE 506

LOT=06-23

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	4	217.000000	11.015141	121.333333	868.000000	364.000000	206.000000	230.000000	5.076
DEPTH	4	59.750000	4.573474	20.916667	239.000000	62.750000	54.000000	65.000000	7.654
WEIGHT	4	165.500000	30.816662	949.666667	662.000000	2849.000000	139.000000	200.000000	18.620
LOGWT	4	2.213156	0.080756	0.006521	8.852624	0.019564	2.143015	2.301030	3.649
COND	4	1.622366	0.285236	0.081360	6.489463	0.244079	1.279585	1.976029	17.581
RATIO	4	2.752466	0.135144	0.018264	11.009866	0.054792	2.621359	2.904762	4.910

LOT=07-25

LENGTH	7	217.428571	23.642174	558.952381	1522.000000	3353.714286	173.000000	245.000000	10.874
DEPTH	7	62.000000	5.099020	26.000000	434.000000	156.000000	55.000000	68.000000	8.224
WEIGHT	7	184.285714	51.609800	2663.571429	1290.000000	15981.428571	103.000000	248.000000	28.005
LOGWT	7	2.249240	0.132336	0.017513	15.744679	0.105078	2.012837	2.394452	5.884
COND	7	1.762599	0.169172	0.028619	12.338192	0.171715	1.465064	1.989294	9.598
RATIO	7	2.863410	0.178810	0.031973	20.043872	0.191838	2.590909	3.179191	6.245

LOT=08-29

LENGTH	3	238.666667	22.052967	486.333333	716.000000	972.666667	220.000000	263.000000	9.240
DEPTH	3	65.666667	4.509250	20.333333	197.000000	40.666667	61.000000	70.000000	6.867
WEIGHT	3	228.333333	40.611985	1649.333333	685.000000	3298.666667	201.000000	275.000000	17.786
LOGWT	3	2.354225	0.074191	0.005504	7.062675	0.011009	2.303196	2.439333	3.151
COND	3	1.683879	0.189973	0.036090	5.051638	0.072180	1.511699	1.887678	11.282
RATIO	3	2.759874	0.209093	0.043720	8.279623	0.087440	2.618026	3.000000	7.576

LOT=08-30

LENGTH	6	211.500000	19.695177	387.900000	1269.000000	1939.500000	176.000000	234.000000	9.312
DEPTH	6	54.333333	7.890923	62.266667	326.000000	311.333333	41.000000	62.000000	14.523
WEIGHT	6	150.333333	45.627477	2081.866667	902.000000	10409.333333	80.000000	210.000000	30.351
LOGWT	6	2.157781	0.147699	0.021815	12.946685	0.109075	1.903090	2.322219	6.845
COND	6	1.540540	0.103937	0.010803	9.243239	0.054015	1.418470	1.690880	6.747
RATIO	6	2.558419	0.160566	0.025781	15.350513	0.128907	2.329545	2.702703	6.276

LOT=08-31

LENGTH	13	212.923077	15.391889	236.910256	2768.000000	2842.923077	190.000000	237.000000	7.229
DEPTH	13	58.769231	6.482719	42.025641	764.000000	504.307692	44.000000	67.000000	11.031
WEIGHT	13	167.538462	33.383168	1114.435897	2178.000000	13373.230769	94.000000	217.000000	19.926
LOGWT	13	2.215064	0.095859	0.009189	28.795827	0.110266	1.973128	2.336460	4.328
COND	13	1.729497	0.254308	0.064673	22.483462	0.776072	1.287427	2.177164	14.704
RATIO	13	2.761701	0.258645	0.066897	35.902109	0.802765	2.268041	3.030303	9.365

LOT=09-33

LENGTH	11	215.000000	26.802985	718.400000	2365.000000	7184.000000	188.000000	287.000000	12.467
DEPTH	11	59.272727	5.780846	33.418182	652.000000	334.181818	47.000000	70.000000	9.753
WEIGHT	11	165.454545	33.281718	1107.672727	1820.000000	11076.727273	116.000000	233.000000	20.115
LOGWT	11	2.210982	0.085193	0.007258	24.320800	0.072578	2.064458	2.367356	3.853
COND	11	1.753275	0.461884	0.213337	19.286022	2.133372	0.571068	2.287547	26.344
RATIO	11	2.782351	0.340556	0.115978	30.605862	1.159781	2.055749	3.244681	12.240

LAKE 506

LOT=09-34

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	7	216.142857	15.847487	251.142857	1513.000000	1506.857143	185.000000	232.000000	7.332
DEPTH	7	59.285714	6.047432	36.571429	415.000000	219.428571	48.000000	64.000000	10.200
WEIGHT	7	166.714286	34.213615	1170.571429	1167.000000	7023.428571	106.000000	206.000000	20.522
LOGWT	7	2.213032	0.098551	0.009712	15.491226	0.058274	2.025306	2.313867	4.453
COND	7	1.632916	0.114632	0.013140	11.430415	0.078842	1.399583	1.747514	7.020
RATIO	7	2.740568	0.162441	0.026387	19.183973	0.158323	2.477064	2.946860	5.927

LOT=10-37

LENGTH	5	224.200000	18.525658	343.200000	1121.000000	1372.800000	208.000000	254.000000	8.263
DEPTH	5	62.400000	5.941380	35.300000	312.000000	141.200000	57.000000	72.000000	9.521
WEIGHT	5	198.000000	58.978810	3478.500000	990.000000	13914.000000	160.000000	300.000000	29.787
LOGWT	5	2.283596	0.114173	0.013035	11.417981	0.052142	2.204120	2.477121	5.000
COND	5	1.721840	0.123625	0.015283	8.609198	0.061132	1.609921	1.878005	7.180
RATIO	5	2.784074	0.151888	0.023070	13.920370	0.092280	2.663551	3.028846	5.456

LOT=10-38

LENGTH	10	208.800000	15.083471	227.511111	2088.000000	2047.600000	186.000000	232.000000	7.224
DEPTH	10	57.800000	6.142746	37.733333	578.000000	339.600000	50.000000	68.000000	10.628
WEIGHT	10	162.800000	36.331193	1319.955556	1628.000000	11879.600000	123.000000	234.000000	22.316
LOGWT	10	2.202690	0.091238	0.008324	22.026897	0.074919	2.089905	2.369216	4.142
COND	10	1.771088	0.162756	0.026489	17.710877	0.238405	1.534715	2.066868	9.190
RATIO	10	2.766934	0.190052	0.036120	27.669336	0.325077	2.463054	3.022222	6.869

LOT=10-39

LENGTH	7	215.000000	9.469248	89.666667	1505.000000	538.000000	200.000000	229.000000	4.404
DEPTH	7	60.428571	2.149197	4.619048	423.000000	27.714286	57.000000	64.000000	3.557
WEIGHT	7	178.571429	12.218253	149.285714	1250.000000	895.714286	163.000000	198.000000	6.842
LOGWT	7	2.250943	0.029662	0.000880	15.756600	0.005279	2.212188	2.296665	1.318
COND	7	1.808417	0.213282	0.045489	12.658918	0.272935	1.548840	2.062500	11.794
RATIO	7	2.815918	0.172152	0.029636	19.711428	0.177817	2.651163	3.050000	6.114

LOT=11-41

LENGTH	11	215.636364	11.164880	124.654545	2372.000000	1246.545455	201.000000	240.000000	5.178
DEPTH	11	59.909091	3.961175	15.690909	659.000000	156.909091	55.000000	68.000000	6.612
WEIGHT	11	172.363636	30.910428	955.454545	1896.000000	9554.545455	133.000000	246.000000	17.933
LOGWT	11	2.230583	0.073562	0.005411	24.536411	0.054114	2.123852	2.390935	3.298
COND	11	1.704100	0.088080	0.007758	18.745098	0.077580	1.580247	1.862660	5.169
RATIO	11	2.778165	0.109391	0.011966	30.559820	0.119663	2.577778	2.863850	3.938

LOT=11-43

LENGTH	3	215.333333	8.962886	80.333333	646.000000	160.666667	205.000000	221.000000	4.162
DEPTH	3	61.000000	3.605551	13.000000	183.000000	26.000000	58.000000	65.000000	5.911
WEIGHT	3	165.000000	15.394804	237.000000	495.000000	474.000000	148.000000	178.000000	9.330
LOGWT	3	2.216189	0.041340	0.001709	6.648568	0.003418	2.170262	2.250420	1.865
COND	3	1.651763	0.078031	0.006089	4.955289	0.012178	1.565705	1.717909	4.724
RATIO	3	2.835270	0.183114	0.033531	8.505809	0.067061	2.624434	2.954545	6.458

LAKE 506
LOT=14-53

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	6	220.500000	9.137833	83.500000	1323.000000	417.500000	207.000000	231.000000	4.144
DEPTH	6	57.666667	4.760952	22.666667	346.000000	113.333333	49.000000	62.000000	8.256
WEIGHT	6	170.666667	27.652607	764.666667	1024.000000	3823.333333	129.000000	198.000000	16.203
LOGWT	6	2.227044	0.074270	0.005516	13.362263	0.027580	2.110590	2.296665	3.335
COND	6	1.581728	0.142594	0.020333	9.490365	0.101665	1.454383	1.859504	9.015
RATIO	6	2.613086	0.152905	0.023380	15.678516	0.116899	2.367150	2.818182	5.851

LOT=14-54

LENGTH	4	215.250000	13.275918	176.250000	861.000000	528.750000	196.000000	225.000000	6.168
DEPTH	4	53.500000	5.916080	35.000000	214.000000	105.000000	45.000000	58.000000	11.058
WEIGHT	4	152.000000	31.885211	1016.666667	608.000000	3050.000000	106.000000	174.000000	20.977
LOGWT	4	2.173558	0.101500	0.010302	8.694233	0.030907	2.025306	2.240549	4.670
COND	4	1.503127	0.067992	0.004623	6.012509	0.013869	1.407789	1.569042	4.523
RATIO	4	2.480487	0.150990	0.022798	9.921949	0.068394	2.295918	2.626728	6.087

LOT=15-57

LENGTH	7	192.428571	14.432107	208.285714	1347.000000	1249.714286	176.000000	220.000000	7.500
DEPTH	7	53.142857	5.928141	35.142857	372.000000	210.857143	44.000000	63.000000	11.155
WEIGHT	7	129.142857	27.291199	744.809524	904.000000	4468.857143	95.000000	183.000000	21.133
LOGWT	7	2.103408	0.086615	0.007502	14.723859	0.045013	1.977724	2.262451	4.118
COND	7	1.800053	0.175721	0.030878	12.600373	0.185268	1.602094	2.164432	9.762
RATIO	7	2.757840	0.165381	0.027351	19.304882	0.164104	2.430939	2.897727	5.997

LOT=15-59

LENGTH	2	175.000000	49.497475	2450.000000	350.000000	2450.000000	140.000000	210.000000	28.284
DEPTH	2	53.000000	4.242641	18.000000	106.000000	18.000000	50.000000	56.000000	8.005
WEIGHT	2	107.500000	51.618795	2664.500000	215.000000	2664.500000	71.000000	144.000000	48.017
LOGWT	2	2.004810	0.217155	0.047156	4.009621	0.047156	1.851258	2.158362	10.832
COND	2	2.071186	0.730127	0.533086	4.142371	0.533086	1.554908	2.587464	35.252
RATIO	2	3.119048	0.639763	0.409297	6.238095	0.409297	2.666667	3.571429	20.511

LOT=16-62

LENGTH	6	222.333333	13.500617	182.266667	1334.000000	911.333333	201.000000	241.000000	6.072
DEPTH	6	59.000000	5.761944	33.200000	354.000000	166.000000	53.000000	69.000000	9.766
WEIGHT	6	177.166667	30.478954	928.966667	1063.000000	4644.833333	138.000000	230.000000	17.204
LOGWT	6	2.243225	0.072767	0.005295	13.459352	0.026475	2.139879	2.361728	3.244
COND	6	1.602549	0.089518	0.008013	9.615292	0.040067	1.498942	1.699382	5.586
RATIO	6	2.652869	0.181413	0.032911	15.917213	0.164554	2.387387	2.863071	6.838

LOT=16-63

LENGTH	3	207.666667	22.368132	500.333333	623.000000	1000.666667	182.000000	223.000000	10.771
DEPTH	3	56.666667	7.505553	56.333333	170.000000	112.666667	49.000000	64.000000	13.245
WEIGHT	3	156.666667	44.736264	2001.333333	470.000000	4002.666667	108.000000	196.000000	28.555
LOGWT	3	2.181929	0.133573	0.017842	6.545788	0.035684	2.033424	2.292256	6.122
COND	3	1.720393	0.102992	0.010607	5.161178	0.021215	1.602281	1.791470	5.987
RATIO	3	2.725647	0.130863	0.017125	8.176942	0.034250	2.614679	2.869955	4.801

LAKE 506

LOT=17-65

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	7	211.571429	7.590721	57.619048	1481.000000	345.714286	203.000000	223.000000	3.588
DEPTH	7	58.428571	3.408672	11.619048	409.000000	69.714286	52.000000	62.000000	5.834
WEIGHT	7	160.285714	21.171634	448.238095	1122.000000	2689.428571	123.000000	193.000000	13.209
LOGWT	7	2.201480	0.059673	0.003561	15.410360	0.021365	2.089905	2.285557	2.711
COND	7	1.686179	0.125909	0.015853	11.803254	0.095118	1.470337	1.815160	7.467
RATIO	7	2.761400	0.122866	0.015096	19.329797	0.090577	2.561576	2.870370	4.449

LOT=17-66

LENGTH	10	228.100000	14.775731	218.322222	2281.000000	1964.900000	196.000000	252.000000	6.478
DEPTH	10	62.100000	5.466057	29.877778	621.000000	268.900000	51.000000	70.000000	8.802
WEIGHT	10	196.300000	39.460388	1557.122222	1963.000000	14014.100000	112.000000	253.000000	20.102
LOGWT	10	2.283510	0.099970	0.009994	22.835097	0.089946	2.049218	2.403121	4.378
COND	10	1.630920	0.100809	0.010162	16.309198	0.091462	1.487475	1.784788	6.181
RATIO	10	2.723456	0.182748	0.033397	27.234556	0.300571	2.460317	3.004292	6.710

LOT=17-67

LENGTH	3	212.000000	8.544004	73.000000	636.000000	146.000000	203.000000	220.000000	4.030
DEPTH	3	57.666667	3.511885	12.333333	173.000000	24.666667	54.000000	61.000000	6.090
WEIGHT	3	163.000000	25.865034	669.000000	489.000000	1338.000000	135.000000	186.000000	15.868
LOGWT	3	2.208385	0.071116	0.005058	6.625156	0.010115	2.130334	2.269513	3.220
COND	3	1.699692	0.074514	0.005552	5.099075	0.011105	1.613785	1.746807	4.384
RATIO	3	2.720104	0.125052	0.015638	8.160312	0.031276	2.636364	2.863850	4.597

LOT=18-70

LENGTH	15	209.133333	15.900883	252.838095	3137.000000	3539.733333	176.000000	239.000000	7.603
DEPTH	15	59.866667	5.841559	34.123810	898.000000	477.733333	49.000000	71.000000	9.758
WEIGHT	15	162.200000	34.585711	1196.171429	2433.000000	16746.400000	96.000000	221.000000	21.323
LOGWT	15	2.200090	0.098573	0.009717	33.001350	0.136032	1.982271	2.344392	4.480
COND	15	1.751735	0.131022	0.017167	26.276022	0.240335	1.582657	2.079689	7.480
RATIO	15	2.861600	0.159894	0.025566	42.923997	0.357925	2.676056	3.160377	5.588

LOT=19-72

LENGTH	3	239.333333	25.423087	646.333333	718.000000	1292.666667	210.000000	255.000000	10.622
DEPTH	3	64.000000	8.717798	76.000000	192.000000	152.000000	54.000000	70.000000	13.622
WEIGHT	3	245.000000	82.528783	6811.000000	735.000000	13622.000000	150.000000	299.000000	33.685
LOGWT	3	2.369376	0.167668	0.028112	7.108128	0.056225	2.176091	2.475671	7.076
COND	3	1.730285	0.113416	0.012863	5.190854	0.025727	1.619695	1.846331	6.555
RATIO	3	2.668298	0.097695	0.009544	8.004894	0.019089	2.571429	2.766798	3.661

LOT=19-74

LENGTH	2	179.000000	12.727922	162.000000	358.000000	162.000000	170.000000	188.000000	7.111
DEPTH	2	52.500000	2.121320	4.500000	105.000000	4.500000	51.000000	54.000000	4.041
WEIGHT	2	118.500000	12.020815	144.500000	237.000000	144.500000	110.000000	127.000000	10.144
LOGWT	2	2.072598	0.044131	0.001948	4.145196	0.001948	2.041393	2.103804	2.129
COND	2	2.120220	0.657268	0.432001	4.240440	0.432001	1.655462	2.584979	31.000
RATIO	2	2.944618	0.327889	0.107511	5.889237	0.107511	2.712766	3.176471	11.135

LAKE 506

LOT=20-76

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	7	210.428571	17.251639	297.619048	1473.000000	1785.714286	184.000000	234.000000	8.198
DEPTH	7	59.428571	8.618916	74.285714	416.000000	445.714286	44.000000	71.000000	14.503
WEIGHT	7	171.428571	50.315197	2531.619048	1200.000000	15189.714286	107.000000	248.000000	29.351
LOGWT	7	2.218383	0.125826	0.015832	15.528680	0.094994	2.029384	2.394452	5.672
COND	7	1.816849	0.344938	0.118982	12.717940	0.713893	1.421070	2.407896	18.986
RATIO	7	2.824462	0.351948	0.123868	19.771235	0.743206	2.244898	3.315217	12.461

LOT=20-77

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	3	203.333333	28.005952	784.333333	610.000000	1568.666667	171.000000	220.000000	13.773
DEPTH	3	57.000000	7.000000	49.000000	171.000000	98.000000	49.000000	62.000000	12.281
WEIGHT	3	153.666667	45.654500	2084.333333	461.000000	4168.666667	101.000000	182.000000	29.710
LOGWT	3	2.171604	0.144952	0.021011	6.514813	0.042022	2.004321	2.260071	6.675
COND	3	1.808118	0.185947	0.034576	5.424353	0.069153	1.671675	2.019915	10.284
RATIO	3	2.807940	0.071952	0.005177	8.423820	0.010354	2.727273	2.865497	2.562

LOT=21-78

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	2	194.000000	15.556349	242.000000	388.000000	242.000000	183.000000	205.000000	8.019
DEPTH	2	49.500000	2.121320	4.500000	99.000000	4.500000	48.000000	51.000000	4.285
WEIGHT	2	113.000000	32.526912	1058.000000	226.000000	1058.000000	90.000000	136.000000	28.785
LOGWT	2	2.043891	0.126782	0.016074	4.087781	0.016074	1.954243	2.133539	6.203
COND	2	1.523585	0.077829	0.006057	3.047171	0.006057	1.468552	1.578619	5.108
RATIO	2	2.555378	0.095563	0.009132	5.110756	0.009132	2.487805	2.622951	3.740

LOT=21-79

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	7	222.857143	12.226046	149.476190	1560.000000	896.857143	202.000000	236.000000	5.486
DEPTH	7	61.714286	3.093773	9.571429	432.000000	57.428571	56.000000	65.000000	5.013
WEIGHT	7	179.428571	27.110005	734.952381	1256.000000	4409.714286	140.000000	212.000000	15.109
LOGWT	7	2.249492	0.067361	0.004538	15.746447	0.027225	2.146128	2.326336	2.995
COND	7	1.612955	0.082340	0.006780	11.290688	0.040680	1.489802	1.719887	5.105
RATIO	7	2.771285	0.098239	0.009651	19.398993	0.057905	2.641509	2.970297	3.545

LOT=21-80

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	14	211.785714	13.417432	180.027473	2965.000000	2340.357143	185.000000	240.000000	6.335
DEPTH	14	56.857143	5.517206	30.439560	796.000000	395.714286	48.000000	68.000000	9.704
WEIGHT	14	151.642857	33.956096	1153.016484	2123.000000	14989.214286	91.000000	226.000000	22.392
LOGWT	14	2.170451	0.099702	0.009941	30.386319	0.129227	1.959041	2.354108	4.594
COND	14	1.573547	0.145453	0.021156	22.029659	0.275034	1.417472	1.822443	9.244
RATIO	14	2.683586	0.180459	0.032566	37.570206	0.423352	2.428571	3.004926	6.725

LOT=21-81

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	4	229.250000	6.130525	37.583333	917.000000	112.750000	223.000000	235.000000	2.674
DEPTH	4	61.250000	4.991660	24.916667	245.000000	74.750000	56.000000	66.000000	8.150
WEIGHT	4	184.500000	16.921387	286.333333	738.000000	859.000000	166.000000	206.000000	9.171
LOGWT	4	2.264638	0.039578	0.001566	9.058553	0.004699	2.220108	2.313867	1.748
COND	4	1.530981	0.113593	0.012903	6.123924	0.038710	1.389224	1.650480	7.420
RATIO	4	2.671811	0.207300	0.042973	10.687243	0.128920	2.478632	2.888889	7.759

LAKE 506
LOT=22-82

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	3	217.333333	23.692474	561.333333	652.000000	1122.666667	190.000000	232.000000	10.901
DEPTH	3	65.000000	6.557439	43.000000	195.000000	86.000000	59.000000	72.000000	10.088
WEIGHT	3	192.666667	33.005050	1089.333333	578.000000	2178.666667	156.000000	220.000000	17.131
LOGWT	3	2.280300	0.077738	0.006043	6.840899	0.012086	2.193125	2.342423	3.409
COND	3	1.898807	0.329201	0.108373	5.696421	0.216746	1.660228	2.274384	17.337
RATIO	3	3.012362	0.409276	0.167507	9.037087	0.335013	2.565217	3.368421	13.587

LOT=22-83

LENGTH	13	219.692308	17.070367	291.397436	2856.000000	3496.769231	198.000000	250.000000	7.770
DEPTH	13	58.307692	5.452593	29.730769	758.000000	356.769231	49.000000	68.000000	9.351
WEIGHT	13	170.769231	33.690142	1135.025641	2220.000000	13620.307692	125.000000	231.000000	19.728
LOGWT	13	2.224605	0.085807	0.007363	28.919868	0.088355	2.096910	2.363612	3.857
COND	13	1.607562	0.197142	0.038865	20.898310	0.466382	1.088000	1.879899	12.263
RATIO	13	2.657946	0.210067	0.044128	34.553303	0.529537	2.413793	3.008850	7.903

LOT=22-84

LENGTH	7	213.428571	23.514940	552.952381	1494.000000	3317.714286	161.000000	226.000000	11.018
DEPTH	7	61.714286	6.156684	37.904762	432.000000	227.428571	51.000000	69.000000	9.976
WEIGHT	7	176.857143	36.916250	1362.809524	1238.000000	8176.857143	97.000000	201.000000	20.873
LOGWT	7	2.236700	0.113323	0.012842	15.656900	0.077053	1.986772	2.303196	5.067
COND	7	1.817406	0.229870	0.052840	12.721839	0.317042	1.628668	2.324310	12.648
RATIO	7	2.902371	0.203806	0.041537	20.316596	0.249221	2.566372	3.167702	7.022

LOT=23-85

LENGTH	9	207.000000	9.578622	91.750000	1863.000000	734.000000	194.000000	222.000000	4.627
DEPTH	9	58.444444	6.247222	39.027778	526.000000	312.222222	49.000000	66.000000	10.689
WEIGHT	9	158.444444	30.451236	927.277778	1426.000000	7418.222222	120.000000	204.000000	19.219
LOGWT	9	2.192631	0.084512	0.007142	19.733679	0.057138	2.079181	2.309630	3.854
COND	9	1.765441	0.120575	0.014538	15.888973	0.116308	1.623211	1.950451	6.830
RATIO	9	2.817363	0.192242	0.036957	25.356266	0.295657	2.474747	3.027523	6.823

LOT=23-86

LENGTH	5	200.800000	12.676750	160.700000	1004.000000	642.800000	189.000000	220.000000	6.313
DEPTH	5	58.400000	3.507136	12.300000	292.000000	49.200000	53.000000	62.000000	6.005
WEIGHT	5	149.000000	19.748418	390.000000	745.000000	1560.000000	130.000000	182.000000	13.254
LOGWT	5	2.170329	0.054806	0.003004	10.851644	0.012015	2.113943	2.260071	2.525
COND	5	1.851136	0.253646	0.064336	9.255678	0.257345	1.508974	2.128590	13.702
RATIO	5	2.920191	0.291772	0.085131	14.600957	0.340522	2.585366	3.280423	9.992

LOT=23-87

LENGTH	4	186.000000	18.129166	328.666667	744.000000	986.000000	165.000000	208.000000	9.747
DEPTH	4	50.750000	5.909033	34.916667	203.000000	104.750000	45.000000	59.000000	11.643
WEIGHT	4	110.750000	36.926729	1363.583333	443.000000	4090.750000	90.000000	166.000000	33.342
LOGWT	4	2.028916	0.128048	0.016396	8.115663	0.049189	1.954243	2.220108	6.311
COND	4	1.696571	0.280679	0.078780	6.786282	0.236341	1.377752	2.003506	16.544
RATIO	4	2.731009	0.211573	0.044763	10.924036	0.134290	2.500000	2.969697	7.747

LAKE 506
LOT=24-89

VARIABLE	N	MEAN	STANDARD DEV	VARIANCE	SUM	CORRECTED SS	LOW	HIGH	C.V. %
LENGTH	10	201.500000	18.343936	336.500000	2015.000000	3028.500000	174.000000	233.000000	9.104
DEPTH	10	54.800000	5.593647	31.288889	548.000000	281.600000	44.000000	64.000000	10.207
WEIGHT	10	139.100000	39.255431	1540.988889	1391.000000	13868.900000	84.000000	226.000000	28.221
LOGWT	10	2.128910	0.116563	0.013587	21.289104	0.122283	1.924279	2.354108	5.475
COND	10	1.667528	0.127304	0.016206	16.675276	0.145857	1.390018	1.835086	7.634
RATIO	10	2.721026	0.166127	0.027598	27.210264	0.248385	2.465753	2.994652	6.105

LOT=24-90

LENGTH	6	209.166667	11.923366	142.166667	1255.000000	710.833333	191.000000	223.000000	5.700
DEPTH	6	59.333333	3.265986	10.666667	356.000000	53.333333	55.000000	63.000000	5.504
WEIGHT	6	153.833333	20.341255	413.766667	923.000000	2068.833333	121.000000	178.000000	13.223
LOGWT	6	2.183732	0.059572	0.003549	13.102392	0.017744	2.082785	2.250420	2.728
COND	6	1.676176	0.066059	0.004364	10.057054	0.021819	1.581201	1.736542	3.941
RATIO	6	2.837268	0.047128	0.002221	17.023606	0.011105	2.766990	2.898551	1.661

LOT=24-91

LENGTH	2	200.500000	12.020815	144.500000	401.000000	144.500000	192.000000	209.000000	5.995
DEPTH	2	56.500000	0.707107	0.500000	113.000000	0.500000	56.000000	57.000000	1.252
WEIGHT	2	129.500000	16.263456	264.500000	259.000000	264.500000	118.000000	141.000000	12.559
LOGWT	2	2.110551	0.054686	0.002991	4.221101	0.002991	2.071882	2.149219	2.591
COND	2	1.605818	0.086756	0.007527	3.211637	0.007527	1.544473	1.667164	5.403
RATIO	2	2.824088	0.204583	0.041854	5.648176	0.041854	2.679426	2.968750	7.244